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AFTER spending several millions of dollars in constructing an immense intercepting sewer to carry the drainage of their city to the ocean, some of the people of Boston seem to be inclined to doubt the wisdom of the whole proceeding, and the *Transcript*, one of the most influential as well as conservative journals in the city, publishes an editorial calling attention to the rapid spread of the practice of sewage disposal by irrigation in Europe, and suggesting that it might be practicable and desirable to utilize the drainage matters discharged from the new sewer by irrigating some of the barren islands in the neighborhood of its outfall. It is not unlikely that something of the kind may be necessary in future, to judge from experiments made a few years ago, which showed that chips of wood thrown into the harbor at the intended sewer outfall were in a great part carried back and deposited on the shore of an inlet which washes one of the most beautiful and popular suburbs, but for the present it may be regarded as certain that no application of the modern system will be attempted in Boston, or indeed in any of our large seaboard cities.

THE fact seems to be that the trial of a system of sewage irrigation on so large a scale as would be necessary for disposing of the wastes of a great city appears to our engineers too formidable an undertaking to be attempted in the present state of knowledge on the subject; and while all understand the advantages which that method presents in theory, most of them probably know also something of the failures and disappointments which have befallen their brethren across the water, and prefer not to risk their own reputations in connection with what might prove a most disastrous enterprise. At the same time, the undoubted fact that Boston has just paid four or five million dollars for a tube through which to throw eight hundred thousand dollars worth of fertilizing matters every year into the sea certainly offers material for serious reflection; and although it is true that no method has yet been discovered for recovering the whole of the valuable ingredients in sewage so greatly diluted as that of our modern cities, this does not make it any less to be regretted that so vast a sum should be annually thrown away, without the slightest benefit to any person whatever, and perhaps with much future injury to the commerce and health of the city.

EVERY one can understand the reluctance of an engineer, entrusted with the expenditure of public money, to try experiments which, to judge from the results thus far obtained elsewhere, would be more than likely to involve extraordinary expenses for maintenance, and perhaps total failure, but it is on that very account all the more desirable that trials at a small scale, which will point out the way for more extensive operations, should be encouraged in every possible way. There would be no harm, for instance, but great benefit, in setting aside, in such towns as Boston, New York or Philadelphia, experimental tracts in the city parks, where the most efficient and least offensive methods of applying sewage as a fertilizing agent to land could be studied, and observations made to determine the kind of crops best suited for cultivation under such circumstances, with the details of their management. No one can read the accounts of the English and French sewage-farming without feeling the lack of scientific study of these points. In nearly all cases, the municipal engineers seem to have made the best contract they could for getting rid of the sewage, and then to have turned the flood of drainage over the tract specified in the contract, without troubling themselves further about what became of it, while the unfortunate lessees or managers of the sewage farm, overwhelmed every day with a foul inundation which must be disposed of in some way, seem also to have been compelled, for want of opportunity to try anything else, to limit their experiments to a small range of crops, not perhaps the most profitable in the end, but the most available for their immediate and pressing needs. In addition to these investigations, which, in view of the variations of climate and circumstances in different States, ought to be carried on simultaneously in all our large cities, a large amount of most valuable information might be gained by encouraging private individuals to make experiments on their own grounds in growing crops by sewage fertilization on a very limited scale. Every householder who owns a cesspool and a cheap pump, or even a bucket tied to a rope, has all the materials for making observations of the greatest value. The amount of cesspool or sewer liquid that a given plant will bear; the length of time that elapses before the smell of the sewage disappears in various soils; the depth to which the roots of different crops will penetrate in search of the fertilizing stream; the comparative effect in promoting the growth of certain crops of surface or sub-surface irrigation, or a combination of both, as well as the amount of sewage purified in each way; the best plan for subsoil drainage of irrigated land; the behavior of plants in winter in gardens irrigated above or below the surface, or both; the effect of the warm soakage about the roots in enabling plants to resist the winter's cold; the comparative utility, both in respect to the purification of the sewage and the growth of the plants, of intermittent or continuous irrigation, both above and below the surface; together with the character of the peculiar insects, if any, which might be found to be attracted to the sewage-fed crops, would all form subjects of the greatest interest and importance, upon which the humblest might contribute valuable information, while every one, rich or poor, farmer, gardener or amateur, would have something new and interesting to tell. The horticultural and agricultural societies, or, still better, the town and village improvement societies now so common, might, with much advantage, offer premiums for the best specimens of sewage-manured gardens, as well as for accounts of careful experiments of the kind, and the public authority could second the good work by the regular distribution, to all who wished them, of printed slips containing reports from the experts employed in the official investigations. In this way, together with the appreciation of the loss which the community sustains in the waste of sewage manure, would come the practical knowledge and experience necessary for using it successfully, and, this once gained, the utilization of the liquid refuse of the largest cities would become a mere matter of detail.

A CORRESPONDENT of *La Semaine des Constructeurs* asks in that journal for advice in regard to certain troubles which have befallen him, these bearing, by the way, a strong resemblance to the afflictions which beset the path of architects in this country who seek employment in public work. *La Semaine's* correspondent, as it seems, was commissioned by the municipality of a certain town to prepare designs for a group of schools and a *mairie*. He made the drawings, but before the time came for carrying them into execution a political overturn occurred, the complexion of the majority in the municipal council was changed, and the task of carrying out the town buildings was entrusted to another architect. The one first employed then bethought himself of a duty too long neglected, and sent in his bill, only to have it rejected by the new council, and a trifling sum offered him as full compensation for his services. This proving unsatisfactory, and the new council being indisposed to do anything more, the claim was referred to the prefectoral council. Meanwhile the new architect went on with his work, and in due course the plans were

completed and thrown open for estimates. The deposed architect had then an opportunity to examine the design of his successor, and found it a reproduction of his own.

UNDER these circumstances the question occurred to him which, finding it insoluble by his own resources, he propounds to the editor of *La Semaine*, namely, whether the payment of his bill, or of any less sum, by the town authorities, would give them the right to have his design copied and carried into execution by another person. The response of the legal editor of the journal is worth noting. In his opinion, the municipal council was entitled, at its discretion, to procure sketches for its buildings from any architect it saw fit, without going farther with him; on the ground that a principal may terminate the service of his agent at pleasure; and in this case nothing more would be due than the usual one and one-half per cent on the proposed cost. In regard to the theft, as some would call it, of the first architect's plan, for the purpose of having it carried into effect by another, the editor believes that the council, whatever might be said of the honorable feeling displayed in such a proceeding, only acted within its legal rights, and the aggrieved correspondent, in order to recover any compensation for what was certainly discourteous treatment, must show that he had suffered real injury, or loss of reputation on account of it.

THE *Sanitary Engineer* quotes from the Fort Wayne *Journal of the Medical Sciences* some singular information in regard to ventilation, from which, among other things, we learn that "an open fire-flue is the most efficient outlet that can be devised," and that if an inlet is made for "pure cold air by an opening directed upward behind the stove, and above the heads of the occupants of the room," "all cold draughts will be avoided, the pure cold air will mingle immediately with the impure air near the ceiling, and the room will be equably and economically warmed and efficiently ventilated." "June air," the account goes on to say, "may be had in January, and the children will be as merry and rosy as the street children, who have nothing but oxygen to make them so." We are glad to think that the street children of Fort Wayne are so "merry and rosy" as to make them worthy of being mentioned as examples of the good effect of oxygen on the system, but we cannot agree with the opinion that the flue of an open fireplace is "the most efficient outlet for foul air that can be devised." On the contrary, so far as our experience goes, the ventilation afforded by an open fireplace without a fire in it is generally of very small value, and so far from such a flue acting to draw down the impure air from the top of the room, it is usually found that if any upward current at all exists in it, the air to supply it is drawn across the floor from the nearest door, leaving the great mass of the atmosphere in the apartment practically stagnant. The account given of the course of the fresh air currents in the room described as worthy of imitation seems to be also quite imaginary. Why "pure cold air" admitted behind a stove should rise immediately to the ceiling, instead of falling, like other cold air, is not very evident, and even if it should do so, it does not appear why the mingling of this "pure cold air" with "the impure air near the ceiling" should give rise to "June air," or should result in "equable and economical" warming of the room beneath. The fact is that the proper ventilation, even of a small room, is a matter for intelligent and careful study, not for cheap recipes and exhilarating allusions to "June air" and "merry and rosy children." No one has yet learned how to make the atmosphere of living rooms, however well provided with flues, entirely suitable for respiration, and no system of ventilation hitherto devised can take the place of open windows. Of course, when open windows are out of the question, artificial ventilation must be resorted to, but successful artificial ventilation does not consist in mixing "pure and impure air," or in "economical" devices for imposing upon the imagination.

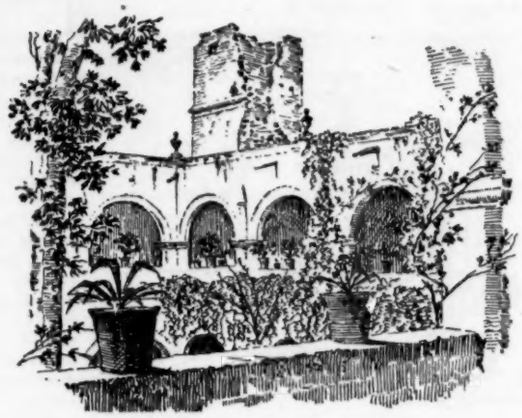
WHAT bright little paper called *Indoors and Outdoors* tells a remarkable story in illustration of the fastidiousness in sanitary matters which prevails in Texas. It seems that a public well in Brownsville, the court-house town of Cameron County, in that State, was recently cleaned out, and in it were found the remains of what had once been a human being. Some one, probably a new-comer in the Southwest, took an interest in the circumstance, and ascertained on inquiry that a prisoner in the neighboring jail had disappeared several years before, leaving no trace to indicate the fate which had befallen him. Shortly after the loss of this gentleman to society it was remembered that the water of the well in question acquired a singular taste, and for some time afterward hairs and bits of flesh were drawn up in the bucket, but the people who used the well supposed that these were merely fragments of drowned cats or rats, and continued to drink the water as usual. By and by the bad taste disappeared, and if some innovator had not rudely disturbed the rest of the deceased individual in the well, he might have been entirely consumed by his brethren above ground without their knowledge.

THE *Scientific American* quotes from the *Electrician* an account of a new claim put forward to secure the honor of inventing the electric telephone to a certain Charles Bourseul, a soldier in the French army in Algeria, who in 1854, twenty-two years before the issue of the famous patent to Alexander Graham Bell, communicated to the French Academy a paper describing the Bell telephone precisely as it now exists. Bourseul seems never to have carried his idea into execution, and it is quite probable that as the circumstances of his profession and situation would naturally preclude him from making experiments for himself, he made the suggestion in as public a manner as he could, hoping that others, with better means, might be disposed to test his invention practically. In his communication, which seems to have had a wide currency at that time, Bourseul explained that "if a metal disk could be invented which would be flexible enough to reproduce all the sound waves transmitted to it by the air, and if that disk could be connected to an electric circuit in such a way that in conformity with the vibration of the air it would start and interrupt the current, then it would also be possible to cause a similarly constructed metal disk, in electrical connection with the first, to repeat all the movements of it, and the effect would be the same as if one had spoken directly against this second disk; that is to say, the ear would be affected in the same manner as if it heard the speech directly through the first metal diaphragm." It would be difficult to describe the Bell telephone in terms more accurate than this, and if the story of the *Electrician* is correct, it certainly seems that, although the practical devices for carrying Bourseul's ideas into effect are undoubtedly due to Professor Bell's ingenuity, the decision made in his favor in a certain court, by which he was declared to be the original inventor of the electrical transmission of speech, ought to be materially modified.

IT seems from a letter in *Le Technologiste* that the work upon the canal across the Isthmus of Corinth is progressing rapidly. Two enormous dredges have been for some time in operation at the ends of the line, and others are in process of construction, which will be at work within a few months. Breakwaters have also been built for improving the harbors of Corinth and Isthmia, which form the terminations of the canal, and houses have been erected for the occupancy of the workmen, as well as workshops, in which will be constructed the rough boats for transporting earth and dredged material. So far, only about a mile and a half of the actual canal has been partially excavated, but more than fifteen hundred men are now busily employed, and the number increases every day, so that as soon as the terminal works are completed the excavation will be vigorously pushed.

THE *Manufacturer and Builder* gives a simple process for preparing the luminous paint now coming slowly into use. The ingredients of the mixture are simply sulphur and lime, the latter being obtained from oyster shells, which are to be washed with warm water, and calcined for half an hour, then allowed to cool, pulverized, and the white portions separated from the gray refuse. The white lime is then to be put in a crucible, in alternate layers with flour of sulphur, and the cover luted on with a mixture of clay and sand, moistened with beer. The crucible is exposed to a bright flame for an hour, and is then, after cooling, broken open, when the contents will be found of a mottled white and gray color. The gray portions are to be separated and thrown away, but the white part is to be finely ground and sifted through muslin, after which it may be mixed with varnish, oil or size, and used like ordinary paint. It is essential that objects painted with this substance, which are intended to be luminous at night, should be exposed to sunshine or bright light during the day. If so treated the paint will retain its qualities indefinitely.

STROLLS ABOUT MEXICO.



Cloisters and Ruined Tower, Coyoacan, Mexico.

IF one wishes to keep in good health in the City of Mexico he should, besides taking a daily constitutional in the Alemeda, or out on the Paseo, at least one day in seven breathe the fresh air of some of the foot-hill suburbs. He thus holds typhoid fever at bay, the spongy soil and defective drainage of the Aztec capital making that disease as common as at Munich, and but for the perfect climate and great altitude, Mexico would probably be one of the unhealthiest cities in the world. But those people who take plenty of pure oxygen may reckon themselves safe, for it is noticed that it is generally those who keep close to their houses who are the sufferers.

The other Sunday I joined some Mexican friends in an excursion to one of the minor suburbs, the village of Coyoacan, about half-a-mile from the battle-field of Churubusco, to the southward of the city. The street-cars of the Federal District Railway Company run to the suburbs in "trains," so-called, at intervals varying from fifteen to ninety minutes, according to the importance of the respective points. Several cars start at once for the same place, making a train of one or two first-class, and two or three second-class cars, the first being like our own street-cars in the American cities, and the second, distinguished by a dark and gloomy green hue, being generally noisy and provided with half-darkened windows, so that economically inclined respectable persons would hardly feel like patronizing them, although the rates are about half those charged for first-class passage. On Sundays the trains are larger, on account of the many excursionists and Sunday visitors in town and out. Once beyond the city limits the pair of mules attached to each car take a pace so lively as to give one a new idea of street-car speed, and, indeed, the running time in the city itself is much faster than in our American cities. The track itself is substantially built, with heavy rails of steam-railway pattern and bolted together in the same style, making a strikingly easy roadway. The cars not being heavy, however, the sleepers are laid pretty far apart. The causeway leads out through green, marshy pastures, partially flooded by the heavy rains of this season, until at last the ground gets higher and dryer and corn-fields line the way, the maize planted remarkably close and showing all stages of growth from the sprouting blades to fields nearly ready for harvest. At Churubusco station a branch railway leaves the Tlalpam line for the charming suburbs of San Angel, the Brookline of Mexico. The scarcity of vehicles in the country is shown by the line of this branch, which takes up the whole of the narrow way, leaving only a small foot-path by its side as it runs between the maguey hedges. The old church of Churubusco, around which the battle was fought with the victorious Americans in 1847, stands alone in the level fields not far away.

The parochial church of Coyoacan, with its interesting tower and the rambling structures attached, appeared most picturesquely at the end of our lane-like way, lined with orchards and market gardens. The quiet, grass-grown village plaza was as restful and shady as an old-fashioned New England village green. Beneath the tall ash-trees of the low-walled central enclosure a few perennially flowering geraniums and other shrubs bloomed modestly and cheerfully. On one side stood the church, on the other the public building of the village with the office of the justice of the peace, — whose office could hardly be an arduous one, judging by the aspect of the place, — side by side with the village school. The church was the attractive point of the place and, leaving our picnic-baskets at the house of a friend of one of our party, close by, we repaired thither. I thought, at first sight of the church, that from the extent of the attached structures it must have been an adjunct to a monastery or convent, and my inference proved correct, for I learned that it was formerly the home of a Dominican brotherhood. It was now nearly a ruin and only a small portion of it was in use.

The underlying Romanesque motive of the Jesuit baroque and rococo styles that prevails in substantially all ecclesiastical architecture in Mexico is often apparent in features of much symmetry, dignity and beauty, laden, as it too often is, with masses of meaningless frippery, though frequently an exuberance of ornamentation is so joined to fine proportion that it but gives a picturesque quaintness to the naïveté of its design. A new-comer is apt to be impressed with a monotony in the churches of Mexico, but although they mostly follow one general plan, an observing eye soon learns to detect marked differences. Though but a layman, a passionate love for the most popular of the formative arts makes for me the noting of these individual variations one of the greatest charms of my various excursions about this interesting country.

The Romanesqueness of this old church and cloister of Coyoacan is very apparent, both in the massive double tier of round arches of the cloister, and in the form of the church itself, which is a decided basilica. The church, as in many of the rural towns, faces a spacious, walled yard, entered through arched portals. We went into the building through the cloister-ways, and the enclosed garden had a beauty so quaint and by-gone-age-like that I desired to photograph it, and one of our party hastened to find the *padre* to get his permission. A fence of high slats shut the court off from the cloister-passages and a hedge of the tallest geraniums I had ever seen rose almost as high as the massive arches. A giant *fresno* or ash, rose in the centre of the enclosure, which contained a profusion of roses, forget-me-nots and other flowers blooming under a tropical luxuriance of plantains. Neatly kept paths coursed through this pretty epitome of perpetual June. The evident gem of the place in its keeper's heart was a dainty little stone pile about two feet high, with grottos, in one of which was a figure of a wild man and in another a representation of the modern legend of Our Lady of Lourdes, a tiny porcelain Virgin transfigured before a tiny porcelain shepherdess. The arched walls were whitewashed but time-stained, and thickets of vines clambered over them to the roof, one of them starry with red trumpet flowers among its glossy dark leaves. On the parapet of the second story, between every arch, were ranged large flower-pots filled with gorgeous blooming plants, highly-decorative, and along the parapet of the roof were ancient terra-cotta urns. The whole place seemed like a picture from one of William Morris's poems.

The *padre* came, (the village curate he was,) with an ascetic, but gentle and refined face, like a man accustomed to simple ways, and pure thoughts. His courtesy was exquisite: with the greatest of pleasure he would grant our request, but would we not first like to look at his chapel? And he led the way through a passage through the church, now bare, whitewashed and dilapidated, to the chapel which occupied the north transept, now about the only part of the church utilized, the main body evidently being used only on rare feast days. There was no dome over the union of the nave, transept and choir as in most Mexican churches, but this chapel had a smaller dome of its own; a rather unusual feature. The chapel was kept in perfect order, and it was evidently dear to its master's heart, for the dark eyes of the *señor cura* gleamed with pleasure when I said that I would photograph it, and he had the tall candles lit before the gilded altar with its garland of paper roses, and he sent out for some people, who, when they came, knelt at his bidding, while he and his sacristan knelt on the altar steps. The sky was overcast and the interior light was not strong. I used an instantaneous plate, but it needed considerable exposure in that light, and I strolled away for ten minutes through the church and passages, pausing here and there to note a bit of decoration which the whitewash-brush had spared. Around one low, round-arched door in an ante-room the stone carving, in rosettes and twisted ornamentation, was painted in brilliant colors, orange and red predominant, and on the landing of a stone stairway there was left a strip of the frieze ornamentation, a beautiful design in black-and-white tracery, with well-drawn outline figures, probably the work of some artist Dominican. The walls of the whole building must have been very beautiful in the old times, for they had all been decorated elaborately, the curate told us.

