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THOSE of our readers who are not familiar with recent building in New York should seize the first opportunity, on their next visit, to take a walk along Fifty-ninth Street, from the Fifth to the Eighth Avenues, expressly for the purpose of seeing the gigantic apartment-houses which line the southern side of the street. Considered as a novel and characteristic type of building, the New York apartment-house in its present development is worthy of attentive study, and no one who has not had some experience in planning such structures can, without study, appreciate the thought which has been bestowed upon them. It is true that there are many criticisms to be made upon most of them, but in comparison with the tenement-houses of other cities, or even those built in New York a few years ago, they show a vast progress. In place of the "unavoidable" dark rooms, gloomy corridors and unventilated kitchens and bath-rooms of ten years ago, the modern apartment-house has daylight and fresh air everywhere. The old-fashioned "light wells," opening like the shafts of a coal-mine through various parts of the structure, and conveying the smallest possible amount of light, and the largest quantity of foul odors, to the rooms opening upon them, are now unknown in the first-class houses, and in place of them we find curiously shaped courts, so arranged as to light all the secondary rooms without losing their coherence as parts of a single ample air-space. The great courts thus formed, which are to the stagnant well-holes of former days what the open country would be to a tightly-closed box, communicate in many cases with the street by means of large openings, pierced through the mass of the building every ten feet or so in height, so that the air in the streets and that in the courts is practically the same. Inside the building a similar study and comprehension of the means for securing wholesome and cheerful rooms is apparent, and instead of the bedrooms furnished only with borrowed light and air, and the bath-rooms and water-closets in still worse condition, which were once commonly found, the apartment-house of to-day is lighted, even to the most inferior passage-ways, more amply and pleasantly than the majority of self-contained dwellings. Whether the single house is, or is not, preferable to the best apartment-house as a place for living we will not undertake to say, that being a matter quite independent of technical considerations, but no person, however prejudiced against gregarious habitation, could fail, after thorough study, to acknowledge the success with which a new and difficult branch of architectural science has been developed.

THE project for erecting a monument at Washington in memory of the late President Lincoln has been revived, and it is much to be hoped that it may be properly carried out. It seems that the original fund, collected by a national subscription fifteen years ago, has sadly diminished, so that out of nineteen thousand five hundred dollars collected only fifteen hundred was left four years afterward; the remaining eighteen thousand having been spent in paying the salaries and expenses of collecting agents, with about fifty-five hundred to Clark Mills, the sculptor, for designs, and a further sum of nearly fifteen hundred dollars to defray the cost of replacing clothing lost by guests at a great ball held in the Treasury Department in 1869. The small balance left after paying for ball-dresses and the salaries of collecting agents has, however, been wisely invested, and now amounts to about twenty-six hundred dollars. A new Board of Trustees has been elected, and an appeal will probably soon be made for new contributions.

THE managers of the Garfield Memorial at Cleveland have been more fortunate than their friends at Washington, and have not only collected, but kept, a fund amounting to about one hundred and fifty thousand dollars, which they propose to expend without delay in procuring what they suppose to be a work of art, in honor of the deceased President. As might perhaps be expected from a Board of Trustees of such business ability, the art which it proposes to purchase with the money is to be of the very cheapest description, one thousand dollars being appropriated as payment for the design of a monument to cost one hundred and fifty times as much. We hope that the trustees have not set their valuation upon artists' time so low as to defeat their own object by preventing any one, however small his capacity, from accepting their invitation; and to provide, so far as may be in our power, against this unfortunate result, we desire to encourage gravestone manufacturers' apprentices and kindergarten pupils by calling their attention to the fact that the compensation announced for the successful model, although the meanest, with one exception, that we ever knew to be offered for any artistic work, is yet sufficient to pay the fortunate designer a small stipend for the time needed to stick a few ready-made "emblems" and stock modeller's figures around a block, in such a way as to pass muster among a jury of politicians and financiers.

TWO very important results have followed from the recent lock-out of the Pittsburgh window-glass manufacturers, the most unexpected one being perhaps the departure of a considerable number of the Pittsburgh men for Belgium, where they are to work at good wages for the great glass-blowers at Charleroi. Some time ago, one of those excellent reports which have made our consular service so useful quoted the wages for glass-workers in Belgium at from one hundred and ten dollars a month for first-class blowers down to eighteen and twenty for laborers, but the rate has advanced since then, and as Belgium is perhaps the most thrifty and economical country in the world, the real value of any given salary is much greater than it would be here. Of the other operative glass-workers, a considerable number are engaged in perfecting a plan for undertaking the manufacture of glass on their own account, and it is said that the necessary capital is secured, and a favorable place for the business selected. One may be excused for doubting whether a capital of a million dollars will be managed so judiciously by a committee of workmen as to insure the financial success of this undertaking, but it does not follow that the trial is not worth making, if only for the sake of the experience in money affairs which it may bring to men who have no other way of learning one of the most important of all sciences; and it is at least a satisfaction to observe the manifestation of American enterprise and self-reliance among so important and influential a class of men, as a relief from the aimless howling which has hitherto been rather characteristic of labor troubles in Pittsburgh.