When I returned to the chapel the kneelers were as still as statues, and the excellent negative which the plate turned out to contain the next evening showed that they had not stirred a hair's breadth. But one of our friends rubbed his knees as he arose and remarked that it had been a long time.

The curate then showed us around the spacious structure. In one corner of the cloister-way a section of the ancient decoration was left, and very rich the effect of the whole passage must have been. The space was divided off into small squares, and each square was filled with little reliefs, carved in wood, representing saints, angels, and other sacred subjects, quaintly conceived, and each square different in design. The whole was profusely gilded and painted in brilliant colors. The work was over three hundred years old, so the curate assured us, and the whole cloister-way had been thus decorated. It was a pity that it was ever destroyed, I observed, and one of our party remarked that the *señor Americano* had a liking for these relics of the ancient time; "And I too," said the curate in a tone of gentle reverence, as he looked regretfully up at the bare, whitewashed ceiling.

The farther part of the building was in total ruin: the flat roofs had fallen in and the walls were tumbling. We went up a broad stone stairway and entered the cloister gallery of the second story, cheerful with its blooming plants, the massive stone arches embowered by clambering vines, and on the walls hung several large and old paintings. The curate's rooms adjoined the gallery and he invited us in to rest. The rooms were spacious and airy; barely furnished but exquisitely cleanly. There were several old paintings on the wall, correctly drawn but most of the commonplace character of the average

sacred composition. Whether of Spanish origin or of the old Mexican school it was impossible to tell, so closely does the latter follow the former. One painting, however, was an exception to the rest. It was a St. Hieronymus, and the enraptured countenance and inspired eyes betrayed the touch of a master. The curate said that it was believed to be a Murillo, and very likely it was, for there are a number of works by Murillo and the great Spanish masters in Mexico. It struck me, however, that the color was a little too positive and strong for Murillo.

We went to the roof, whence there was a charming look down into the cloister court, the luxuriant leafage clambering up the walls and over the parapet with its terra-cotta urns. There were also noble vistas across the fertile valley robed with its summer green and margined by some of the grandest mountains in the world.

As we came away the curate presented us with two bottles of *vino de Membrillo*, or quince wine, and gave us each souvenirs of his garden in the shape of lovely bouquets, arranged by Manuel, the sacristan, with the fine taste for flowers which distinguishes the Indians of the country. We paused to say farewell to the good father at a point in the gallery where there was a view of a ruined tower beyond, supported, as it were, by the line of gracefully strong cloister arches, with their cool, deep shadows, and framed in by the archway beneath which we stood.

It was then lunch time and we repaired to the house of our friend, who was a chicken fancier, and had in his parlor five lusty game-cocks tied by strings attached to one leg, along the wall beside nearly every chair. As the floor was of brick tile, their clutter mattered little. In the back yard was the cockpit. The table was spread in the passage-way in the centre of the house, and beside the fare we had brought from the city there were the national *tortillas* and *chile*, besides a most palatable soup and the *frijoles*, or beans, common to every Mexican table. To one satiated with the rather tough fresh French rolls of the city restaurants, the *tortillas*, made of corn-meal, were a welcome change, and with the peculiar fruit called *aguacate*, which is soft and butter-like, spread over one of the flat cakes and then folded into an omelette-like roll, it was really delicious. Many of the Mexican fruits have a most deceptive cooked flavor in their natural state. The *aguacate* seems like a cooked vegetable; the *mamey*, its substance of a dark terra-cotta red, tastes like ready-made pumpkin pie, and the *cherimoya*, or custard apple, is like a delicious ice-cream. Of the latter there is a saying:

"Hay dos cosas en la vida
Que se nunca olvida:
La felizidad y la cherimoya!"

(There are two things in life which one never forgets: happiness and the *cherimoya*.)

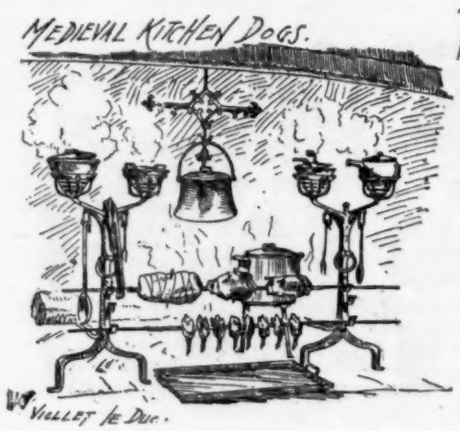
When we were about half-way through our meal the great door was thrown open and two riders appeared — an amiable-looking man and a very small boy mounted all alone on a very large horse. The boy, who was only three years old, seemed doubtful whether he should dismount, or ride in upon us, that being the way to the stable behind the house. The former were decided upon, the horses were tied to trees, and the newcomers joined us, for they were members of the family who had been off for a Sunday-morning ride.

After lunch we strolled through some of the market-gardens of the neighborhood, filled with thickets of fruit-trees, apples and pears, — the former of a miserable quality, like all the apples of Mexico, from lack of proper modern stock — while all around bloomed a wilderness of the loveliest roses, together with other garden flowers, dahlias being particularly common. In one garden a clear rill was flowing out of the pipe of an artesian well, about two feet above the ground, and then running away under the trees in a pretty brook. The proprietors of the gardens all seemed to be Indians, who had a well-to-do and respectable appearance.

As we rolled home over the smooth tramway the two great mountains that preside over the Valley of Mexico, — Popocatepetl and Ixtlaccihuatl, — which in the morning had been veiled with clouds, now lifted in the southeast their snow-crowned heads far up into the heavens.

Sylvester Baxter.

SMOKY CHIMNEYS.



As there can be very few of our readers who have not in one way or another been troubled by smoky chimneys, we give space this week to the setting forth some of the plainest and most sensible words of advice we have seen in regard to their cause, prevention, and cure. The author, Capt. James T. Johnston, R. E., has issued a small shilling pamphlet on the subject, which would discover a remedy in most cases of smoky chimneys for those who read and remember it.

Capt. Johnston believes we shall for a long time hold to our open fireplaces, and therefore limits his remarks to a consideration of those only. The subject is divided under several heads, which we print as below: —

1. Heat expands air or rarefies it.
2. Hot air is lighter or more buoyant than cold air.
3. Smoke is heavier than air until it becomes rarefied.
4. Dry air is heavier than moist air.

It would be quite beside the object of this little work to recommend any particular form or kind of grate, so we will premise that a suitable one has been selected from the number now everywhere obtainable, and whose name is legion, only recommending: —

(1) The plan of the hearth should not be rectangular, but the sides inclined to an angle at the back, as a grate of this form throws out much more heat into the room.

(2) The back and sides should be composed of fire-brick in place of metal, owing to its being a better radiator, as well as an inferior conductor of heat, and to the fact that all heating-apparatus made of cast-iron emit a large quantity of carbonic oxide (CO), which is seriously injurious to health.

Cause 1. A great deal, more than is generally supposed, depends upon the manner in which the grate is set. If it be set too far back into the wall, the greater portion of the heat evolved will escape up the chimney, instead of coming into the room to warm it. If, on the other hand, it be placed too far forward, the smoke, in place of ascending the flue, will find its way into the room. So here, as in most things in life, the happy medium must be hit off. For this no general rule can be laid down, as the number of sizes of grates now manufactured is infinite, and the thickness of the walls of our dwellings varies.

Cause 2. Again, if the arch over the fireplace be too high above the grate, the smoke will have time to cool to a certain extent before it enters the chimney proper, and will consequently descend into the room; for smoke, be it remembered, until it becomes rarefied, is heavier than air. The smoke whilst in this position, too, will be more influenced by the various currents of air that are always circulating around a well-ventilated apartment, and will be liable at any moment to be blown outwards into the room. The cures for this are either: —

(1) To raise the grate, which in some cases would increase the heat thrown out.

(2) To fill up a portion of the space by inserting a second arch under the existing one.

(3) To affix a blower, movable or not, as desired.

Some little care is required in applying any of these three remedies, the result of all of which is practically the same, viz., they compel the fresh cold air to pass through the fire instead of over it, thus warming it and making it more buoyant; and also they cause more oxygen to be supplied to the burning fuel, for, if not carefully adjusted, the fire will be converted into a roaring furnace, nearly all the heat generated by which will be sent up the chimney, at a great increase of the amount of fuel consumed. For an average-sized grate the fireplace opening should be square; for a smaller grate the opening should be higher than it is broad; and for a larger one broader than it is high.

Cause 3. I have met with a case in which everything was to all appearance perfectly satisfactory, but still the smoke could not be persuaded to take the course clearly marked out for it, but would persist in coming into the room in aggravating puffs. I was nearly giving its remedy up as hopeless, thinking, with Artemus Ward, that perhaps the fire only smoked out of "sheer cussedness," when I decided to make one more attempt, and to build up the cheeks so as to meet in a point at the middle of the back. This I did with entire success, and I can only explain the cause of the cure as follows: It is

a fundamental law in natural philosophy that the angle of incidence is equal to the angle of reflection. A direct draught towards a fireplace has a two-fold motion, viz., towards the back of the grate and upwards. Now, suppose a grain of the smoke to be carried by this intermittent two-fold force in the direction of the resultant, it will rebound at nearly the same angle and come into the room. In the altered form of grate it will glance off inwards, and by the time it has made its second impingement, it will have been carried up the chimney. I have since tried this on more than one grate with equal success.

One word as to the back of the fireplace — the portion between the actual cage in which the fuel is burning and the mouth of the flue. Should it be vertical or slightly receding? By all means the latter, as directing the impinging smoke upwards at a greater elevation. But better than either have I found the giving a slight belly to the part immediately above the live coal; the smoke appears to cling to this swelling, and in consequence to ascend closely against the wall.

Cause 4. The last ill-behaved chimney that I came across was one in which everything connected with the grate was satisfactory, the flue was lined with nice glazed earthenware piping of the correct size, and the chimney-top was all that could be desired; *but* the gathering wing had been badly designed with a too sudden gathering over to the flue, which construction did not allow of the smoke entering the flue sufficiently gradually, like wine decanted through a funnel. The effectual remedy adopted was reducing more gradually the size of the mouth of the smoke channel.

The three principal points to be considered with reference to the flue are its shape, size, and length.

First, as regards shape, a circular flue, though requiring more care in its original construction, is to be preferred to a rectangular one, because friction, which tends to retard the free escape of the smoke, is less in one of such form, and if such circular flue be lined with glazed earthenware pipes the construction is simplified, and the friction and deposition of soot are reduced to a minimum, for soot, like other things, will adhere to a surface in proportion to its roughness. A round orifice, too, is more easily cleaned than one which contains angles and corners for the accumulation of soot.

Cause 5. Now as to size, the flue must be proportioned to the fireplace, so as to carry off quickly and readily all the smoke generated by the combustion of the fuel. In one of too small sectional area the smoke will be unable, owing to friction against the sides, and to the particles getting in one another's way, to get away quickly enough, just as in the case of a fluid. The only cure is to take down the flue and rebuild it of the proper size.

Cause 6. If the flue be too large, there is set up in it a descending as well as an ascending current, which is fatal, and further, the pressure of the atmosphere on the top of the flue will overcome the force of the ascending column of smoke, driving it back into the room. A cure may be accomplished in this case by contracting the top of the chimney in a conical form, thus giving to the smoke sufficient velocity to resist the action of the wind. I have said advisedly that this *may* effect a cure, as it will not in the majority of cases do so, when the only alternative is, as in the case of the too small flue, to take it down and rebuild it of the proper size.

Cause 7. And lastly, coming to the question of length, we must bear in mind that the force of the draught up any chimney is always proportionate to the difference of weight between the cold air which feeds the fire and the column of heated air in the flue. If the flue be too short, as may happen more especially in the rooms near the top of a house, the draught will be too slack, and the ascending current will not have sufficient power to force the smoke up. The simplest remedy for this would be to increase the height of the chimney, but this is not always practicable; when this cannot be done, the opening of the flue immediately above the grate, commonly called "the throat," should be contracted by forming a belly on the front side of the flue which will cause the air to ascend more quickly, for the same reason that the velocity of a river is always more rapid at its narrowest points.

I have never yet come across a flue that is too long, though of course there must be a limit even in this direction, else the ascending current of hot air will get cold before it reaches the top, and have a tendency to descend again.

Cause 8. The contraction of a flue of the proper sectional area near its summit is by no means an uncommon cause of a smoky chimney. Only in the winter of last year I came across a case of this kind in the guard-room of the Military Hospital at Stoke (where the men had not only to live for twenty-four hours, ready to turn out smart and clean at a moment's notice, but also to cook their food), which was rendered quite uninhabitable. The flue was very large, being twelve inches square, and on the top had been placed a nine-inch circular chimney-pot. It was of course impossible for a volume of smoke filling the larger orifice to get through the smaller one at the same rate, and the consequence was that the exit of the smoke being choked up above, the flue became filled faster than it could empty itself, and the surplus smoke was bound to escape into the only other outlet, viz., the guard-room. The higher the smoke rises the less is the force that drives it, and the slower it moves, and in consequence, it should, if anything, have more room to move in. I took off the nine-inch pot, and continued the chimney up to the same height as the top of the pot had been, and of the same size as the rest of the flue, with the satisfactory result that the fire burned more brightly than before, and without a particle of smoke finding its way into the room.

Cause 9. A flue should never be built perfectly straight, as such construction in certain situations is quite sufficient to cause a chimney to smoke. It should be constructed with a bend, which is called in the trade "breaking daylight," which prevents the wind blowing vertically down, as also the rain from falling on to the fireplace. The bend should commence some way above the mouth of the flue, so as not to diminish the initial velocity of the ascending current and in some cases more than one bend may be constructed with advantage.

The proper lining of a flue is a necessary point, as assisting the rapid ascent of the smoke. The sides of the flue, as already stated, should be as smooth as possible, so that where earthenware pipes are not used the sides should, in the first place, be built with their surfaces as even as possible, and then either plastered or pargeted, the latter being a paste composed of mortar and cow-dung, in very general use. All angles and sharp turns should be avoided, being rounded off.

All the flues in a house should be gathered into one common stack, as in this way they help to keep each other warm, and so to increase the draughts. Moreover, if possible, all flues should be in the inner walls of a house, as they will thus retain their heat better than if they were in the outer walls, and parting with some of it to the outside air; but this is not a very important point, bricks, stone, and mortar being very inferior conductors. A wall exposed to cold north and east winds is the worst position for a chimney-stack.

A chimney-pot is at any time an unsightly makeshift and a *perfectly unnecessary* adjunct to a properly constructed flue. An architect by adopting it in his design, except for the sake of appearance, merely damns his own flue, and any design dependent for effect on its chimney-pots must be a poor one indeed. Where, however, they are adopted, they should at least be made to serve some useful purpose, and *to direct the wind upwards;* but in walking through the streets, how rare a thing it is to find amongst all the myriad forms and varieties one constructed on this, the only correct principle!

We will now proceed to notice certain causes for which neither the grate, nor the flue, nor the chimney-top can be held responsible.

Cause 10. First, let us take the case most frequently met with of a fire insufficiently supplied with fresh air which contains the oxygen necessary for combustion. If not supplied from a proper source, the fire will draw the necessary supply down the chimney, thus driving the smoke into the room. As a rule, sufficient fresh air enters through the crevices of the doors and windows; but where this is not the case, and the weather is too severe to allow of the opening of a door or window, and all the crevices are hermetically sealed by sandbags or some other method, an extra supply must be provided, and the simplest means of doing this is to carry a small tube from beneath the grate to the outside of the building. This air-flue may, however, prove a curse instead of a blessing unless a little judgment be exercised in regard to it. It must, in the first place, be of the necessary size to supply the wants of the fire: neither too large nor too small. If too large, the combustion will be so increased as to cause an unnecessary expenditure of fuel; if too small, it will be but an improvement on the original state of things, in place of a cure. The side of the house on which the air is to be introduced must next be considered, for if the air-flue has a warm aspect, such as the south, the air that comes from without will, even in winter, be warmer than that in the room, and what will then happen will be that the air-flue will draw the air down into the room. A damper or some other arrangement for closing the air-flue must be provided, else when the fire is not lighted, the cold external air will blow directly into the room and reduce its temperature, to the discomfort of the occupants.

Cause 11. In a room where two fires are lighted, the room will sometimes be filled with smoke, owing to the precaution of supplying each of the fires with the amount of fresh air necessary for its combustion having been neglected, in which case the stronger fire will overpower the weaker and draw the air it requires down through its flue. The same may also happen even if the two fires be in different rooms and the door between them left open. It is no uncommon thing for a kitchen fire to overpower all the others in a house, and to literally fill the habitation with smoke. The cure for all these cases is the same as that prescribed for the foregoing.

Cause 12. The position of the door of a room with relation to the fireplace is too often overlooked in the designing of our houses. The best position for it is exactly opposite the fireplace.

Cause 13. The case which I have most frequently heard pronounced as incurable is that of a chimney commanded by a higher building, especially a vestry chimney, or of a chimney behind which there is some vertically rising ground, such as a cutting in a rock. The usual rule-of-thumb remedy is to employ a revolving cowl, with which I do not hold for the following reasons: the wind in such positions as those above described, after striking the commanding object, rebounds, and naturally forms an eddy, whirling the cowl, as well as any other light objects within its grasp, round and round with it. The mouth of the cowl must in its turn face towards the gust, when the wind will enter the flue with a screw-like motion, driving the smoke down into the room. Even if an eddy be not formed, a strong wind will keep the mouth of the cowl always turned towards the obstructing object, from which the air will rebound and rush down the open mouth, carrying the smoke along with it. In calm, still weather, a cowl is actually bad. But now, if, instead of affixing a cowl, the flue near its summit be forked, the eddy, never being likely

to enter both orifices with equal force at the same instant, a gust will rush down one and force the smoke out by the other.

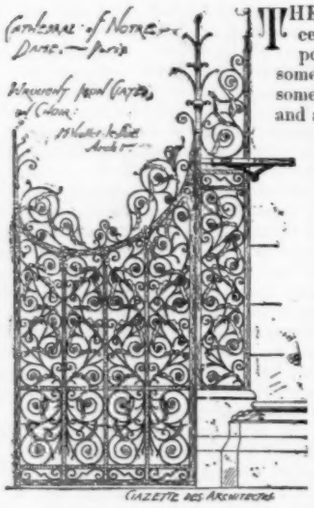
Cause 14. A room in which there is no fire burning will sometimes be filled with smoke from an adjacent chimney in use, through the smoke being literally drawn down the unused flue into the room. The most efficient remedy, where feasible, is to increase the distance between the two conflicting chimney-tops; but where this cannot be done, an almost equally beneficial result will be obtained by raising one of the terminations some little height above the other. The placing slates meeting at an angle, or half-pipes over the flues, or simply small vertical divisions between the flue openings, if the flues be in a common stack, are also efficacious and extremely simple. Closing the register above the unused grate should obviate the nuisance during the carrying out of the permanent rectification; but this is not desirable, for as a rule it shuts off the only means of ventilation in the apartment.

Cause 15. A chimney in need of repair, owing to the displacement of a brick or a lump of mortar or other material, will oftentimes injure the draught by obstructing the passage, and if the chimney be cracked, so much the worse, for the cold external air entering the breach will chill the warm ascending smoke and cause it to descend. The cure for these causes is self-evident.

Cause 16. Chimneys are sometimes constructed with a portion of the smoke channel horizontal, which allows the smoke to hang about in it and become cool. The construction of such flues should, where possible, be altered.

Cause 17. We will conclude with a cause the exact converse of No. 13, that of a chimney situated beneath a hill *over* which the wind is blowing, where the air, as it has been so graphically described, "falls like water over a dam." It has not been my good luck to come across a case of this sort, and to try the remedies usually recommended (1) of raising the chimney above the hill, which can in very few cases be practicable, (2) of affixing a cowl, or (3) of making all doors and windows in the side of the house facing the hill. Should I ever be called upon to recommend a cure for such a case, I should adopt experimentally an angular covering, which would, as it were, split the falling air in two like a wedge, and cause it to drag the smoke down out on each side.—*British Architect.*

THE ADHESIVE STRENGTH OF PORTLAND CEMENT.



THE ordinary methods of testing cement refer to its cohesive power only. Briquettes are made, sometimes from neat cement, and sometimes from cement and sand, and after being subject to from seven to twenty-eight days' immersion in water, they are broken by a tensile strain. But it may be argued that, since the principal function of cement is to produce adherence, so as to convert loose or disconnected material into a solid coherent form, that its tensile strength, unless that also be a measure of its adhesive strength, is but a fallacious guide to its constructive value. This is the view taken by Mr. Isaac John Mann, and which was advocated by him in a paper presented to the Institution of Civil Engineers, and selected by them for publication. Reviewing the history of cement making, and the experimental researches connected with it, he came to the conclusion that neither of the above systems of testing is likely to become universal. The test that he prefers shows the adherence of two strips of sawn limestone, or ground plate-glass, held together by a thin layer of Portland cement. The transition from the test of cement mixed with sand to this test is not so abrupt as would appear; in the former a great number of small pieces of stone are used in the form of sand, while in the latter two pieces only are employed, and the test is thus simplified and better defined. The sand test is neither one of cohesion only nor of adhesion, but involves an indeterminate proportion of both.

Cement, as at present received from the manufacturer, consists of a mixture of an almost impalpable powder with coarser particles, the latter being extremely sluggish or inert, and incapable of developing any great cementitious value within the limits of time over which the tests can extend. It can be hardly doubted that the strength of a test-point made with ordinary cement will be influenced by the fortuitous position which the coarse particles occupy, or, in other words, by the proportion of comparatively inert particles that happen to be in direct contact with the cemented surfaces, and hence it is necessary that one of the standard adhesive tests should be made with material from which the inert particles have been removed. Mr. Mann's attention was directed in the first place to discovering the degree of pulverization required to convert the unground clinker into active cement, and to this end he made a large number of experiments. These led to the conclusions that so far as concerns a seven days' test, the particles of cement stopped by a No. 176 sieve developed little or no cementing power during that period, and that even some of the less fine particles might be very deficient in cementitious strength; and that so far as concerns a twenty-eight days' test, the cement of different manufacturers varied in the cementitious strength of the particles stopped by a No. 176 sieve from nothing to twenty pounds per square inch, their strength increasing but slowly in the longer periods, and probably becoming soon exhausted. If any general conclusion can be drawn from the experiments, it would appear to be that the cementing energy of coarse particles develops much more slowly than that of fine particles. The necessity of adopting a high standard of pulverization is also shown. For example, the particles that were sufficiently fine to pass a sieve of 10,600 meshes to the square inch, viz.: No. 103, possessed less than one-fifth of the cementitious value of those passing a sieve of 31,000 meshes per square inch, viz.: No. 176. The average degree of pulverization of ordinary cement is such that 45.6 per cent is stopped by a No. 176 sieve.

The next point requiring investigation was the cementitious strength of the fine particles. For this purpose the finest sieve obtainable was used, No. 176, and the cement was sifted until an inappreciable amount escaped through the meshes. The material was such as would set in forty minutes to five hours in air. At the end of seven days' immersion the average of sixty-two tests showed an adhesive strength of seventy-eight pounds per square inch, and at the end of twenty-eight days thirty-eight tests gave an average result of ninety-three pounds per square inch. The highest figure ever obtained, two hundred and four pounds to the square inch, was after fifteen months had elapsed.

When the cement was not sifted, but tested as received from the manufacturer, the average of the seven days' trial was fifty-seven pounds per square inch, the lowest result being fifty-one pounds and the highest seventy-six pounds. The average strength found by the twenty-eight days' trials was seventy-eight pounds per square inch, the lowest figure being sixty-nine pounds, and the highest one hundred and eight pounds. Estimated by their cohesive strength all the cements were of good quality. As a general conclusion the experiments showed that the cementitious strength of sifted cement was greater than that of unsifted cement by thirty-seven per cent at the end of seven days, twenty per cent at the end of twenty-eight days, and eighteen per cent at the end of thirteen weeks.

The relation, if any, between the cohesive and adhesive, or cementitious strength of neat cement seems to be extremely obscure, as might be anticipated from the fact that the presence of coarse particles within certain limits increases the former but diminishes the latter. The following examples will serve to show that the ordinary seven days' test of cohesive or tensile strength is unreliable as an exponent of the cementitious value.

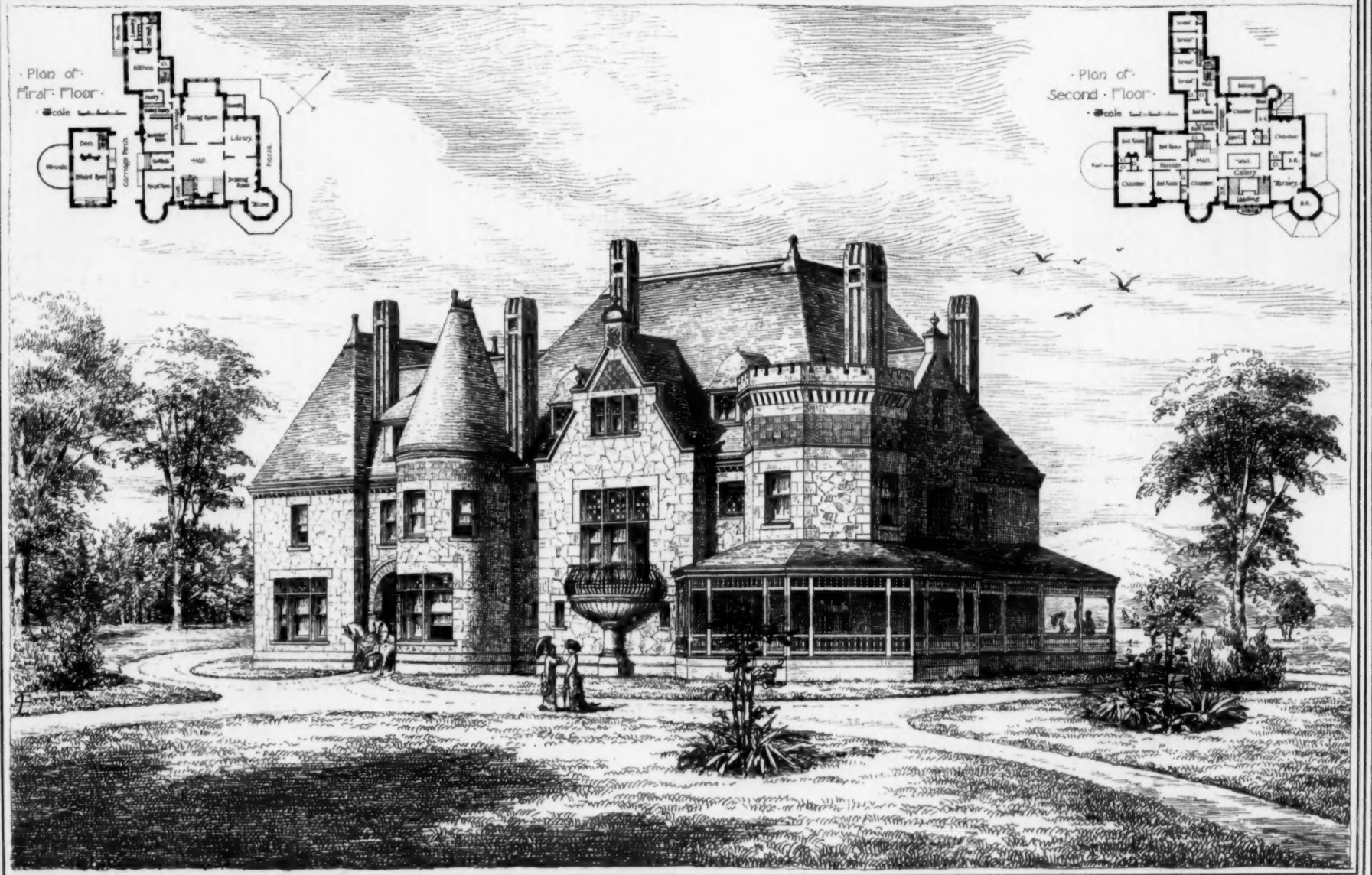
COMPARISON OF ADHESIVE AND COHESIVE STRENGTH.

No.	Description.	Average Strength in Pounds per sq. inch.	
		Adhesive.	Cohesive.
1	Ordinary cement, age seven days.	59	532
2	Ordinary cement, age seven days.	51	336
3	Fine cement, sifted through No. 176 sieve, age seven days.	94	428
4	Fine cement, sifted through No. 176 sieve, age seven days.	57	345
5	Fine cement, sifted through No. 176 sieve, age seven days.	65	500
6	Fine cement, sifted through No. 176 sieve, age twenty-eight days.	105	500
7	Fine cement, sifted through No. 176 sieve, age twenty-eight days.	109	387
8	Fine cement, sifted through No. 176 sieve, age twenty-eight days.	84	428
9	Fine cement, sifted through No. 176 sieve, age twenty-eight days.	110	309
10	Fine cement, sifted through No. 176 sieve, age twenty-eight days.	85	320

The investigation of the effect of quick and slow setting on the adhesive strength, which is capable of being developed within the limits of time available for ordinary testing purposes, shows that, with one or two exceptions, the quick-setting cement manifested a greater development of adhesive strength than the slow, while in the case of cohesive strength quick setting seemed generally to produce an opposite effect. The time of setting was arrived at by the following means: A vertical steel needle, moving freely in guides, and having a flat point one-sixteenth of an inch in diameter, was loaded so as to weigh one pound. When the pressure of the point made no visible mark on the surface of the gauged cement it was considered to be set. This is approximately the same pressure as that of the finger-nail, but it has the advantage of being more definite and reliable.

The strength of adhesion of Portland cement to different substances varies considerably; the roughness or smoothness of the cemented surfaces does not, however, affect the strength as much as has been supposed. The table on the next page was compiled from experiments made with cement obtained from five leading manufacturers.

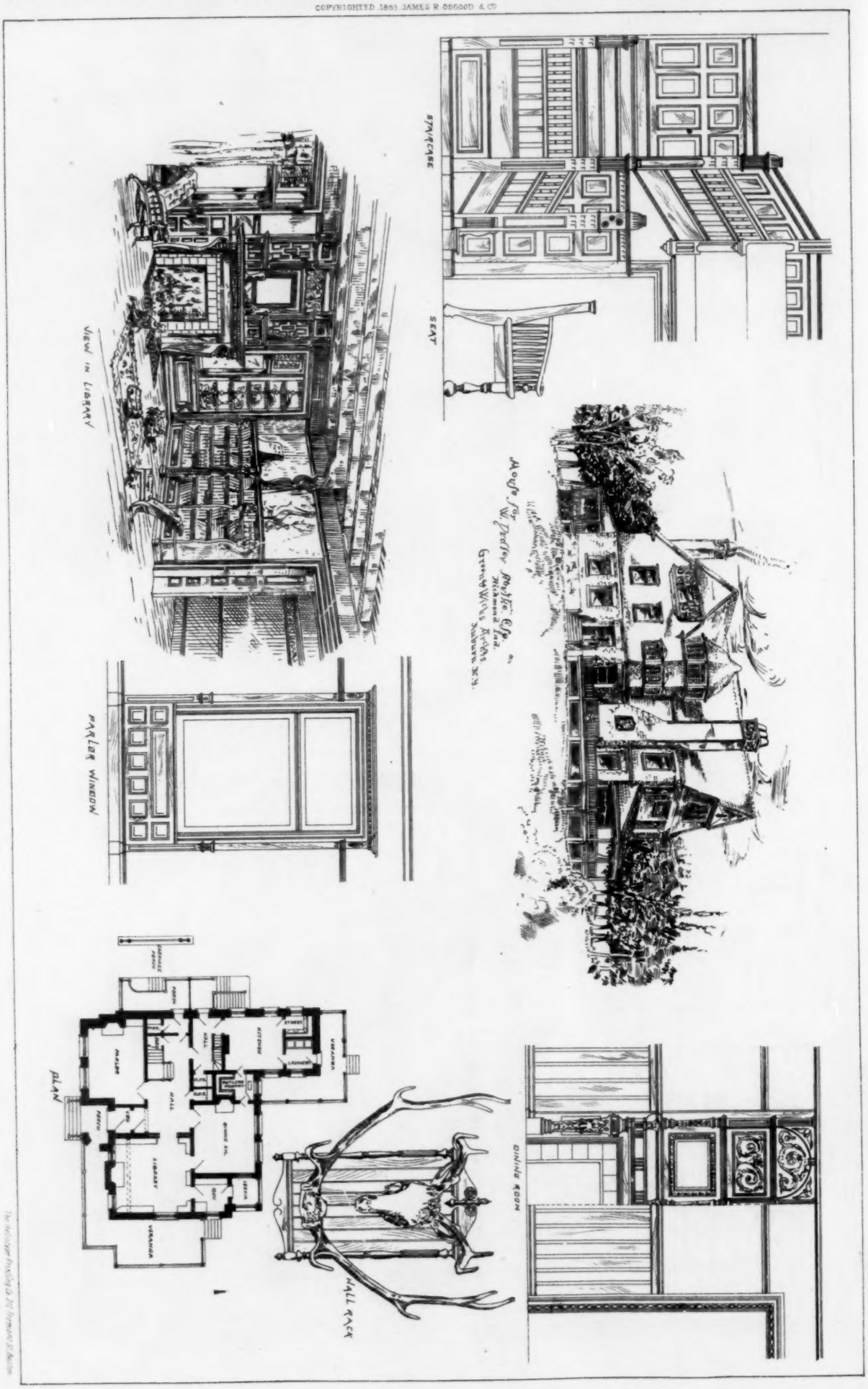
No. 406 American Architect and Building News, Oct. 6. 1883.

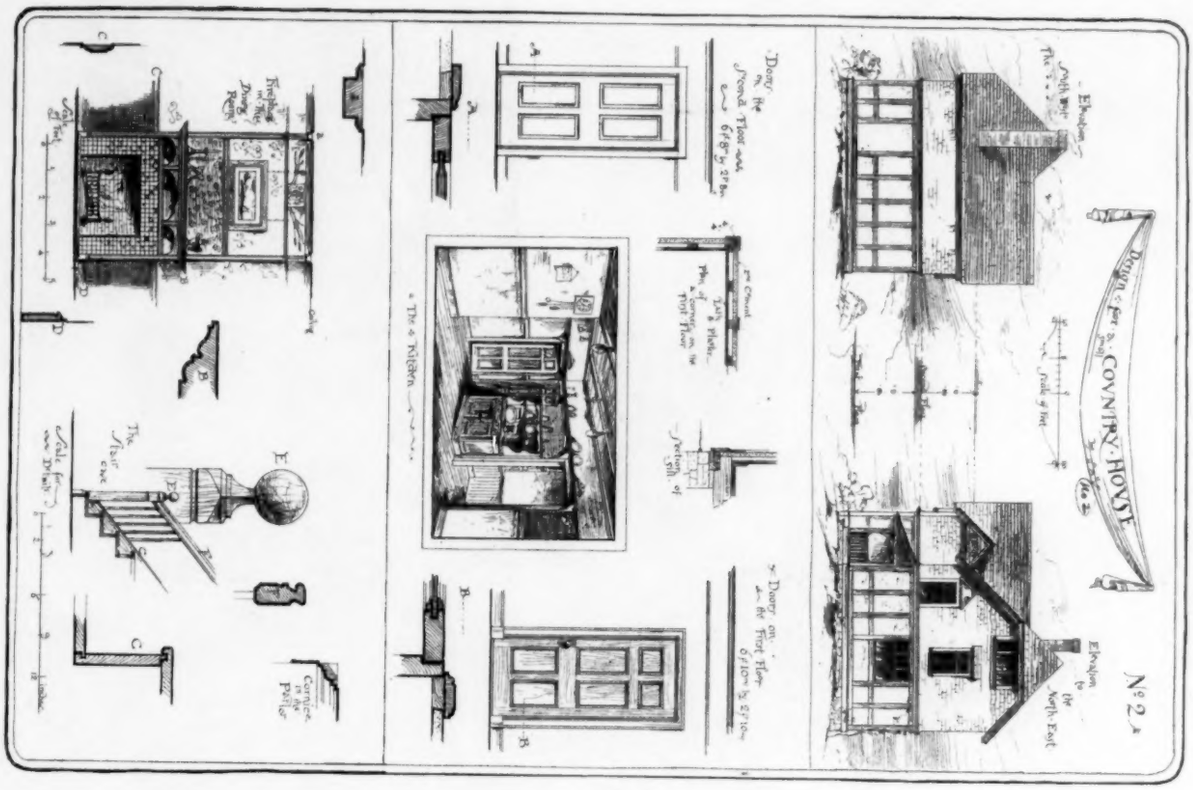


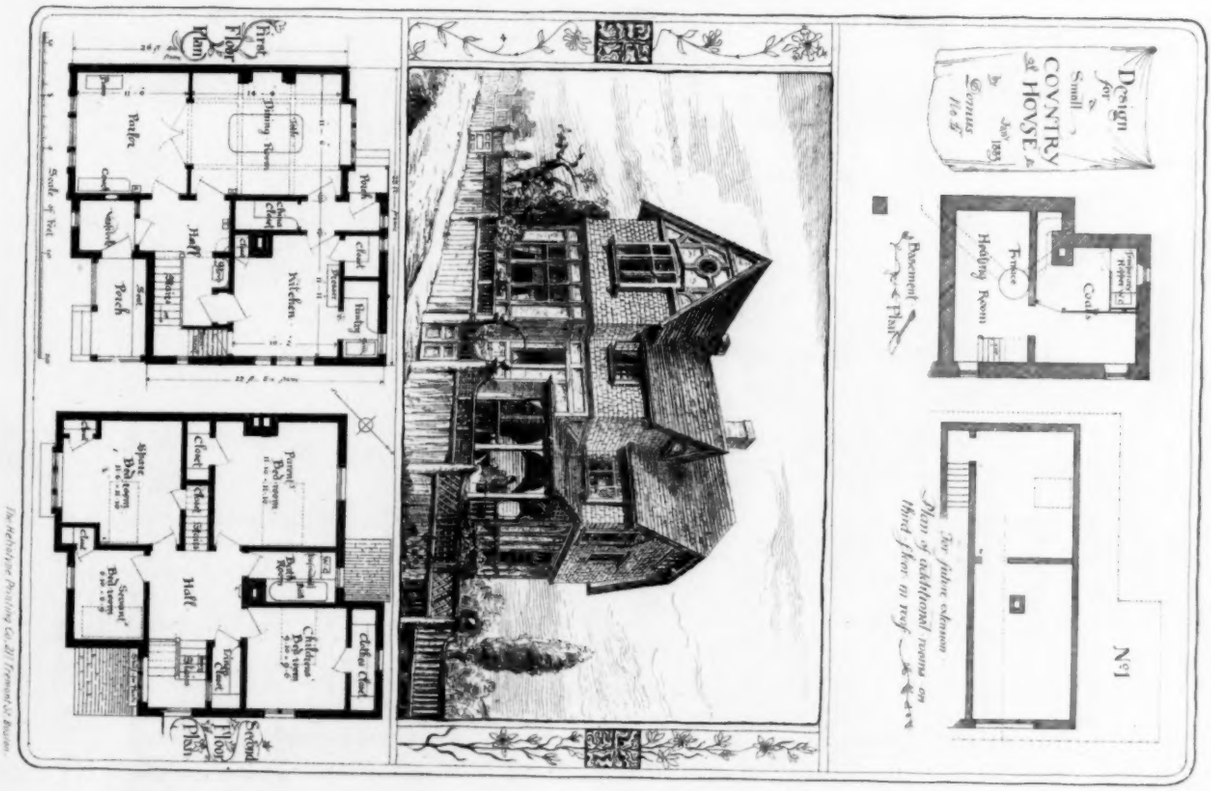
The Heliotype Printing Co. 211 Tremont St. Boston.