THE Congress of Americanists, which met this year at Copenhagen, naturally took advantage of its proximity to the scene of ancient Norse activity to investigate the evidences of the early exploration of America by Norwegian voyagers. That Scandinavian vessels reached the Western Continent at least as early as the twelfth century is certain, and one of the papers read at the Congress maintained that in the year 1000 the advance of the Norse pioneers by way of Greenland, Labrador and Nova Scotia had extended as far south as the present state of Virginia, which the writer believed to have been the Vinland mentioned in the chronicles. These visits were continued, and at some period a considerable settlement seems to have existed on the American coast, although, being maintained probably simply as a post for the convenience of fur-traders, and collectors of timber and dried grapes, no buildings of a permanent character were erected, and no traces now remain of

it. Some ancient maps were laid before the Congress, containing a representation of the coast-line of Greenland, from observations made in the year 1427, and accurately indicating the conformation of portions of the shore which are now rendered inaccessible from the sea by the ice which constantly lines them, and as land surveys could hardly have been within the means of the officers of trading vessels, it would appear that the climate four or five hundred years ago must have been materially warmer than at present. A letter was also presented to the Congress, written by a Norwegian priest about the year 1265, which described certain voyages made toward the north by some Greenland sailors, who reached a strait which opened into a large bay. The description of the strait answers accurately to that of Smith's Sound, and the bay at the end corresponds perfectly with the open Polar Sea which Mr. Morton reached over the ice after so much effort thirty years ago. The account given by Mr. Morton of the variety of animal life found on the shore of the open sea is curiously recalled by the old Norseman's letter, which relates that the sailors from Greenland were unable to land on the shore of their "bay," on account of the multitude of bears.

THE progress of the movement toward the establishment of a uniform standard of time in this country has been so rapid that another month will probably see the new regulations adopted by all important railways in the United States, and by a large number of cities and towns for local purposes, followed, of course, in and near all such towns and railway routes by a corresponding change in the adjustment of private clocks and watches. In Boston, where local time has for many years been very accurately established by daily signals given from the neighboring Observatory of Harvard College, much interest has been felt in the new scheme, and the city authorities, in consultation with the Director of the Observatory, have decided to substitute the new for the old standard on the eighteenth of November next. The difference between mean solar time at Boston and the standard time is fifteen and three-quarters minutes, and on the day appointed the noon signal, which is rung on the fire-alarm bells, instead of sounding at the moment when the sun crosses the theoretical meridian will be deferred for the quarter of an hour necessary to bring it into accordance with the standard noon, which will thereafter stand in place of the theoretical noon. A certain amount of annoyance will undoubtedly be caused by the reform, and as the hours of business will naturally continue the same, the prolonging of every working day sixteen minutes further into the evening will involve an addition of perhaps ten or fifteen per cent on an average to the yearly gas bills of those who live within seven and one-half degrees east of each standard meridian, while the dwellers within an equal space to the west of the meridian will find their expenses for artificial light correspondingly diminished.

A QUESTION of very great importance to the architects of public buildings is raised in *La Semaine des Constructeurs*. It seems that what we should call a "city architect" in a certain town of France made plans some years ago for buildings for municipal purposes. A commission of the municipal council approved the plans, and they were sent to the higher authority, the Council of Civic Buildings, which directed that certain unimportant modifications should be made in them, which was done, and they were put in hand for execution. The buildings are now nearly completed, and are tumbling down. The contractor asks for his money, but the city refuses to pay for the building until the architect shall have accepted it, and this the architect hesitates, very naturally, to do. A commission of experts has decided, unanimously, that the plans are vicious in several points; and the question is, who is pecuniarily responsible for the failure? Must the cost of reconstruction fall upon the architect, or does the approval of his plan, both by the municipal council and the higher authority, with, moreover, the alterations made in his scheme, relieve him of strict accountability; and in this case, is the city bound to pay the bills?

THE reply of *La Semaine* should be taken to heart, for it seems to us certain that the law in the United States would under such circumstances be the same as in France. As to the responsibility of the architect for loss caused by defects in his plans, it asserts without hesitation that the approval of the plans by the two councils does not in any way relieve the architect from the consequences of his carelessness or ignorance. This is in itself important to remember, but *La Semaine* goes on to speak of another consideration more important still. "If, however," it says, "the architect executed the work as the hired agent of the town, that is, as a salaried employé, the town must pay the cost of the reconstruction made necessary by the faults of the plan, since no legal responsibility attaches to an architect unless he has been paid by a percentage on the cost of the work, and not by a regular salary." The principle upon which this reasoning is based forms a part of the common law of this country as well as of France, and takes the form that any person doing work for another person, and paid regular wages, is to be considered the agent or servant of his employer, and the employer is accountable for the faults or carelessness of his servant; while a person doing work for another under a contract, or for a fixed price agreed upon between the parties, is no longer an agent, but is responsible for all the consequences of his own misdeeds, or of those committed by the persons whom he in his turn employs.