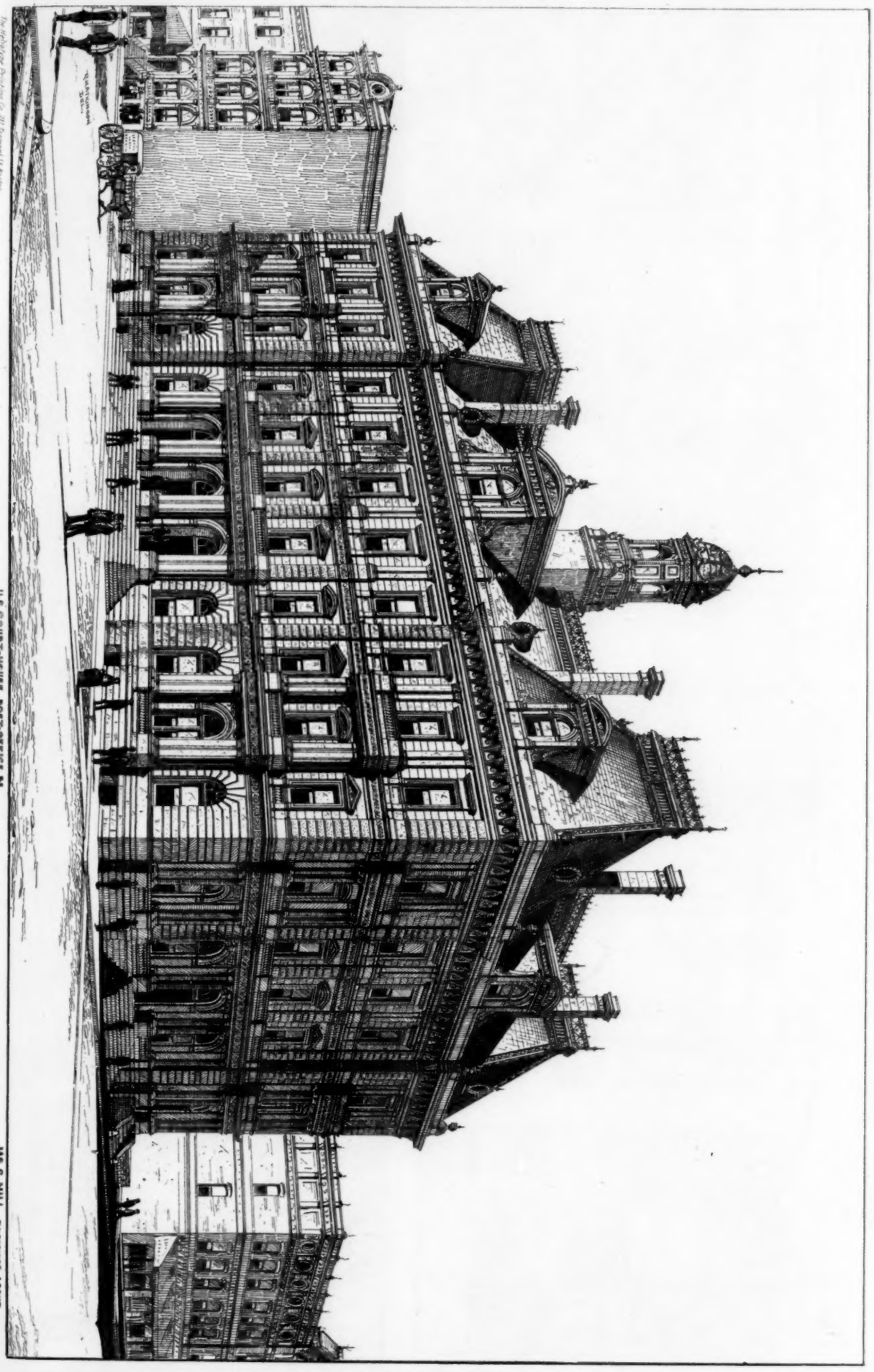
RICHMOND HILL

ARTHUR HOOPER DODD ARCHT
RIALTO BUILDING BOSTON









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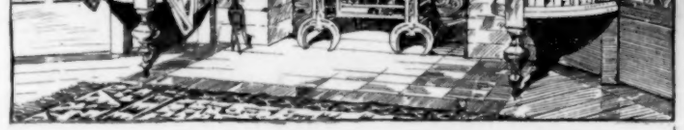
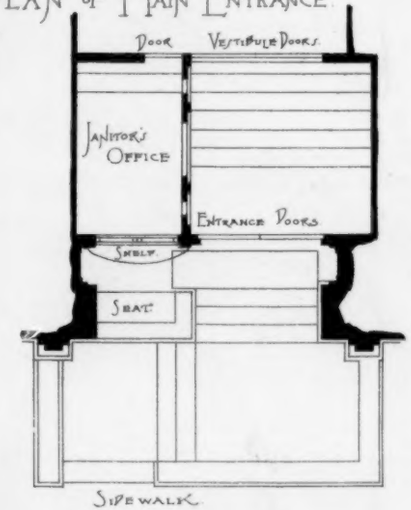
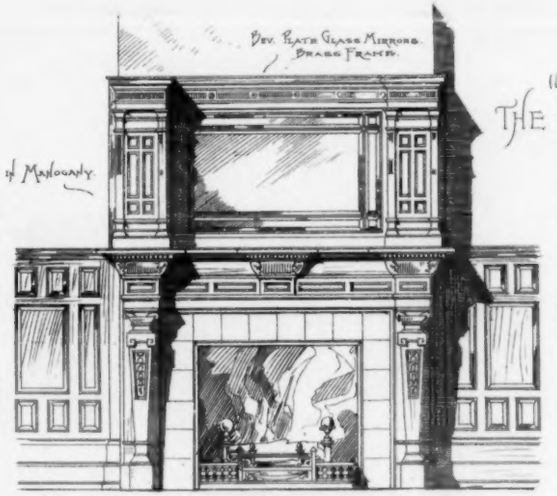
American Architect and Building News



Plan of Main Entrance





Mantel in Dining Room – Second Floor

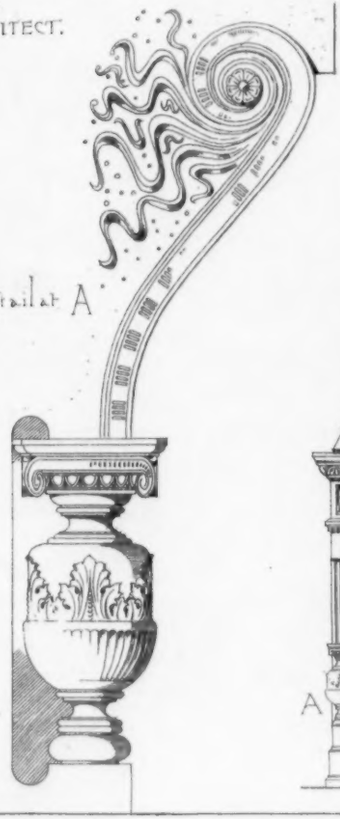
Bits from the "Berkshire"

N.W. Cor. 52d St. & Madison Ave. New York.

Mr. Carl Pfeiffer, Architect.

Detail at B

Dining Room – 3d. Floor



Detail at A

Mantel in Entrance Hall.

D. A. Grace, Del.

The Heliotypic Printing Co. 211 Fremont St. Boston.

J. R. OSGOOD & CO.

THE MAIN ENTRANCE.

A MANTEL, 1st FLOOR.

PLAN OF CEILING.

THE ELEVATOR CAR.

SECTION

STRENGTH OF ADHESION OF PORTLAND CEMENT TO VARIOUS MATERIALS.

Material.	Average Adhesive Strength.				Remarks.
	7 d's.	28 d's.	13 w'ks.	6 m'ths.	
Bridgewater brick	19	..	..	..	Ordinary cement.
" "	24	66	..	..	Sifted through No. 176 sieve.
Slate (Sawn)	49	..	..	..	Ordinary cement.
" "	53	82	..	62	Sifted through No. 176 sieve.
Portland stone	26	50	..	..	Ordinary. Fragments torn out of surface.
" "	29	62	..	55	Sifted through No. 176 sieve. Fragments torn out of surface.
Ground plate-glass	..	102	113	..	Ordinary cement.
" "	..	..	145	..	Sifted through No. 176 sieve.
Plate-iron	23	68	..	..	Ordinary.
" "	44	66	..	..	Sifted through No. 176 sieve.
Sandstone.	..	49	..	..	Ordinary. Fragments torn out of surface.
Polished marble	38	..	..	..	Ordinary cement.
" "	52	71	..	75	Sifted through No. 176 sieve.
" plate-glass	47	40	..	70	Ordinary cement.
" "	55	49	51	..	Sifted through No. 176 sieve.
Granite (chiselled)	41	..	..	..	Ordinary.
" "	78	97	153	..	Sifted through No. 176 sieve.
Limestone (sawn)	57	78	98	..	Ordinary.
" "	78	93	116	..	Sifted through No. 176 sieve.

Total number of tests (omitting those of sawn limestone), 182.

With reference to a standard test the author's investigations and remarks may be summarized as follows: (1) That the cementitious or true value of Portland cement can be best determined by testing its adhesive strength. (2) That the degree of pulverization is probably the only other condition, the practical importance of which will warrant an introduction into the standard system, which should, therefore, include a standard sieve. (3) That a sieve having one hundred and seventy-six meshes to the lineal inch will be found sufficient for all practical purposes. In adopting the adhesive test the usual specification of the quality of English Portland cement requires to be modified to the following effect: "The cement shall be ground so that not more than forty-five per cent shall be stopped by a No. 176 silk sieve, and its average adhesive strength, after twenty-eight days' immersion, shall be as follows: cement passing No. 176 sieve, not less than ninety-five pounds per square inch — cement as supplied for use not less than seventy-five pounds per square inch."

Mr. Mann's researches are most interesting and valuable, and display the perseverance and assiduity which must form the basis of all true scientific theorizing, but whether his new standard test will be able to displace those already in vogue remains to be seen. If the use of Portland cement were comparable to that of mortar, that is, if it were used to effect the union of flat surfaces, subject to transverse or tensile strains, then it would be evident that Mr. Mann's test is the proper one. But a mass of concrete is very different from a brick wall. The surfaces of its units are essentially round, and present points rather than planes of contact to each other. Hence, although it may be perfectly true that when concrete gives way it fails from want of adhesive strength in the cement, rather than cohesive strength, yet it is by no means clear to us that Mr. Mann's method of testing would properly demonstrate the values of different cements under the conditions of actual practice. The connecting bond or film is extremely thin, and it is well known that the value of such a cemented joint largely depends upon the skill of the person making the joint. When two pieces of wood are carefully united by glue the union is often so firm that it is easier to fracture the solid wood than to tear apart the glued junction, but still it is no uncommon sight to see glued articles fall to pieces. The sand or German test probably comes as near reproducing the conditions under which the cement will be used, as can be done in the laboratory, and, if the difficulty of finding a standard sand could be overcome, would present many advantages over the pure cohesive test. Whether Mr. Mann's system becomes the standard of the future or not he has done good service in calling the attention of engineers to the wide difference between the adhesive and cohesive strength of Portland cement.— *Engineering.*

THE ILLUSTRATIONS.

UNITED STATES COURT-HOUSE, DETROIT, MICH. MR. J. G. HILL, SUPERVISING ARCHITECT OF THE TREASURY DEPARTMENT.

COMPETITIVE DESIGN FOR A $3,000-HOUSE SUBMITTED BY "*Domus.*" [NO. 2.]

"'DOMUS' [No. 2] is evidently one of the most practised designers in the competition, his elevation being one of the most architectural in treatment. Note the clever way in which his gable, with its half-timbering, is combined with the large window. The rough-cast, also, is well managed. There is one serious defect, however, in the roof, which has a dangerous valley. This fault is the more to be regretted in that the plan entitles 'Domus' to one of the first places in the competition. Both above and below economy and convenience find every requirement fulfilled. Wittingly or unwittingly, the author has adopted a device very like a fraud. On his plan a bath-room is shown, with water-closet and bath-tub drawn out; to be sure, 'unfinished' is printed across it, but that is not enough to warn one that the plumbing is practically left out of the estimate, which should include the pantry-sink and a hopper water-closet shown. A perusal of the items of cost shows that $18.50 is all that has been counted upon for the generous amount of plumbing shown on the plans. The furnace might have been left for the owner to furnish, but it is more than misleading to leave out the plumbing in an architect's formal estimate of the cost of a building. The item for painting is quite inadequate, in spite of the well-known name of the painter offered as guaranty."— *Extract from Jury's Report.*

"RICHMOND HILL." MR. A. H. DODD, ARCHITECT, BOSTON, MASS.

BITS FROM THE "BERKSHIRE," CORNER FIFTY-SECOND STREET AND MADISON AVENUE, NEW YORK, N. Y. MR. CARL PFEIFFER, ARCHITECT, NEW YORK, N. Y.

FOR a description of this building see *American Architect* for August 4, 1883.

HOUSE FOR W. DUDLEY FOULKE, ESQ., RICHMOND, IND. MESSRS. GREEN & WICKS, ARCHITECTS, AUBURN, N. Y.

THE $3,000-HOUSE COMPETITION. — XIX.

DESIGN SUBMITTED BY "*Domus.*" [No. 2.]

ADAPTATION for Double House: — The building can be placed close on the side boundary without danger of being overlooked by any adjacent house, the elevation on this side having no windows. With a slight change in the roof, the plan is made suitable for forming one-half of a double house; an arrangement which would considerably reduce the cost.

Area: — The area occupied by the building amounts to 758 square feet.

Heights: — The height of the first story is 9′, and of the second story 8′ from floor to ceiling.

Things not included in Estimate: — The following things, although shown in the drawing, are not included in the cost of the house: the garden gate and fencing; the bath-tub and water-closet on second floor; the inside wood finish of bath-room; the hall stove; the dresser in kitchen and other furniture; the stairs to the attic; the whole of the plastering, wood floors, wood finish, and windows in attic floor.

Digging: — Remove the loam from the site and pile separately. Excavate as required for cellar, for all walls, foundations, piers and drains. Level the cellar bottom for concreting.

Rubble-work: — Cellar walls of the thickness and heights shown, to be rubble-work laid dry up to ground line, chinked and pointed on the inside with cement mortar. The underpinning above ground line to be set in cement mortar and neatly lined.

Brickwork: — Build all chimneys and flues in good merchantable, hard-burned, common brick in mortar.

Chimney-Shafts: — The exposed chimney-shafts to be of same brick with wide joints of red mortar, the top course set and pointed in cement.

Collars and Thimbles: — Build in 5″ collars and thimbles for all rooms having flues; also for halls.

Trimmer Arch Fireplace: — Turn arched hearth to fireplace in dining-room, and face the hearth, jambs, and back, with a good quality of face brick, with neat joints in red mortar.

Tiles: — Set red tile facing to fireplace.

Cellar Floor: — The cellar bottom is to be grouted with concrete 2″ thick, composed of hydraulic cement and coarse gravel.

Furnace and Registers: — Provide for setting a No. 1 portable furnace. The hot-air will be taken from it to registers in dining-room, parlor, hall, and bedrooms. Hot-air pipes of heavy tin.

Framing: — The frame is to be of the best straight-edged spruce. The floor joists are to be properly crowned and bridged. Headers and trimmers to be framed in best manner and well pinned. Make sufficient transverse ties across the building at the floors. Use all iron bolts and straps required to make strong and substantial work.

Boarding: — Cover the walls for shingling, and roofs with sound hemlock boards.

Clapboards: — The only portion to be clapboarded is that forming back of piazza, which is to be covered with pine clapboards, laid 4½″ to the weather. Use tarred paper or felting around door and window openings and corner boards.

Shingling on Walls: — Such parts of the walls as are shown or marked on elevations, are to be covered with plain, sawed pine or cedar shingles.

Roof Shingles: — The roofs are to be covered with shaved cedar shingles, put on with galvanized-iron nails.

Flashing: — Flash hips, ridges, and valley, with 9-oz. zinc.

Exterior Finish: — All the exterior finish is to be of clear, well-seasoned pine stock, ⅞″ thick.

Steps: — The treads of front steps to be of hard-pine. The floor of piazza formed with narrow boards, laid open.

Partitions: — Set the partitions generally with 2″ x 4″ spruce studs. Set 4 nailings to a lath, bridged with one row of plank pieces well fitted and nailed. Short partitions to be formed with 2″ x 3″. Partitions over voids to be strongly trussed or braced.

Plastering: — The walls of second story are to be furred, lathed, and back-plastered. The walls, ceilings, and partitions of the first and second stories, including closets, are to be lathed with good spruce laths, and to be plastered, two-coat work, ⅞″ thick.

Kitchen Plastering: — There will be no lathing or plastering on the ceiling of kitchen, nor on the walls of same as high as dado capping. Oil-cloth, to be provided by the proprietor, will be nailed directly to studs. The joists and floor forming ceiling will show. To be tinted with lime-wash.

Under Floors: — The under floors of best quality hemlock.

Upper Floors:— The upper floor of kitchen, and closets off, to be of hard-pine. All other floors to be of the best clear spruce, planed, thoroughly seasoned, and kiln-dried in 5″ widths. The interior finish throughout to be of pine.

Stairs: — The stairs to basement to be formed with ⅞″ treads, planed and nailed on rough-cut plank carriages. The stairs from first to second floor to be in two flights, as shown, and of ⅞″ treads, and risers on plank carriages.

Newel Posts:— Three newel posts, out of 4″ x 4″, with turned ball terminals. The balusters ⅞″ x ⅞″ plain, square in section; all of clear pine.

Sashes: — The cellar windows to have 1½″ thick sashes, hung at top, and provided with hooks and staples to fasten when open. The sashes on first and second floors to be 1½″ thick, of pine, with hard-pine pulley-styles and beads. Sills of 2″ stock. The windows of kitchen, parlor, dining-room and porch, to be double-hung.

Casements: —The sashes generally on second floor to be casements hinged to open outwards, with link and hook fastening.

Doors: — All doors to be hung to rebated pine plank frames. The doors to be made with clear, kiln-dried pine stock. The front door and vestibule door to have locks, value, $2 each, knobs worth $2, and night-latches. Rear door to have good japanned bolts on the inside.

Locks and Fastenings: — All inner doors to have locks costing $6 per dozen, and knobs, value on the average, 37 cts. per pair. The doors generally to have plain japanned-iron loose-joint butt hinges.

Shelving: — Finish the closets generally as indicated on plans. Two tiers of shelving to those on ground floor, and linen closet on second floor. The remainder to have one tier each.

Hanging Strips: — All closets in bedrooms to have hanging strips and hooks.

Closet under Sink: —The sink in kitchen is to have closet beneath with cleated door.

Shelving in Kitchen: — The kitchen to have one tier of shelving at one end and part of side, supported on ⅞″ cut wood brackets.

Bath-room: — The bath-room to be left unfinished at present.

Bases: — Bases to principal rooms to be ¾″ x 4″.

Chair-Rails: — The dining-room to have chair-rail, and kitchen to have rail to form cap to oil-cloth dado.

Ribs on Ceiling of Dining-room: — Light ribs are dotted on plan to be secured to ceiling of dining-room and parlor, to be hung with beaded frames, the spaces on each side of door being filled in with 1″ x 4″ frames to receive canvas on which the wall-paper will be hung.

Cornice in Parlor: — A small wood-moulding to form cornice in parlor only.

Glazing: — The windows generally will be glazed with second quality single-thick, cylinder glass.

Leaded Glass: — The upper portion of parlor window and also vestibule light will have light-tinted leaded glass.

PAINTING.

Exterior: — The outside wood-work and sashes to receive two coats of oil paint.

Shingles: — The shingles on second story to be stained before being laid.

Roof: — The roof shingles to be oiled.

Inside Wood-work: — The inside wood-work to be painted three coats.

PLUMBING.

Sink: — One enamelled iron sink in wash-closet off kitchen, and stop-cock, waste, etc.

Hopper Water-Closet: — One hopper water-closet in basement with lead pipe connecting with drain.

ESTIMATE OF QUANTITIES AND PRICES RULING AT BOSTON, MASS.

Mason-work, Messrs. Vinal & Dodge	$ 340.00
Carpenter-work, Messrs. Morton & Chesley	2,130.00
Heating-apparatus, Mr. Cyrus Carpenter	100.00
Plastering, Mr. Thos. Parker	142.50
Glazing, Messrs. Cook, Redding & Co.	24.13
Plumbing, Mr. Lunt	18.50
Painting, Mr. T. Burgess	100.00
Cement work, Mr. R. Jackson	50.00
Total	$2,905.13
Architect's fee	145.25
Total cost	$3,050.38

MASON-WORK.

107 cu. yds. of excavating	$ 37.45
25 ft. 6 in. glazed terra-cotta drain-pipes, @ 25 c.	6.25
912 cu. ft. of rubble walls, 1′ 6″ thick	148.00
250 cu. ft. of brickwork	115.00
5 thimbles and covers for stoves, @ 25 c	1.25
Setting one furnace in basement	10.00
27½ sq. yds. cement floor in basement	22.50
548 sq. yds. plastering, @ 26 c.	142.48

PAINTING.

97 sq. yds. shingles on outer walls stained yellow.	
170 " " shingles and roof oiled.	
61 " " plain two-coat work in oiled paint outside.	
60 " " painted moulded work, two coats outside.	
50 " " painting sashes and frames, outside doors and windows.	
50 " " " and varnishing do. inside.	
166 " " three-coat work inside house.	
Total	$100.00

PLUMBING.

1 hopper water-closet in basement	$ 8.00
Lead pipe to do.	3.00
Kitchen sink	7.50

CEMENT WORK ON WALLS.

91 sq. yds.	$50.00

GLASS.

16 ft. super, plain tinted, leaded glass, @ 70 c.	$11.20
125 lights second-class, single-thick	12.93

HEATING.

1 portable furnace in basement, with register and tin piping, as indicated on drawings	$100.00

CARPENTER'S WORK.

124 lin. ft. sill for frame.	
1353 sq. ft. frame up to second floor, set for cement-work.	
1057 sq. ft. do., above second floor, covered with plain shingles.	
104 " in two gables prepared for plastering.	
100 " clapboarding on back of piazza or porch.	
3 arches, 4″ thick.	
4 posts (plain square), 5″ x 5″.	
9 lin. ft. of plain square balustrade, of ¾″ square bars.	
50 sq. ft. open-laid floor, porch.	
4 steps to porches.	
10 sashes, double hung, 1½″ thick (average 15½ sq. ft.).	
17 do. casements, do. (average, 13½ sq. ft.).	
1 front door, 3′ x 7′ x 1¾″, six-panelled.	
1 rear door, 3′ x 6′ 10″ x 1¾″, four-panelled.	
1380 sq. ft. shingling on roofs.	
1798 " framing in partitions, 2″ x 4″, 16″ centres; short lengths, 2″ x 3″.	
70 " rough board partitions in cellar.	
1 flight of stair steps to basement; no risers, ⅞″ treads, rough carriages.	
844 sq. ft. joists on first floor, 2″ x 8″; two thicknesses.	
857 " do. second floor.	
Principal stairs in two flights, from first to second floor, nine treads, 7″ risers, all ⅞″.	
10 doors on first floor, 2′ 10″ x 6′ 10″.	
3 closet-doors, first floor, 2′ 8″ x 6′ 8″.	
2 sash-lights, 18″ x 24″, 1½″ thick.	
1 vestibule door and side-light; door three-panelled, 2′ 10″ x 6′ 10″.	
76 sq. ft. shelving on first floor.	
7 doors on second floor, 2′ 8″ x 6′ 8″.	
3 doors to closets, 2′ 6″ x 6′ 6″.	
50 sq. ft. shelving on second floor.	
400 lin. ft. baseboard to rooms.	
830 lin. ft. architrave.	
52 lin. ft. light ribs and mouldings, ceiling of dining-room.	
48 lin. ft. chair-rail, do.	
48 lin. ft. base, do.	
1 fireplace, as per detail drawing, No. 2 pine.	
19 lin. ft. shelving, in kitchen.	
4 brackets under do.	
22 lin ft. wall-rail in kitchen, 1″ x 3″.	
45 " moulding, forming cornice to parlor.	
Total carpenter's work	$2,128.00

CHESTERFIELD STEEPLE.

KING LEAR may have derived considerable satisfaction from his memorable exclamation, "Blow winds and crack your cheeks," but he would not have been so eager to encourage the hurricane had his home stood near some crumbling cathedral tower or rickety church steeple. The more timorous occupiers of the old-fashioned houses that cluster around the Chesterfield parish church have not felt thoroughly at ease during recent gales. They have retired to bed hesitatingly, not to slumber, but to toss sleeplessly on their pillows, rendered nervous by the thought that the crooked steeple, unable, perhaps, to withstand the tempestuous blasts, might come down suddenly and with even less warning than an avalanche gives. Luckily, these fears had far less foundation than the spire, and the famous steeple, the object of so much curiosity to all travellers on the Midland, has not been toppled over by the fierce gusts that have rioted in "the wrathful skies." Nevertheless, those who live within the shadow of the old and curiously shaped fabric that is always threatening to overbalance itself may be forgiven for feeling uncomfortable on stormy nights. Even as far back as 1817 the steeple was believed to be in a state of collapse. A daring expert, venturing as high as the crow-hole, was startled to find not only that the timbers comprising the framework of the spire were very much decayed, but that the steeple leaned very much toward the south, and was not less than six feet out of the perpendicular. Nay, the idea of the singular structure giving way filled him with such terror that he forgot his professional *sang froid*, and speedily descended from his lofty position a more cautious, if somewhat perturbed man. In 1818 a vestry meeting was actually held for the purpose of considering whether the steeple should be taken down. The inhabitants, however, were loth to demolish the architectural singularity which had been the town's pride for years; and when an independent surveyor reported that the carpenter's work at the base was so good that the steeple would probably last another century, they clutched at this opinion as readily as drowning men are said to catch at straws, and the twisted spire was left in peace.

It is doubtless the most extraordinary structure in the world, for "whichever way you turn your eye it always seems to be awry." No one can tell exactly when it was put up, but for at least five hundred years the grotesquely-shaped steeple, with its huge warped timbers and cloak of lead, has defied the tempest's howling and the lightning's incisive touch. Although assailed by many terrible storms the spire still rises crookedly, but firmly, two hundred and thirty feet above the church tower; and those who love old landmarks and relics of a bygone time trust that it may long remain on its dark stone pedestal, crowning the ancient church, which is not only rich in knightly monuments, but contains a rib of the marvellous dun cow killed by the Earl of Warwick!

The steeple has created more fun than any of Gilbert and Sullivan's operas. It has been likened to the uplifted tail of the Dragon of Wantley, to a corkscrew, to the leaning Tower of Pisa, and to a man perpetually tipsy; while one writer asserts that it sticks "with a mock-gravity air on the church tower, looking as comical as a jester on an Archbishop's back." There are many legends to account for its peculiar shape. One of these, taken from a very old book on "Church History," states that a Derbyshire magician engaged a village blacksmith to shoe Satan, but the work was done so carelessly that Lucifer's hoof was pricked, and the pain made him kick out so violently on passing Chesterfield Church that he twisted the spire. Another story charges the King of Darkness with being the cause of the steeple's deformity in an even more laughable way. It is to the effect that Satan, alighting one day to rest on the summit of the fabric, had his nose so tickled by the incense arising from the altar beneath "that he gave a terrible sneeze, and not merely shook

but actually twisted the steeple with this diabolical spasm." Yet a third tradition, says the writer of "Old and New Chesterfield," endeavors "to slander the fair sex of Chesterfield in its efforts to give a reason for the steeple's corkscrew-like form. It ungallantly asserts that pretty and virtuous women were scarce in the town; so scarce, indeed, that when a lovely and good woman approached the church one day to be married the steeple was astonished, and in astonishment bowed to the bride who possessed such rare qualities. Attempting to regain its original position, the steeple wrenched its back, and never recovered its upright attitude; nor is it likely to do so until another lovely and virtuous woman whispers her marriage vows in the church. But the legend, like the spire has been twisted. It really ought to say that so many lovely and virtuous women enter the old church that the steeple is perpetually bowing in recognition of their comeliness and purity."

These legends which are almost as familiar in the Midlands as the steeple itself, are not only entertaining but instructive, for they reveal wondrous power of imagination in a people, of whom it has been scathingly said:

"Derbyshire born, and Derbyshire bred,
Strong in the arm, but weak in the head."

Quite apart from the fables that have almost become a portion of its history, the steeple has more practical reason for its leanings than many politicians. It was straight when first erected. Neither demon's kick nor woman's frailty is responsible for its whimsical shape. The sun's heat and the wind's relentless force have shrunk its timbers and twisted its lead covering until the spire has become wellnigh as crooked as the "ways of the wicked."— *London News.*

NUTS AND WASHERS.

Chicago, Ill., September 7, 1883.

To the Editors of the American Architect: —

Dear Sirs, — In the issue of your paper for September 1, appeared an article by Professor Ricker, entitled "Dimensions of Rod-ends, Heads, Nuts and Washers," containing some ingenious formulæ for the determination of the proper size of washers bearing on wood. These formulæ, and especially the tables calculated in accordance with them, would be very useful if correct; but there is a serious error in the reasoning which complicates the results unnecessarily, and renders them quite misleading in some cases.

The object of the formulæ is to give the proper diameter of washer corresponding to any given size of rod. The crushing strain transmitted by the washer to the side of the timber is the same as the tension in the rod which pulls on the washer, and as the permissible tension varies directly as the sectional area of the rod, the bearing area of the washer will vary directly as the sectional area of the rod. It is also evident that the bearing surface of the washer will be to the sectional area of the rod in the same ratio that the safe tensile strength of the iron per square inch bears to the safe resistance to crushing per square inch of the wood. For example: if the rod will bear safely five tons per square inch, and the timber will resist one ton per square inch crushing strain, then the surface of the washer bearing against the wood must have an area five times that of the net cross-section of the rod.

Now, to quote from the article in question: —

"Let C' = ultimate resistance to crushing at right angles to the fibres of the wood, in net tons per square inch.

"Let k = the factor of safety for this crushing.

"Let $k = 1.25$ when the maximum safe tensile strain of the rod is very seldom exerted, as in the case of the rods of roof-trusses.

"Let $k = 2.5$ when this maximum safe strength is frequently or permanently exerted, as in the case of bridge-trusses."

So much is good; the writer of the article recognizes the difference between the strains on the rods of a roof-truss and those in a bridge, and provides against the more injurious character of the latter by reducing the unit strain for crushing of the wood, using double the factor of safety employed in the roof-truss; but, while thus caring for the safety of the timber, he neglects to make any such provision for the iron rods, and employs in all the formulæ the uniform tension of five tons per square inch. The result of this is that the washers on the rods of a bridge-truss are made *twice as large* as those on the *same rods* if put into a roof. For example, in the table for rods with enlarged ends, the washer for a one-inch rod to bear against pine has a diameter of 4.15 inches for temporary strains, and of 5.73 inches for permanent strains, the bearing area of the first being $12\frac{3}{4}$ square inches, and of the second 25 square inches.

Now, if a given weight, as applied in a bridge, produces a greater or more injurious strain on the surface of the wood under a washer than the same weight in a roof-truss, it must also produce a greater strain on the nut, which ought, then, to be made twice as thick as that of the roof-bolt, and if the theory advanced in the article be correct, the table for the dimensions of nuts to resist "permanent" strains should be revised in this respect.

But this view of the case overlooks the fact that this increased strain must be transmitted by the rod, which also needs enlargement; in fact, the same reasons which lead to increasing the factor of safety for the pressure of the bridge washer point, with even greater clearness, to the necessity of increasing the factor of safety for the tension on the bridge-rod; for there is greater danger to the structure from the failure of a tension-rod, than from the crushing of the fibres under its washer. No engineer would think of designing a railroad-bridge and a roof truss with the same tensile unit strain for the iron rods. If five tons per square inch is safe for the former, seven or even seven and a half is equally safe for the latter, "when the maximum safe tensile strain is seldom exerted." There is no evidence to show that wood is injured by "permanent" strains more than iron, and many facts tend to prove the contrary. Iron is accused of crystallizing under repeated shocks, but no such charge is made against wood, which often bears strains very near its ultimate strength without apparent deterioration.

We shall be safe if we assume the same ratio between the factors of safety for permanent and temporary strains, for the crushing of the wood, and the tension of the rod. A similar thing is done by engineers in proportioning pins of eyebars to prevent crushing of the metal of the eye. This has been the subject of much experiment, and as the result, the bearing surface of the eye on the pin (when not modified by the bending of long pins) has a fixed ratio to the sectional area of the tension-bar. In structures where it is safe to permit a high tensile strain on the bar, the surface of the eye will, *for the same reasons*, bear the increased strain on it.

As with the eye and the nut, so with the washer, to bear against any given material; its surface should have a *fixed ratio* to the net sectional area for the rod; for whatever forces affect one affect the other in like manner. The washer which is suitable for a given rod in a roof-truss, will be equally safe for the same rod in a bridge, both to bear against the same material.

It now remains to determine the ratio of the crushing resistance of wood, to the tensile strength of wrought-iron.

Trautwine says that 1000 lbs. per square inch, indents well-seasoned white-pine $\frac{1}{10}$ of an inch; common yellow-pine about the thickness of writing paper, and ordinary black-oak, cherry or mahogany, not at all. The following tests of the resistance of various woods to indentation perpendicular to grain, made on the Government testing-machine, at the Watertown Arsenal in 1881, are useful for comparison with earlier experiments, and are probably as trustworthy as any tests made. The table is condensed from the report of the Chief of Ordnance, and gives the pressures which produced indentations of $\frac{1}{100}$ inches, and $\frac{1}{20}$ inches respectively. The first column gives the number of tests made, and the highest and lowest results of each series are recorded, as well as the average, to show the amount of variation in different samples. The blocks of wood tested were all clear and seasoned, and tested by pressing a cast-iron block of sixteen or nineteen square inches area against the wood. Most of the specimens were three to four inches thick. Thinner pieces gave slightly higher results. Knots increase the resistance to crushing.

INDENTATIONS PERPENDICULAR TO GRAIN.

Kind of Wood.	Number of Tests made.	Pressures producing indentations in lbs. per sq. in. Indentation of $\frac{1}{100}$ in. Minimum.	Maximum.	Average.	Indentation of $\frac{1}{20}$ in. Minimum.	Maximum.	Average.
Spruce	4	400	600	450	875	1025	969
Whitewood	6	500	500	500	900	1150	966
White-pine	10	400	800	645	875	1160	1033
Oregon pine	1			700			1150
Yellow-birch	2	500	600	550	1650	2000	1825
Ash	2	1000	1000	10 0	1800	1850	1825
Yellow-pine	2	1000	1000	1000	1900	1900	1900
White-maple	2	700	1000	850	1900	2500	2200
Black-walnut	6	1000	2000	1660	2200	2600	2390
Black-walnut	6	1000	1600	1500	2360	2800	2500
White-oak	3	1000	1000	1000	2300	3550	2850

An indentation of $\frac{1}{20}$ of an inch may be taken as the limit of effective resistance of the wood, for beyond this point the fibres begin to shear, and the wood to crack. Inasmuch as with $\frac{1}{20}$ of an inch indentation the wood is practically uninjured, the strain producing this indentation corresponds to the limit of elasticity of wrought-iron in tension rather than to its ultimate strength, and if we use the same factor of safety that measures the ratio of the elastic limit to the working load of the iron rod in any given case, we shall have the same security in the wood against crushing that we have in the iron against tearing apart. The elastic limit in wrought-iron in tension may be assumed at about one-half its ultimate strength; and a factor of safety of five in reference to the ultimate strength is equivalent to a factor of $2\frac{1}{2}$ on the elastic limit. This is the factor employed in the article referred to when the tensile strain in the rod is five tons per square inch.

The values of the constant C' which represent the resistance of the wood to crushing perpendicular to the grain, deduced by Professor Ricker, are .4 of a ton = 800 lbs. per square inch for white-pine, and 1.16 tons = 2320 lbs. per square inch for oak and other hard woods. On the basis of the Government tests given above, the constant for pine seems a trifle small compared with that assumed for oak, and 900 or 1000 lbs. could perhaps be used with safety; but for the present argument it is sufficient to accept 800 lbs., as the limit for white-pine.

Then in the case of a bridge, with a factor of safety of five, we will have a pressure on the wood of $800 \div 2.5 = 320$ lbs. per square inch, and the bearing surface of the washer must be $\frac{10000}{320} = 31\frac{1}{4}$ times the sectional area of the rod when the ends are upset. The dimensions of the washers will be those given in Professor Ricker's table for permanent loads.

In the case of a roof, if our factor of safety for the rods is reduced from 5 to $3\frac{1}{3}$, that for the crushing of the wood will be reduced in the same proportion from $2\frac{1}{2}$ to $1\frac{2}{3}$, and the pressure on the wood to correspond to 12,000 lbs. per square inch tension on the rod, will be $800 \div 1\frac{2}{3} = 480$ lbs. per square inch, and the bearing area of the washer will be $\frac{15000}{480} = 31\frac{1}{4}$ times the sectional area of the rod as in the former case. Therefore the same size of washer should be used in both cases.

If the half-size washer given in the table as suitable for temporary strains were used the pressure on the timber would be $482 \times 2 = 960$ lbs. per square inch, which is greater than the ultimate resistance we have assumed for it. This shows the necessity of using the same sized washers for temporary as for permanent strains, unless the unit strains in the roof are reduced to those employed in a railroad bridge; but an architect who should design a roof on that basis might wait in vain for a second client.

Very respectfully, NORMAND S. PATTON.

LIGHTNING AND SOIL-PIPES.

BOSTON, September 26, 1883.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — I would like to enquire, through you, of Colonel Waring, Mr. Philbrick, or any of the conscientious engineers who counsel the carrying of soil-pipes through the roof, what precautions they take in the matter of protecting country buildings from lightning where there is no sewer or water service whose pipes offer good ground connections. That is, do they advise and enforce connecting the soil-pipe with the existing lightning-rods on the building, supposing there are any, or do they consider the soil-pipe in itself an efficient and sufficient conductor, supposing there are no conductors proper? What has called the matter afresh to my mind is that I have been lately called to examine and test a complicated system of plumbing in a large country house. A few years ago the system was rearranged by an architect, and an endeavor was made to carry out the best views then in vogue, but when it came to carrying the soil-pipe through the roof it was found that it would come out so near a lightning-rod that the possible danger arising from such approximation occurred to both architect and plumber, and a halt was called while advice from a man who stands well in this community as a practical lightning-rod man was sought and obtained. His advice was such that the soil-pipe was turned into a spare ventilation flue below the roof, the lower end of which was sealed up.

I believe this was a mistake, and that, were it not that the deck-roof is tinned and the lightning-rods (copper ribbons) soldered to this tin roof, the arrangement would be more likely to cause an eruptive discharge between the rod and the soil-pipe, than if the soil-pipe had been carried through the roof. Perhaps, considering the protection offered by the tin roof, the present arrangement is well enough so far as lightning protection is concerned, though I disapprove of a main soil-pipe terminating in a brick flue of any sort. But I would like to hear from others an opinion as to whether my views or those of the lightning-rod man are sound. If my views are sound I would like to know if architects and engineers are as careful as they should be when running up soil-pipes to see that so important a conductor is properly connected with the system of lightning-rods which is already in place or is afterwards to be put up.

A peculiarity of the electrical protection of the house in question is, so far as I can determine, that although the conductors are copper and are properly connected with gutters and down-spouts, which are also of copper, yet the only earth-connection is in the rain-water cistern, an arrangement which I have supposed to be peculiarly adapted to produce explosions. Yet the house has stood for thirty years in a high exposed situation and has suffered no injury.

Very truly yours, W.

REFERRED TO OUR CONTRIBUTORS.

BOSTON, September 25, 1883.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Will you please publish as soon as possible a plan of a house that will not cost more than one thousand dollars or less, that is a double house for two families, of about five rooms for each. You will publish them at once.

And oblige, J. T. B.

[If any architect can furnish the *rara avis* our rather peremptory correspondent desires we will consider the question of letting it try its wings in our pages. — EDS. AMERICAN ARCHITECT.]

BUFFALO, N. Y., September 12, 1883.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Sirs, — I think it would be a good policy and please a great many subscribers if you would publish a series of counters, and office-screens, finishes, etc. Please consider the matter and oblige,

Yours truly, C. W. SUMNER.

ORIGIN OF THE STEPPED-GABLE.

MINNEAPOLIS, MINN.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Gentlemen, — Will you please inform me at what date and where the "stepped-gable," so common in German and Scotch houses, originated, and oblige, A STUDENT.

[THE "crow-stepped" or "corbie-stepped" gable was originally devised as a mode of fortifying the end of a roof of that shape, the steps forming a kind of parapet, which was sometimes pierced with loop-holes. In time of peace, the same form of gable afforded an opportunity for passing easily from one side to the other of a steep roof. The shape seems to have pleased the Scotch and Germans, who retained it, more or less modified, long after its original use was forgotten. — EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS.

EL PASO DEL NORTE, MEXICO. — Paso del Norte is three hundred and sixty years old. It has one lonely street exactly seven miles long. Its principal point of interest is the Gaudaloupe Cathedral, which is over three hundred years old, and has had no repairs for at least two hundred years. It has no pews. There is only a piece of carpet spread in front of the altar, and on this the worshippers kneel one at a time. Generations have come and gone, and nothing has been done to improve this ancient town until now, when they have begun the restoration of the Grand Plaza. The Mexican Central Railroad Depot is the only modern edifice in the place. — *Philadelphia Press.*

COMPARATIVE STRENGTH OF MINNESOTA AND NEW ENGLAND GRANITES. — Mr. N. H. Winchell, of Minneapolis, Minn., recently had occasion to test the qualities of the building stones of Minnesota, and the results obtained are interesting in many respects. Mr. Winchell subjected the stones to the usual tests of crushing, and used for this purpose specimens consisting of two-inch cubes. These specimens included sandstones, limestones, granites and trap rocks to the number of about one hundred. Great care was taken in preparing them, and they were sent to General Gillmore at Staten Island, and there subjected to the tests, which were applied by crushing the samples, one in the direction of the schistose structure and one across it. Taking the average of the results of twenty samples of Minnesota granites, it appears that the strength of a cubic inch was equal to 26,675 pounds. Allowing eleven per cent difference between the process of crushing between steel plates and wooden cushions, this gives an average for Minnesota granites of 23,318 pounds. Testing New England granites gave for the average of twenty specimens a strength per cubic inch of 14,946 pounds. After discussing several probable sources of error, Mr. Winchell suggested causes why the Minnesota granites may be stronger than those of New England, and among other things stated that those of the Western regions may have been less changed by decay. The lateness of the glaciation to which they were exposed may have left them comparatively fresh through the recent removal of a considerable thickness. — *Iron Age.*

EXPECTED DISCOVERIES AT ROME. — Students of Roman art and archæology must prepare themselves for a campaign of unprecedented activity and importance. I do not think I exaggerate in declaring that at the present moment no other capital in Europe can be compared to Rome as regards the extent and the importance of public works closely followed by private enterprise. The embankment of the Tiber, the new railway station in the Trastevere, the military and city hospitals, the barracks for three regiments, the military school, the palace of the national bank, the law courts, the Ministry of War, the monument to Victor Emmanuel, the Via Nazionale from Piazza di Venezia to Ponte S. Angelo, the Via del Tritone carried as far as the Piazza Colonna, the widening of the Corso, the new bridges on the Tiber, the twenty-one large fortresses, the new ramparts, or inner circle of defence, twenty-two miles long, the new drilling and parade grounds between the Tiber and the Via Angelica, the new system of drainage — all these works in course of execution require the excavation of many millions of cubic metres of ground, every one of which may provide a surprise to the archæologist. Private houses are built or rebuilt at the rate of three hundred per annum. The Government and the Municipality keep the strictest watch over this formidable amount of work and excavation with a fair success, considering that every guard has to keep an eye over one thousand or more workmen. Those who are always ready to criticise what their neighbor does, those who denounce to the world from time to time the disappearance, the demolition of some bits of Roman ruins, ought to remember that this immense amount of work, necessary for the transformation of Rome into a clean, healthy, comfortable town, requires some sacrifice. Up to the present time many have been pleased to consider the population of Rome as a kind of *main-morte* of the scientific world, whose mission is simply to sit as a model for artists — to whom must be applied what the Gospel says of the maniac from Gerasa: "*Vestimento non induebatur; neque in domo manebat, sed in monumentis.*" At any rate, the experience of these last twelve years has shown that the interests of art and archæology are not injured or compromised by the material improvement of the town; that our antique, mediæval, and Renaissance monuments do not lose a particle of their interest if they are delivered from their shameful and dirty surroundings. The building of the new quarters and the improvement of the old ones are an astonishing source of daily discoveries. The stock of the old Capitoline Museum has been more than doubled in less than ten years; the map of the ancient town has been traced and surveyed in regions which were marked by a blank space in Canma's plan. When the *piano regolatore* of the town was submitted for examination to a committee of archæologists, they had only one point to criticise — the demolition of the bell-tower of S. Benedetto in Piscinula! — and I dare say the *piano regolatore* involves a series of works to the amount of three hundred million lire. This detail shows how careful we are in planning and in carrying on the improvements of our city, and how little we need to be taught by hysterical women how to take care of our monumental treasures. — *Correspondence London Athenæum.*

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.]

285,371. EAVES-TROUGH HANGER. — Jonathan P. Abbott, Cleveland, O.

285,378. BATH-TUB ATTACHMENT. — Geo. P. Bassett, Cincinnati, O.

285,382. LOCK. — Joseph Breyer, Cincinnati, O.

285,397. SMOKE-CONSUMING STOVE. — Edwin L. Dodge, Somerville, Mass.

285,404. T-SQUARE. — Joseph Gardam, Brooklyn, N. Y.

285,405. FOLDING-SQUARE AND SCALE-HOLDER. — William H. Goldsberry, Cedar Rapids, Iowa.

285,415. WRENCH. — William E. Lawrence, New York, N. Y.

285,437. ELEVATOR-ATTACHMENT. — Jas. D. Sinclair, Brooklyn, N. Y.

285,440. AUGER. — Jas. Swan, Seymour, Conn.

285,446. CUTTING-NIPPERS.—Henry B. Todd, Meriden, Conn.

285,449. WRENCH. — Charles D. Wells and Charles A. Newlin, Millville, N. J.

285,452. HOLLOW-TILE ARCH FOR CEILINGS. — Peter B. Wight, Chicago, Ill.

285,459. FIRE-EXTINGUISHING SYSTEM. — Charles E. Buell, New Haven, Conn.

285,471. FIRE-ESCAPE. — William Henry Harrison Doane, Morganville, Kans.

285,484. SCREW-DRIVER. — Micajah C. Henley, Richmond, Ind.

285,485. HEATING-APPARATUS. — Hezekiah Howe, Wellsville, N. Y.

285,505. SASH-BALANCE. — William Ormsby, Boston, Mass.

285,533. COMBINED VENTILATING AND HEATING APPARATUS. — Corydon Wheat, Geneva, N. Y.

285,539. SYSTEM OF HEATING AND VENTILATING BUILDINGS. — Nathaniel Wheeler, Bridgeport, Conn.

285,542. FIRE-ESCAPE.—Richard E. Andrew, Shepherdstown, W. Va.

285,546. BENCH-PLANE. — Leonard Bailey, Hartford, Conn.

285,564. FIRE-ESCAPE. — Oliver N. Brooks, Guilford, Conn.

285,574. PLUMBER'S TRAP.—Robert Clarke, Brooklyn, N. Y.

285,575. DOOR-HANGER. — Benjamin J. Cloes, Lake Bluff, Ill.

285,583. MITRE-BOX AND JACK-BOARD. — Henry W. De Courtenay, Boston, Mass.

285,601. BEVEL-SQUARE. — Michael Farley, Portland, Oreg.

285,603. FIRE-ESCAPE. — John R. Fell, Philadelphia, Pa.

285,605. LADDER. — Orlando V. Flora, Madison, Ind.

285,606. FIRE-ESCAPE. — Paul Thomas Forsyth, Memphis, Tenn.

285,625. COMBINATION DAYLIGHT-REFLECTOR. — Thaddeus Hyatt, New York, N. Y.

285,636. METALLIC TILE FOR FLOORS, ETC. — Andrew H. Lord, Chicago, Ill.

285,658. SASH-LOCK. — Frederick Osterhage, Vincennes, Ind.

285,663. PACKAGE-ELEVATOR. — Frank I. Pearce, Chicago, Ill.

285,669. RATCHET-WRENCH. — Albert E. Petticrew, Springfield, O.

285,681. SAFETY-GUARD FOR ELEVATOR-HATCHWAYS. — John P. Richardson, Cambridge, Mass.

285,690. FIRE-ESCAPE LADDER.—Stephen D. Shattuck, Cohocton, N. Y.

285,740. FIRE-ESCAPE. — Emil C. Eyl, Jefferson City, Mont.

285,744. FIRE-ESCAPE. — James H. Frazee and George M. Culver, Rushville, Ind.

285,756. FIRE-ESCAPE. — William A. King, Cleveland, O.

285,759. STABLE. — George A. Knight, Lamartine, Pa.

285,762. SAFETY-ATTACHMENT FOR ELEVATORS. — Oliver S. Nowell, Boston, Mass.

285,770. GREASE-TRAP FOR SINKS. — John Tucker, New York, N. Y.

285,774. APPARATUS FOR RAISING WATER FROM WELLS HAVING WATER-BEARING STRATA OF DIFFERENT HYDROSTATIC LEVELS. — John B. Yeagley, Indianapolis, Ind.

285,775. SPIRIT-LEVEL. — Geo. B. Youngs, Rochester, N. Y.

285,776. KILN FOR BURNING TILES, EARTHENWARE, ETC. — David Lasmmle, Fort Wayne, Ind.

SUMMARY OF THE WEEK.

Baltimore.

BUILDING PERMITS. — Since our last report thirty-one permits have been granted, the more important of which are the following: —

J. Schneider, 2 three-st'y brick buildings, s w cor. Fairmount and Collington Aves.

F. D. Sauerwein, 10 two-st'y brick buildings, e s Fulton Ave., n of Lorman St.

J. A. Swingley, 2 three-st'y brick buildings, w s Arlington Ave., between Edmondson Ave. and Franklin St.

Winchester Mason, 10 two-st'y brick buildings, s s Randall St., between Light St. and Riverside Park.

J. M. Honewell, 8 two-st'y brick buildings, w s Vincent Alley, s of Edmondson Ave.

M. C. Irvin, 2 two-st'y brick buildings on n s, and 2 two-st'y brick buildings on s s of alley in rear of Mount St., between Fayette and Lexington Sts.

M. Campbell, 2 three-st'y brick buildings, n s Bank St., w of Central Ave.

Enoch Pratt Library, one-st'y brick building, s w cor. Hollins and Calhoun Sts., and one-st'y brick building, n e cor. Fremont and Pitcher Sts.

Richard Russell, two-st'y brick stable in rear s e cor. Mount and Tennant Sts.

A. Gregg & Co., four-st'y brick buildings, s w cor. Charles and Barnet Sts.

Jesse B. Irvine, 18 three-st'y brick buildings, e s North St., between Lanvale and Townsend Sts.; 4 three-st'y brick buildings, s s Townsend St., e of North St.; 4 three-st'y brick buildings, n s Lanvale St.

L. Turnbull, 14 three-st'y brick buildings, s s Lanvale St., between Carter St. and Greenmount Ave.

W. T. Phillips, 5 three-st'y brick buildings, s s Mulberry St., w of Gilmor St.

Allen D. Spencer & Co., 2 three-st'y brick buildings, w s Battery Ave., between Clement and West Sts.

Chas. Wheeler & Co., 3 two-st'y brick buildings, w s Battery Ave., between Clement and West Sts.

John W. Locke, two-st'y brick building, s s Orleans St., between Broadway and Ann St.

Geo. Sanders, three-st'y brick building, e s Gilmor St., between Montrose and Fayette Sts.

Lineweaver & Co., four-st'y brick building, s w cor. Grantby St. and Slemmer's Alley.

Dr. John I. King, 2 three-st'y brick buildings, e s Carey St., between Harlem and Edmondson Aves.

The labor market quotations remain unchanged.

Boston.

BUILDING PERMITS. — *Brick.* — *Unnamed Pl.*, rear Forty-seventh St., Ward 14, for Henry Souther, stable, 24′ x 44′, one-st'y mansard; Wm. T. Eaton, builder.

Dorchester Ave., cor. Preble St., Ward 15, for David H. Gear, dwell. and store, 26′ x 53′, four-st'y flat; J. F. Smith, builder.

Beacon St., Nos. 382 and 384, Ward 11, for Samuel T. Ames, 2 dwells., brick and stone, 24′ x 66′, three-st'y mansard; S. T. Ames, builder.

South St., cor. Beach St., Ward 12, for Wm. P. Blake and John B. Osborne, mercantile, 27′ 6″ x 110′ 6″, five-st'y flat; James H. Kelly, builder.

Commonwealth Ave., No. 266, Ward 11, for John W. Shapleigh, dwell., 25′ x 60′, three-st'y mansard; Antoine Xavier, builder.

Vale St., Nos. 43 and 45, rear, Ward 21, for Dennison Manufacturing Co., manufactory, 42′ x 80′, three-st'y flat; D. H. Jacobs & Son, builders.

Wood. — Cambridge St., rear, near Howard St., Ward 25, for N. & G. D. Chamberlain, 2 dwells., 15′ x 20′, two-st'y flat; Otis Wheeler, builder.

Crosby St., near Washington St., Ward 20, for Patrick Crosby, dwell., 21′ x 31′, two-st'y pitch; John Gately, builder.

Polk St., Ward 3, for A. O. Smith, et als., storage, 31′ x 31′, one-st'y pitch.

Crawford St., near Elm Hill Ave., Ward 21, for Mrs. E. D. Mallory, dwell., 36′ 6″ x 47′, two-st'y pitch; Spinney & Haddock, builders.

Waumbeck St., near Warren St., Ward 21, for Neil McNeil, dwell., 26′ x 41′, two-st'y pitch; McNeil Bros.

Hemlock St., near Washington St., Ward 23, Elizabeth Patterson, stable, 14′ x 18′, one-st'y pitch; Peter Heany, builder.

Cottage St., rear, near Dudley St., Ward 20, Louis S. Adams & Co., storage coal, 30′ x 125, one-st'y pitch; John Horsford, Builder.

Harvest St., near Boston St., Ward 15, for L. E. H. Jones, stable, 22′ x 26′, one-st'y pitch; C. E. Ricker, builder.

Florence St., Ward 23, for S. W. Cunningham, dwell., 22′ 5″ x 28′, two-st'y pitch; E. F. Moulton & Co., builders.

Sparhawk St., near Cambridge St., Ward 25, for Frank G. Newhall, 2 dwells., brick and frame, 24′ x 68′, two-st'y pitch; Henry M. Perry, builder.

Charles St., near Dorchester Ave., for Benj. D. MacDonald, dwell., 22′ x 30′, two-st'y pitch; Isaac Atwood, builder.

Evans St., rear, near Thetford St., Ward 24, for Samuel T. Long, stable, 20′ x 24′, one-st'y pitch; S. T. Long, builder.

Wakulla St., near Dale St., Ward 21, for John O. N. Stultz, 3 dwells., 21′ x 31′, two-st'y pitch; John Polton, builder.

K St., No. 113, Ward 14, for J. Frank Foster, dwell., 24′ 6″ x 35′, two-st'y mansard; L. D. Robinson, builder.

Chicago.

FLATS. — Jno. Addison is architect for three-st'y flats on Rush St., for S. P. Hanson; cost, $26,000.

E. Baumann, architect, has made the plans for three-st'y flats on Lincoln Ave., for John Woltz; cost, $8,000.

HOUSES. — Wheelock & Clay are architects for 5 two-st'y dwells. on Groveland Park Ave., for U. P. Smith; cost, $25,000.

P. C. Hanford will build a two-st'y dwell. on Calumet Ave.; cost, $15,000.

Mrs. E. G. Russell will erect a two-st'y dwell. at 525 West Monroe St.; cost, $10,000; R. G. Stiles, architect; Snow & Alsop, builders.

Bauer & Hill have completed plans for a three-st'y dwell. to be erected on Lasalle Ave., for Chas. Halla; cost, $10,000.

B. W. S. Clark, architect, has plans completed for two-st'y dwell., stone front, terra-cotta trimmings, to be built for Mr. Long, at cor. Forty-third St. and Wolcott Ave.; cost, $10,000.

STORE. — Charles A. Dupee will erect a four-st'y store on Lake St.; cost, $10,000; Dixon & Townsend are the architects.

STORE AND FLATS. — P. W. Ruehl, architect, has made plans for three-st'y store and flats on West Twelfth St.; cost, $10,000; M. Schmitt, owner.

H. Daniels will build 2 three-st'y stores and flats on Cottage Grove Ave.; cost, $13,000; architect, L. Klinkerfues.

BUILDING PERMITS. — Charles Heinbach, two-st'y dwell., 111 West Eighteenth St.; cost, $3,600.

S. P. Hanson, three-st'y flats, 49 and 51 Rush St.; cost, $26,000; architect, Jno. Addison; builders, Barney & Rodtz.

Frank Hawat, two-st'y dwell., 735 Loomis St.; cost, $3,200.

E. Schrieder, two-st'y store and dwell., 627 Blue Island Ave.; cost, $4,400.

M. Schmitt, three-st'y store and flats, 320 West Twelfth St.; cost, $10,000; architect, P. W. Ruehl; builders, Swartz & Keys.

H. Daniels, 2 three-st'y stores and flats, 3842 and 3844 Cottage Grove Ave.; cost, $13,000; architect, L. Klinkerfues; builder, H. Appel.

N. Barnes, two-st'y flats, 328 Webster Ave.; cost, $5,000; architects and builders, Scott & Gage.

M. Suntanka, two-st'y store and dwell., 614 West Seventeenth St.; cost, $4,500.

Mrs. E. G. Russell, two-st'y dwell., 525 West Monroe St.; cost, $10,000; architect, R. G. Stiles; builders, Snow & Alsop.

Chas. A. Dupee, four-st'y store, 240 Lake St.; cost, $10,000; architects, Dixon & Townsend; builder, R. E. McKay.

Turner & Bond, 20 cottages, Hanover St., near Thirty-first St.; cost, $25,000.

A. Erickson, three-st'y flats, 166 Townsend St.; cost, $4,000.

P. Smith, two-st'y dwell., 351 South May St.; cost, $2,800.

C. Champion, 3 two-st'y dwells., 31 to 35 Hoyne Ave.; cost, $6,000.

John Woltz, three-st'y flats, 143 Lincoln Ave.; cost, $8,000; architect, E. Baumann; builder, G. Eberlen.

S. Nelson, two-st'y dwell., 458 Belden Ave.; cost, $5,000; architect, L. G. Hallberg; builder, J. Downey.

Jacob Hepp, warehouse, 75 to 81 West Chicago Ave.; cost, $3,000.

C. E. Peterson, three-st'y store and flats, 3226 State St.; cost, $5,500.

W. L. B. Jenney, three-st'y dwell., 116 Third Ave.; cost, $4,000.

D. Fitzpatrick, three-st'y dwell., 451 Taylor St.; cost, $5,000; architect, A. J. York; builder, F. Fenner.

V. Sevora, two-st'y dwell., 693 West Eighteenth St.; cost, $3,000.

James Scheahan, two-st'y dwell., 2357 Prairie Ave.; cost, $5,000; architect, Cass Chapman; builder, J. O'Shay.

U. P. Smith, 5 two-st'y dwells., 3224 to 3239 Groveland Park Ave.; cost, $25,000; architects, Wheelock & Clay; builder, W. E. Wheeler.

H. Copeland, two-st'y dwell., 703 Congress St.; cost, $3,500.

J. H. Swan, barn, 2623 Michigan Ave.; cost, $4,000; architects, Treat & Foltz; builder, A. Bickmolt.

F. Tumler, two-st'y store and dwell., 738 Milwaukee Ave.; cost, $6,000; architect, H. Kley; builder, E. Menshing.

Thos. Lorenz, two-st'y dwell., 103 Mather St.; cost, $3,800.

Chas. Halla, three-st'y dwell., 592 Lasalle Ave.; cost, $10,000; architects, Bauer & Hill.

W. R. Clark, two-st'y dwell., 512 West Sixteenth St.; cost, $4,000.

Schumacher & Sons, three cottages, 12 and 13 Marvin St.; cost, $2,000.

P. C. Hanford, two-st'y dwell., 2008 Calumet Ave.; cost, $15,000.

J. Fuss, two-st'y dwell., 274 West North Ave.; cost, $3,500.

J. Jensen, 6 cottages, 121 to 131 Coblentz St.; cost, $5,000.

Wm. Cuthbert, two-st'y dwell., 3636 Prairie Ave.; cost, $8,000; builder, B. N. Branch.

J. Huber, two-st'y livery-stable and dwell., 285 North State St.; cost, $4,800; architect, Otto Matz; builder, Geo. Fries.

E. Heno, three-st'y store and flats, 479 Sedgwick St.; cost, $6,800; architect, J. Schweitzer; builder, Geo. Fries.

Dr. J. R. Bucan, two-st'y flats, 694 Chicago Ave.; cost, $4,500; architect, D. Wilson; builders, Wilkin & Holman.

Milwaukee, Wis.

HOUSES. — Ground has been broken for a dwell., to cost $11,000, for Dr. Danforth, on the n w cor. of Division and Van Buren Sts.

William Pilger, residence on Astor St., First Ward; cost, $5,000.

Mrs. Terry is to have a house, to cost about $10,000, built on the East Side.

Plans for the new Colby Block, on the n w cor. of Milwaukee and Mason Sts., are about completed.

BUILDING PERMITS. — J. B. Wright, frame dwell. for Hugh Reynolds, on Harmon St., Fifth Ward; cost, $4,000.

Joseph Boehm, frame house for Mrs. Phelan, on Virginia St., Fifth Ward, to cost $2,700.

George Gruendler, brick dwell. on Oneida St., Seventh Ward; cost, $4,000.

William Pilger, brick dwell. on Astor St., First Ward, to cost $5,000.

Gilhaas & Co., brick veneered dwell. for L. C. Kommonda, on Fourth St., Second Ward; cost, $3,000.

O. Knie, brick dwell. for Dr. Danforth, on Division St., First Ward; cost, $11,000.

J. Pauler, frame store for J. Pauler, on Ninth Ave., Eighth Ward; cost, $3,000.

New York.

APARTMENT-HOUSES. — On Sixty-ninth St., between Second and Third Aves., 12 five-st'y brownstone apartment-houses, 25′ x 80′ each, are to be built at a cost of about $200,000: four by Mr. Andrew Kelly, and eight by Mr. C. A. Buddensieck.

Four five-st'y brick and stone flats, three 25′ x 80′, and the other 17′ x 80′, are to be built at a cost of about $72,000, on the s s of One Hundred and Eighteenth St., between Third and Lexington Aves., for Mr. John Walker, from designs of Mr. J. H. Valentine.

FACTORY.—A three-st'y brick factory, 24′ x 80′, is to be built for Mr. Robert Steinhardt, on the n e cor. of Eleventh Ave. and Thirty-seventh St., to cost $10,000, from designs of Mr. Geo. B. Pelham.

HOUSES.—Nine first-class brick and Belleville stone residences, four stories and basement, 16′ 8″ x 65′, with extension, are to be built on the south side of Fifty-fifth St., w of Sixth Ave., for Mr. C. T. Barney, at a cost of $180,000, from designs of Mr. Jas. Brown Lord.

BUILDING PERMITS.—*East Seventy-ninth St., No.* 239, five-st'y brick and brownstone front tenement, tin roof; cost, $17,000; owners, Timothy McAuliffe, 916 Lexington Ave., and Henry G. Gabay, 245 East Fifty-third St.; architect, A. B. Ogden; builders, Cook & Higgins.

One Hundred and Thirty-third St., s s, 75′ w Madison Ave., six-st'y brick brewery, tin roof; cost, $125,000; owner and builder, James Everard, 671-675 Washington St.; architect, Otto C. Wolf.

One Hundred and Forty-fifth St., n s, 400′ e Willis Ave., three-st'y frame dwell., tin roof; cost, $4,000; owner, John Murphy, St. Ann's Ave., cor. One Hundred and Forty-ninth St.; architect, Arthur Arctander.

One Hundred and Fifty-second St., n s, 135′ w Third Ave., 2 three-st'y frame dwells., tin roofs; cost, each, $2,500; owner, Geo. Weis, Bergen Ave., cor. One Hundred and Forty-eighth St.; architect, Arthur Arctander.

Christopher St., s e cor. Bedford St., five-st'y brick tenement and store, tin roof; cost, $25,000; owner, John Totten, 240 West Forty-ninth St.; architect, C. F. Ridder, Jr.

Bedford St., e s, 28′ s Christopher St., five-st'y brick tenement and store, tin roof; cost, $15,000; owner and architect, same as last.

One Hundred and Fourteenth St., n s, 80′ e First Ave., three-st'y brick dwell., tin roof; cost, $4,500; owner, Mrs. Catherine Kehoe, n e cor. First Ave. and One Hundred and Fourteenth St.; architect, John McIntyre.

One Hundred and Eighteenth St., s s, 225′ w Third Ave., five-st'y brick tenement, tin roof; cost, $15,000; owner, John Walker, 233 East One Hundred and Thirteenth St.; architect, J. H. Valentine; builders, Walker & Gelston.

One Hundred and Eighteenth St., s s, 242′ 2″ w Third Ave., 3 five-st'y brick tenements, tin roofs; cost, each, $18,000; owner, architect and builders, same as last.

Broadway, n e cor. Fifty-fifth St., nine-st'y brick and stone flat, brick and cement roof; cost, $420,000; owner, Herman Hoefer, 241 West Forty-third St.; architects, Thom & Wilson.

Eleventh Ave., No. 477, two-st'y brick tenement, gravel roof; cost, $3,000; owner, F. Thorp, 601 West Thirty-eighth St.

Second Ave., n w cor. One Hundred and Twenty-fourth St., five-st'y brownstone front tenement and store, tin roof; cost, $20,000; owner and builder, Michael Fay, 416 East One Hundred and Twentieth St.; architect, J. H. Valentine.

Second Ave., w s, 19′ 11″ n One Hundred and Twenty-fourth St., 3 five-st'y brownstone front tenements and stores, tin roofs; cost, $18,000; owner, architect and builder, same as last.

Vesey St., Nos. 63 *and* 65, five-st'y brick tenement and store, tin roof; cost, $15,000; owner, Ed. M. Cary, East Milton, Mass.; lessee, James P. Bennett, s e cor. Vesey and Jeremiah Sts.; architect, Hugo Kafka.

West Twenty-sixth St., Nos. 455 *and* 457, five-st'y brick factory, gravel roof; cost, $20,000; owner, The John Tragreser Copper Works, 447 West Twenty-sixth St.; architect, M. C. Merritt.

Eighty-second St., n s, 115′ w Fourth Ave., 5 four-st'y brownstone front dwells., tin roofs; cost, each, $17,500; owner, Silas M. Styles, 143 West One Hundred and Thirtieth St.

Anderson Ave., w s, 100′ s Highbridge St., 2 two-st'y frame dwells., tin roofs; cost, $2,000; owners, Matthew and Cath. Ziegler, Highbridge St., cor. Claremont Ave.; architect, A. Spence.

Grand St., Nos. 383 *and* 383½, four-st'y brick tenement and store, tin roof; cost, $14,000; owner, Antonio Minaldi, 361 Grand St.; architect, B. Walther.

Greenwich St., No. 428, three-st'y brick boiler-house and dwell., tin roof; cost, $7,000; owner, Jas. Pye, 215 West Forty-fifth St.; architect, Thos. R. Jackson.

Seventy-third St., s s, 300′ w Ninth Ave., 3 four-st'y brownstone front dwells., tin roofs; cost, total, $54,000; owner, Anna McDonald, 271 East Seventy-Eighth St.; architect, Jas. E. Ware; builder, Chas. McDonald.

Third Ave., e s, 145′ n One Hundred and Fiftieth St., three-st'y brick dwell., tin roof; cost, $4,000; owner, Peter Kirchhof, cor. Third Ave. and One Hundred and Fiftieth St.; architect and carpenter, Henry Piering; mason, Chas. Huffen.

East Fortieth St., No. 312, two-st'y brick stable and dwell., tin roof; cost, $10,000; owner, Ann Killaan, on premises; architect, Albert Wagner; builder, Gordon Bros.

Twenty-eighth St., foot of E St. (Bellevue Hospital), five-st'y brick dwell., iron and slate roof; cost, $15,000; owner, Dept. of Public Charities and Correction, City of New York, 66 Third Ave.; architect, Jos. M. Dunn; builders, Moran & Armstrong.

ALTERATIONS.—*West Seventy-fifth St., No.* 318, raise one st'y, change stairs and elevator, take out east wall, and put in girders and posts; cost, $16,000; owner, Maria Moss, 421 West Twenty-second St.; architect, G. H. Budlong.

Philadelphia.

BUILDING PERMITS.—*Sixteenth St.*, e s, n of Dickinson St., 12 three-st'y dwells., 16′ x 50′; W. R. Matchett, owner.

Dickinson St., n s, w of Fifteenth St., 22 three-st'y dwells., 16′ x 50′; W. R. Matchett, owner.

Sixteenth St., w s, s of Dickinson St., 6 three-st'y dwells., 16′ x 50′; W. R. Matchett, owner.

Mole St., e and w s, between Reed and Dickinson Sts., 31 two-st'y dwells., 14′ x 38′; W. R. Matchett, owner.

Beach St., e s, s of Otis St., two-st'y stable, 37′ x 94′; Cook & Furman, contractors.

Madison Ave., s s, between Emerald and Jasper Sts., 8 two-st'y dwells., 15′ x 44′; D. Trainor, contractor.

Collins St., cor. Huntingdon St., stable, 30′ x 40′; Chas. Yeltman, owner.

Adam St., s s, w of Emerald St., three-st'y dye-house, 44′ x 153′; Firth & Foster Bros., owners.

Almond St., n of Lehigh Ave., two-st'y stable, 20′ x 34′; Frank Conroy, contractor.

Tasker St., n s, e of Second St., two-st'y store and dwell., 20′ x 26′; Jno. Haglet, owner.

Lawrence St., cor. Orkney St., between Huntingdon and Cumberland Sts., 18 two-st'y dwells., 13′ x 26′ and 16′ x 40′; F. Lambrecht.

Carlisle St., n of Susquehanna Ave., two-st'y stable, 30′ x 34′; H. Waters, contractor.

Cedar St., e s, n of Somerset St., two-st'y dye-house, 45′ x 110′; Edward Dingler, contractor.

Thirteenth St., cor. Snyder Ave., one-st'y car-house, 84′ x 200′; Wm. McPherson, contractor.

North Second St., No. 1910, three-st'y store and dwell., 16′ x 50′; Ed. J. Devlin, owner.

Walnut Lane, near Township Line, two-st'y dwell., 18′ x 34′; Jno. Breidlin, contractor.

Haines St., e of Limekiln Pike, 4 two-st'y dwells., 15′ x 30′; E. McDermond.

Neff St., s s, e of Melvale St., two-st'y store and dwell., 16′ x 20′; Thos. Cassady, contractor.

Mill St., n s, e of Cumberland St., engine-house and picker-room, 40′ x 77′; A. Jenkins, contractor.

Fifteenth St., n of Columbia Ave., 2 three-st'y dwells., 18′ x 70′; J. S. Albright, owner.

Twenty-second St., cor. Walnut St., two-st'y addition to Sunday-school building, 22′ x 75′; J. A. Decker, contractor.

York St., above Green Lane, addition to dwell., 32′ x 46′; W. W. Grubb & Bro., contractors.

North Front St., No. 2420, three-st'y dwell., 18′ x 40′; Thos. Crampton, owner.

Tacony St., w s, n of Margaretta St., two-st'y store and dwell., 14′ x 34′; Chas. Strickler, contractor.

Armat St., e of Main St., 5 three-st'y dwells., 22′ x 28′; A. Reiver, owner.

North Eighth St., No. 149, three-st'y dwell. and store, 16′ x 42′; F. Thurwanger.

James St., s w s, between Thompson and Edgemont Sts., 8 two-st'y dwells., 15′ x 28′; Chas. Judge.

Pearl St., w of Thirty-third St., two-st'y stable, 27′ x 34′; Geo. D. Miller, owner.

Reed St., w of Twelfth St., 2 three-st'y dwells., 18 x 60′; D. A. Hall.

Wood St., No. 2227, second-st'y addition to machine-shop, 30′ x 100′; Walker Bros. & Co.

Carpenter St., No. 916, two-st'y brick building, 17′ x 60′; Thos. Bradley, contractor.

Lehigh Ave., e of Bevan St., two-st'y dwell., 18′ x 44′. Thos. L. Kelly, contractor.

Nicholas St., s s, w of Twenty-fifth St., 12 two-st'y dwells.; 14′ x 28′, J. S. Carre, owner.

Hope St., cor. Berks St., three-st'y addition to factory, 21′ x 160′; Montague & White, owners.

Franklin St., cor. Eighth St., above Cumberland St., 4 two st'y dwells., 15′ x 42′ and 15′ x 48′; C. H. Wisler, owner.

Lieper St., above Unity St., two-st'y dwell., 16′ x 46′; B. H. Foulkrod, contractor.

Township Line, cor. Manheim St., two-st'y dwell., 50′ x 50′; Jas. H. Errickson, contractor.

Cadwalder St., e s, n of Thompson St., three-st'y dwell., 17′ x 50′; Jas. McCartney, contractor.

Bacon Lane, between Fisher's Lane and Wistar St., two-st'y stable, 32′ x 62′; Samuel West, owner.

Allegheny Ave., cor. Frankford Road, one-st'y Baptist chapel, 34′ x 57′; S. R. Stewart, contractor.

South Second St., Nos. 1413 *and* 1415, 2 two-st'y stores and dwells., 16′ x 51′; E. Cubberly, contractor.

Nevada St., Nos. 1017 *and* 1019, 2 two-st'y dwells., 16′ x 45′ and 16′ x 50′; W. C. Merritt, contractor.

School Lane, cor. Township Line, four-st'y dwell., 42′ x 85′; C. C. Henciman, Superintendent.

St. Louis.

BUILDING PERMITS.—Thirty-nine brick dwells., thirty frame dwells.

August Meyer, two-st'y brick dwell.; cost, $3,200; R. Richard, builder.

John Long, two-st'y brick dwell.; cost, $3,200; J. J. Wharton, builder.

E. W. Harris, two-st'y brick dwell.; cost, $2,800; J. B. Legg, architect; C. Aufderheide, builder.

Mrs. B. Branconier, two-st'y brick dwell.; cost, $2,700; A. McAllister, builder.

H. Fahlem, two-st'y brick dwell.; cost, $2,800; F. Knittel, builder.

P. Wiesse, two-st'y brick dwell.; cost, $2,900; F. Knittel, contractor.

St. Anthony School, two-st'y brick school; cost, $3,200; J. Rolfes, builder.

George Boller, two-st'y brick dwell.; cost, $3,500; Kledus, architect; J. Steffen, builder.

E. T. Hoffmann, two-st'y brick dwell.; cost, $2,500; Ramsey, architect; E. T. Hoffman, builder.

Washington.

MONTHLY REPORT.—The monthly report is 74 new buildings, and 159 repairs.

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

Cor. Eleventh and M Sts., s e, two-st'y brick store for J. T. Campbell; cost, $3,000.

Alley bet. Ninth, Tenth, N and O Sts., n w, two-st'y brick livery stable, 95′ x 105′, for Holmes & Thompson; cost, $5,000; D. B. Groff, builder.

New Hampshire Ave., bet. N and P Sts., n w, three-st'y brick dwell. for Mrs. C. L. Bishop; cost, $8,000; A. R. Duryee, architect; Jno. Sweeney, builder.

R St., bet. Ninth and Tenth Sts., n w, two-st'y brick church, to be known as "Mount Pisgah Church;" cost, $11,000; Robert Johnson, builder.

Seventh St., bet. L and M Sts., n w, two-st'y brick store and dwell. for Christian Wagner; cost, $3,500.

Columbia Heights, three-st'y stone dwell. for A. L. Barber; cost, $15,000; T. Chandler, architect.

Seventh St., bet. Q and R Sts. n w, 3 two-st'y brick stores and dwells. for Jno. M. Young; cost, $9,000; Cluss & Shulze, architects; Langley & Gettinger, builders.

B St., bet. Sixth and Seventh Sts., s w, three-st'y brick dwell. for W. E. Thompson; cost, $7,000.

G St., bet. Twenty-first and Twenty-second Sts., n w, three-st'y brick dwell. for Robert Reyburn; cost, $4,000; S. Plumley, builder.

LATEST.

Brooklyn.

BUILDING PERMITS.—*Commercial St.*, n s, 300′ e Bell St., nine-st'y gravel sugar refinery, gravel roof; cost, $60,000; owners, Havemeyer Sugar Refining Co., Greenpoint.

Eighteenth St., n s, 400′ w Fifth Ave., 2 two-st'y and basement brick dwells., tin roofs; cost, total $8,000; owner, L. Lockman, Eighteenth St., bet. Fourth and Fifth Aves.; architect and builder, W. J. Conway.

Atlantic Ave., s s, 140′ w Classon Ave., 2 one-st'y frame dwells., office and shed, tar and gravel roofs; cost, $2,300; owner, Estate of Abner Chichester, 318 Monroe St., New York City; architect, J. V. McKee; builders, McKee Bros.

Hancock St. s s, 250′ e Lewis Ave., three-st'y brick tenement, gravel roof; cost, $4,000; owner, John T. Sullivan, Fulton St., cor. Reid Ave.; architect, J. Pettet; builder, P. Sullivan.

St. John's Place, s s, 222′ 2′ w Eighth Ave., 2 three-st'y brownstone front dwells., tin roofs; cost, each, $10,000; owner and builder, Wm. Johnston, 96 Taylor St.; architects, Parfitt Bros.

Broadway, s w cor. Willoughby Ave., 3 four-st'y and attic brick buildings; cost, $80,000; owner, Benj. T. Warner, 81 Morton St.; architects, Parfitt Bros.

Graham Ave., s w cor. Devoe St., four-st'y store and tenement, tin roof; cost, $7,000; owner, Charles Kinken, 302 Humboldt St.; architect, E. F. Gaylor; builders, J. McQuaid and Thoma & Wade.

Willoughby Ave., s s, 100′ w Marcy Ave., 2 three-st'y brownstone front dwells., tin roofs; cost, each, $6,000; owners, architects and builders, Colson & Reiners, 81 Grand Ave.

Floyd St., n s, 81′ e Marcy Ave., 3 three-st'y frame double tenements, tin roof; cost, $3,800 each; owner, Andrew Froelich, 202 Stockton St.; architect, T. Engelhardt; builder, J. Fuchs and Eich Bros.

Chauncy St., s s, 140′ w Ralph Ave., 4 two-st'y frame dwells., gravel and felt roofs; cost, each $2,500; owner, architect and builder, Baldwin Pettit, 295 Chauncey St.; mason, E. Sutterline.

Commercial St., n s, 300′ e Bell St., seven-st'y brick sugar refinery, gravel roof; cost, $40,000; owners, architects and builders, Havemeyer Sugar Refining Co., Greenpoint; mason, J. B. Woodruff.

Lafayette Ave., s s, 170′ w Franklin Ave., 4 two-and-one-half-st'y brownstone front dwells., tin roofs; cost, each, $5,500; owners and builders, Lambert & Mason, 148 Putnam Ave.; architect, I. D. Reynolds.

Pacific St., s w cor. Emmet St., two-st'y brick stable, tin roof; cost, about $5,500; owner, E. C. Swift, Boston, Mass.; architect, A. B. Campbell; carpenter, B. F. Bailey.

Huron St., No. 179, n s, 150′ e Manhattan Ave., three-st'y frame double tenement, gravel roof; cost, $3,800; owner, Jno. Davidson, on premises; architect, James Mulhaul; builders, J. Haford and Port & Walker.

Fifth Ave., n w cor. Fifteenth St., 2 three-st'y brick tenements, tin roofs; cost, each, $7,000; owner and architect, Geo. Ingram, 752 Fifth Ave.; builder, W. Corrigan.

Sackett St., Nos. 424 *and* 426, s s, near Hoyt St., 3 two-st'y brick dwells., tin roofs; cost, total, $8,667; owner, A. J. Dower, 380 Union St.; architect and builder, G. W. Brandt; mason, E. Sutterline.

Melrose St., n s, 175′ from Central Ave., three-st'y frame double tenement, tin roof, cost, $3,300; owner, C. Gossman, Evergreen Ave., cor. Myrtle St.; architect, E. Schrompf; builders, G. Straub and F. Ringer.

PROPOSALS.

BRIDGE. [At Lowell, Mass.]

Sealed proposals will be received at the office of City Engineer, City Hall, Lowell, **until 2 o'clock, of Monday, the first day of November, 1883,** for the temporary pile bridge over Merrimack River, below Central Bridge, Lowell, Mass.

The bridge to be removed from the river and adjoining lands within three weeks from the date of acceptance of the proposal. Bridge consists of forty-seven bents of six piles each.

The right to reject any or all proposals is hereby reserved.

Proposals must be marked "Proposals for Temporary Bridge," and addressed to

ROBT. J. THOMAS,
406 Chairman Committee on Streets.

IRON LIGHT-HOUSE. [At Mosquito Inlet, Fla.]

OFFICE OF THE LIGHT-HOUSE ENGINEER,
FIFTH AND SIXTH DISTRICTS,
BALTIMORE, MD., October 2, 1883.

Sealed proposals will be received at this office **until 2 o'clock,** P. M., **of Tuesday, the 16th day of October, 1883,** for furnishing the materials and labor of all kinds necessary for the completion of the metal-work of the Mosquito Inlet Light-house for the coast of Florida.

Plans, specifications, forms of proposal, and other information may be obtained on application to this office.

The right is reserved to reject any or all bids, and to waive any defects.

O. E. BABCOCK,
407 Major of Engineers, U. S. A.,
Light-House Engineer, Fifth and Sixth Districts.

The American Architect and Building News

ADVERTISERS' TRADE SUPPLEMENT.

No. 16. SATURDAY, OCTOBER 6, 1883. Volume XIV. No. 406.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

BOSTON, MASS., September 1, 1883.

COURSE IV. — ARCHITECTURE.

THE President deems this a fitting occasion for calling attention to the course in Architecture in the Massachusetts Institute of Technology, which has been rearranged to suit the increased facilities for artistic as well as technical training now at the command of the Institute. By the coöperation of the other departments, the first-year studies, which are common to all departments, have been revised, so as to allow practice in the drawing of architectural forms to begin in that year, as soon as a moderate degree of skill in the management of drawing instruments has been acquired; and simultaneously with this is given instruction in drawing to scale, together with a somewhat extended course in Projections, preparing the student for the rendering of the problems in architectural design which he will take up immediately at the beginning of the second year, instead of the third year, as heretofore. Through this arrangement, and with the aid of an increased number of instructors, it will become possible to complete, by the end of the third year, the work in design which has heretofore extended throughout the course, leaving the fourth year to be occupied by projects of a more advanced character than have yet been attempted in the Department.

In addition to the work in architectural design, and as an assistance to it, an efficient training will be given in sketching, divided between exercises in water-color, under Mr. Ross Turner, and drawing in black-and-white. The lessons in color will be given out of doors in the pleasant season. Those in black-and white will be devoted chiefly to the drawing of detail, from the casts, both of architecture and sculpture, belonging to the Institute and to the Museum of Fine Arts; but students will be encouraged to form the habit of note-book sketching upon all occasions. In addition to these exercises, two evenings in each week during the winter will be devoted to drawing from the life; all students in the department who have attained suitable proficiency in drawing from the round being admitted to this class.

Instruction in the theory of Fine Art will be given by lectures, the students of the Department, by the favor of the Trustees of the Boston Museum of Fine Arts, being admitted free of charge to those given to the pupils of the School of Painting connected with the Museum, as well as to the use of the galleries; while, in addition to the regular courses, special lectures will be given every year in the Institute itself, by gentlemen distinguished for their professional attainments, upon the arts more immediately related to Architecture. For the next year these special lectures will constitute an extended course on the theory and practice of Decorative Painting, and will be given by Mr. Arthur Rotch and Mr. E. P. Treadwell.

Notwithstanding the increased extent and variety of the artistic work required from students, the study of construction, both theoretical and practical, will be not less comprehensive and thorough than before, and will be combined with actual experience to an extent not previously possible, the increased space at the command of the Institute giving larger opportunities for the handling of tools and materials. Regular visits to structures in process of erection will supplement this work, and will be continued throughout the course, the city and suburbs of Boston presenting an unlimited number of examples both successful and unsuccessful, for the illustration of points in heating, ventilation, drainage, acoustics, and the technical problems of plan and design, as well as matters relating more strictly to construction.

Not the least among the incidental circumstances which serve to assist the efficiency of the school should be counted the friendly interest which has been uniformly shown by the best architects in the city. For many years the Boston Society of Architects has made a liberal annual appropriation of money to be expended in prizes or other encouragements for the students or recent graduates of the Architectural course of the Institute, and its generous sympathy shows no sign of abating; while to the individual members whose courtesy there has been frequent occasion to invoke, the officers of the Department, as well as nearly all the young men who have been students in it, owe a debt of gratitude which is gladly acknowledged.

The Department of Architecture will remain under the charge of Professor Theodore M. Clark; Professor Létang, as before, directing the instruction in design. Mr. Edward F. Ely, a graduate of Brown University, and of the Architectural Department of the Institute, in the class of '82, and during the past academic year assistant in the Department of Applied Mechanics, has been engaged as Instructor in Architecture, and will have the general care of the drawing-room, under Professor Létang, giving also regular instruction in certain branches. The lessons in water-color drawing and sketching will be given by Mr. Ross Turner, who will also lend his aid in the organization of the evening Life School; and Messrs. Arthur Rotch and E. P. Treadwell will, as stated, be the lecturers of the year upon Decorative Art.

In addition to these instructors, the officers of other Departments prepare special lectures for the students in Architecture upon subjects which can be best taught in this way. Thus the lectures and explanations upon the theory and practice of Heating and Ventilation are given by Mr. Woodbridge, of the Department of Physics; and those upon Acoustics by Professor Cross, of the same Department. Parties in Field-surveying are also made up specially for the students in Architecture, under Professor Vose.

FRANCIS A. WALKER,
PRESIDENT.

GREAT IMPROVEMENT IN BLIND AND SHUTTER FASTENINGS.

THERE have been many devices for operating outside blinds, which, however, possessing little or no merit have been one and all discarded after a brief trial. There is, however, a thoroughly practical fixture, lately introduced for this purpose, called the "Dudley Blind and Shutter Worker."

The introduction of this new and useful contrivance for opening and closing outside blinds and shutters from within the house, without raising the window-sash, shade or screen, promises not only to revolutionize the old and crude method of reaching out to fasten and unfasten them, but also to check the rage for substituting inside blinds, which never can replace the former, inasmuch as they fail to prevent the heat entering the house, are expensive, are continually interfering with lace curtains, furniture or window bric-à-brac, and being an open receptacle for dust and cobwebs are a constant trial to housekeepers. Nothing is more annoying than for one to be compelled to raise windows in cold and stormy weather in order to open or close the blinds; wind, rain and snow enter the room, injuring curtains, furniture and carpets, and what is more, endangering the health of the inmates. It is obvious, and physicians all agree to the fact, that colds and bronchial troubles are oftener acquired by exposure to these sudden changes of temperature than in any other way. In summer, likewise, the necessity of removing the window-screens in order to get at the blinds is both troublesome and unpleasant. All of these difficulties are met and overcome by this shutter-worker, which is both ornamental and durable, and which works so easily that a child can operate it. By pulling or pushing a knob inside the

house the blind outside is correspondingly opened or closed; when open it is firmly fastened back against the house, and when closed it is as firmly locked and cannot be opened from the outside. It can also be securely set at any angle, so that where bay-windows are concerned the shutter-worker offers still another inducement. It costs but little more than ordinary blind fastenings, and is undoubtedly the cheapest in the end.

This fixture, covered by some half-dozen letters-patent, is the invention of Russell G. Dudley, of Jersey City, and is manufactured and sold exclusively by the Dudley Blind and Shutter-Worker Company, of New York City. It is endorsed by the Builders' Exchange of Brooklyn, and by many prominent architects in New York, Chicago and other cities of the Union, who are already specifying it in their plans. We congratulate the Company for having an article in which there is so little competition, and although not yet a year old is, according to appearances, an assured success.

Full information can be had by addressing the business manager,

C. S. KEMPTON,
14 Bible House, New York City,
or D. J. MATTESON,
227 La Salle St., Chicago.

THE "PAINT PRESERVER."

There seems to be an indefinite idea with the profession in regard to the purpose of the "Paint Preserver," and it may be to their interest to have further light on the subject.

Forty years' attention to this subject with an earnest desire, based on the practical uses of paints, to improve upon old methods in their application, has not been without important results.

To say that pure linseed oil is the best vehicle to employ in painting is simply reiterating the idea of old painters before me, who made use of it in a fattened state for sign-painting only. They understood that therein lay a principle of exceeding great durability, but how to employ it in common house-painting remained a secret until the present time, when I had the honor of discovering it. No intelligent painter will deny its great value for that purpose over the ordinary or newly manufactured oil. To distinguish it I have very appropriately christened it the "Paint Preserver." Its strong adhesive power to attach any pigment, and to resist the combined forces of the elements, is positive evidence of a claim to its good name. The present system of painting the exterior of houses does no credit to either architect or painter, for in less than three years' time the owner complains that he was cheated in the painting of his house. Why? Because the paint rubs off at the touch. All three of the parties are innocent and excusable, because of ignorance on the subject of painting, but henceforth let not this excuse prevail after it has been shown how it can be prevented.

The "Preserver" in its natural state is transparent and dense as copal varnish, and should be applied first coat in its natural state, and for the second coat add about five pounds of ready-mixed paint to half a gallon of the "Preserver," which two coats form a perfect glossy surface; the next coat should be of paint reduced with one-third oil, and two-thirds turpentine, so as to produce a flat or dead surface. The finishing coat should be mixed, if in colors, half each mixed-paint and "Preserver," but if white, French zinc made ready for use, and one-fourth part "Preserver" mixed with it.

This formula has been carefully tried for eight years with such entirely satisfactory results as to enable me to guarantee its durability for twenty years, or longer.

I am aware of the opposition to be met with from painters and paint dealers, but as an earnest of my sincerity and confidence in the system I freely offer a *reward of five hundred dollars*, which I will pay to any party who shall show me a different plan as good, by any other method or vehicle employed.

ASAHEL WHEELER,
145 Milk Street, Boston.

PATENT RAW-HIDE STRIP FOR CHAIR AND CAR SEATING, ETC.

The attention of the public is called to this valuable product for chair and car seating and sundry other purposes. It is not altogether unknown to the public as a seating, its manufacture having been attempted in a somewhat crude form some years since. Meanwhile its durability has been put to the severest test, both in public places and in private dwellings, and with the most satisfactory results. Ample testimony is at hand to corroborate our statements.

"*Tough as raw-hide!*" For seating it has been used for ages the world over, as the traveller will testify as often as he recalls the time-honored, century-worn chairs; but thus far the hide has been used either in sheets or wide bands. Not until now has any attempt been made to manufacture raw-hide into a delicate strip (resembling cane) for weaving, by which an open, ventilated seat of great strength and durability is secured.

For constant use no seat is so healthful or so comfortable. This is the verdict of physicians as well as the experience of the public generally. The preference now given for the various open or perforated seats speaks loudly for such seating, as shown by the enormous market which has been created for them both at home and abroad.

No attempt is herein made at comparison. We simply contend that a seat of raw-hide strip weaving is the strongest woven, open-ventilated seat in existence. Besides strength it has elasticity and beauty, and with its parti-colored weaving it commends itself as a seating for the better class of chairs, above that of any article in use. Neither is any attempt made to compete with cane or other seating. It is a better article and fills a need not yet met by any other manufacture. Wherever a durable, open seat is demanded or desired, the raw-hide strip must eventually take the place of all other woven seating.

For Car Seating, it is the strongest and coolest seat for summer travel, and in mild and hot climates the only proper article for constant use.

It overcomes the objection made to the use of cane, in that it is durable, open and ventilated, elastic enough to counteract the jar, and affords a hold on the seat sufficiently secure to prevent the slipping forward, which is so uncomfortable upon the closely-woven cane seat.

It is invaluable for cleanliness, and its freedom from vermin, offering no crevices for the accumulation of dirt, nor does it absorb impurities from the atmosphere vitiated by smoking or otherwise.

The attention of railroad officials is especially called to this material because of its great durability, its cleanliness and its beauty.

Chair Seating: — For hotels, restaurants, public halls, colleges, institutions, and dining-rooms, raw-hide will outwear cane many times. The cost of re-seating once with cane will more than pay the first additional cost of raw-hide. The manner of weaving is the same.

The hide is cut by machinery into strips, about the size of ordinary cane, is sold in its natural color — a light brown — or is stained black or any other color desired. It is wound on spools holding from 600 to 1200 feet.

This article has proved to be so tough and enduring, it is being eagerly sought after for a great variety of purposes.

With machinery and every facility in the most complete order we are now prepared to execute orders.

RAW-HIDE MANUFACTURING CO.,
167 Tremont St., Boston.

THE DURHAM SYSTEM.

The following buildings have been furnished with the Durham system during the period March—August, 1883: —

Yale Lock Manufacturing Co., work-shop, Stamford, Conn. William Pickhardt, Esq., private stable, East Seventy-fifth Street, New York City; Mr. E. S. Philbrick, Consulting Engineer. Lieutenant Aaron Ward, U. S. N., country residence, Roslyn, Long Island. John A. Aitken, Esq., lawn-tennis court, One Hundred and Thirtieth Street, Harlem; Mr. W. B. Tuthill, architect. Henry Johnson, Esq., residence, Muncy, Pa. Charles Buek & Co., architects, six residences, Madison Avenue and Sixtieth Street. Charles A. Dana, Esq., residence, corner Madison Avenue and Sixtieth Street.; Charles Buek & Co., architects. Joseph Cummings, Esq., residence, Rutherford, N. J. School of Mines, Columbia College; Mr. C. C. Haight, architect. Messrs. Farley & Son, eight houses, Eightieth Street, near Madison Avenue; Messrs. Thom & Wilson, architects. Mr. George Burnham (Baldwin Locomotive Works), residence, West Philadelphia. Mr. Theodore J. Lewis (Standard Steel Works), residence, West Philadelphia. New York, West Shore & Buffalo R. R. Co.'s depot, offices and hotel, Syracuse, N. Y.; depot at Canajoharie, N. Y.; depot at Port Jackson, N. Y.; and depot at Fultonville, N. Y.

The following work is now progressing and under contract: —

Hoffman House, extension, Twenty-fifth Street, New York City; Mr. John B. Snook, architect. Brooks Brothers, store, corner Broadway and Twenty-second Street; Mr. C. C. Haight, architect. New York, West Shore & Buffalo R. R. Co.'s terminal station, Weehawken, N. J.; ferry-house, West Forty-second Street, New York City; depot at Canastota, N. Y.; depot at Mohawk, N. Y.; depot at Frankfort, N. Y.; depot at Cornwall, N. Y.; and union depot, offices and hotel, Buffalo, N. Y., and all other stations on this line requiring drainage. A. J. Drexel, Esq., residence, Thirty-ninth and Locust Streets, Philadelphia; Mr. T. Roney Williamson, architect. Henry R. Kibbe, Esq., residence at Somers, Conn.; Mr. E. C. Gardner, architect. William H. Vanderbilt, Esq., two residences, Fifth Avenue, and Fifty-fourth Street, New York City; Mr. John B. Snook, architect.

DURHAM HOUSE DRAINAGE CO.,
187 Broadway, New York City.

NOTES.

Messrs. E. T. Weymouth, C. N. Marcellus, and W. Blondel have associated themselves together under the name of the Universal Steam-Heating Company, of New York City. Mr. Weymouth has long been known as an authority in all matters pertaining to steam heating, and, although the firm has been but a brief time in existence they have completed several large contracts, and been awarded the contract for heating the eight-story apartment-hotel of Edward H. M. Just, corner One Hundred and Twenty-second Street and Seventh Avenue, New York. The office of the above firm is No. 13 W. Vandewater Street, New York City.

IMPORTANT PATENT SUITS.

NEW YORK, September 10.

IMPORTANT suits have been entered in the United States District Court by A. L. Bogart, of 22 Union Square, against Mitchell, Vance & Co., Charles H. Hinds, Smith, Bridge & Co., the Electric Supply Company and others. They are suits in equity for infringements of patents held by complainant, covering a frictional electric machine and electric gas burners used in the lighting of gas-jets in *multiple*, as well as every variety of apparatus and burners now in general use for lighting gas-jets *singly* by electricity.

If these patents are held to be valid it will give the complainant a monopoly of the manufacture of these popular and valuable appliances in the United States.