ONE of the most recent experiments in chemistry had for its object the liquefaction of ozone, the variety of oxygen which is produced by the passage of an electrical discharge through the gas in its ordinary form. Every one who has stood near an electrical machine of the old-fashioned frictional kind will recollect the peculiar penetrating odor which accompanies the production of sparks, and which is due to the conversion of a part of the oxygen of the air into ozone. By transmitting a succession of electrical discharges through oxygen under great pressure, and cooling the tube containing the gas to a temperature of about one hundred and twenty degrees below zero, a small quantity of a deep blue gas was obtained, which on further compression condensed into a blue liquid. By introducing carbonic acid gas into the ozone mixture, and then compressing and cooling it, the carbonic acid liquefies, with solution of the ozone, which colors it blue. A very curious natural phenomenon, involving the liquefaction of gases, has been lately observed in studying a mineral from Connecticut, known as smoky quartz. This mineral, which consists of masses of discolored rock crystal, contains a great number of small cavities, which are seen to be partially filled with some liquid. On breaking a piece off a crystal containing such cavities a sudden snap is often heard, as if the hard silica had been ruptured by a pent-up force; and on heating a portion of the mineral it bursts with great violence. By warming some crystals gently, the liquid contained in the cavities was observed to disappear at a temperature of thirty-one degrees Centigrade, reappearing on cooling, and as this is just the point at which carbonic acid liquefied by pressure under such circumstances resolves itself into the gaseous form, it was inferred that the fluid contained in the cavities must consist of this substance. By breaking up a number of crystals, and collecting the contents of the cavities, this inference was confirmed, the mixture yielding carbonic acid combined with a certain amount of water. A little nitrogen was found to be combined with the other substances, but the quantity was very small. The most difficult part of the inquiry is to account for the presence of the little drops of gas, under enormous pressure, in the interior of hard crystals. If deposited there millions of years ago, during the formation of the crystals, it would seem that the elasticity of the gas should have enabled it to force its way out of the plastic substance; while, if we suppose the cavities to have been formed after the quartz crystals were complete, we have before us a still more difficult task, to account for the introduction of the compressed gas through the hard silica.

THE attention of the State Board of Health of Connecticut has, according to the *Scientific American*, been called to the fact that the workmen in certain factories in Bridgeport, where the well-known red cocobola wood, brought from Panama, is used for making knife-handles and other articles, have been seriously poisoned by the dust from the wood. The sawdust is said to cause swelling of the face and hands of those using the wood, and children playing where a quantity of it had been thrown out were badly poisoned about the feet; while in the neighborhood of another factory all the chickens are said to have died from accidentally swallowing the dust which settled upon the grass. We remember hearing once that the California redwood was so poisonous that the dust from the saw-mills killed the fish in the streams which flowed from them, and perhaps the cocobola is really responsible for an effect which seems to be unjustly attributed to the redwood.

SPANISH ARCHITECTURE.[1] — II.

SEVILLE (*continued*).

THE Alcazar at Seville, more of a palace than castle now-a-days, is visited by all tourists who can get access to it, and has been often described. I have little desire to add to its chronicles. It is an odd assemblage of the beautiful and the repulsive in art — of the interesting and commonplace in archæology. A checkered history of eight centuries, from the old time when Prince Abdu-r-rahman Anna'ssir Lidin-Allah caused it to be built in Oriental splendor, upon the site of an ancient Roman palace, down through the years of alterations and extensions, Gothic and Renaissance, of whitewashing and disfigurement, to the restorations of latter days, has made it what it is. Much of the old Moorish and later Gotho-Moorish work is highly attractive and worthy of study, but the charm of it is lessened by contiguous fantasies of the Rococo fashion. The gardens do not deserve the lavish praise bestowed upon them; the many beauties they have are marred by extravagant caricatures of architecture in stucco and paint — nightmares of uncouthness, instead of dreams of beauty as they were conceived to be. Still it is pleasant to forget the critical mood and linger in some of the charming apartments, to read or hear one of the thousand legends which attach to it — stories some of which connect our own times with the old past as much as do the buildings themselves. The following tale for example: "Here in this chamber, Don Pedro, the Cruel (well he deserved the adjective), caused to be murdered Abu Said, who, fleeing from political trouble at Granada, was promised protection by the Spanish king, and found instead robbery and death. His wealth and jewels were too much for the cupidity of the despot, and might was right in those days. Among the treasures thus stolen was a great ruby which Don Pedro afterward gave to the Black Prince of England, and it is said this is the same gem which Melville sought of Queen Elizabeth, as a present for Mary, Queen of Scots," and, as Ford tells in his book, it is now one of the adornments of the royal crown of England. This is a type of the stories which guides relate, undoubtedly true in the main. They are many, too: tales of blood and tales of love by the score, and the traveller who stands on the scene of their horrors or delights may well be pardoned if he lets the deep interest of the past enhance his appreciation of the relics that remain, especially when the relics are themselves so charming as are parts of the Alcazar at Seville.

Another aspect of this old city, another leaf from its history, is to be found in wandering through the byways and side streets and the old thoroughfares which modern "life" has almost deserted. Many an old house and palace, with a history to fill a book, may be seen, degraded to common uses, yet retaining many charms and beauties; and in retired streets — tortuous ways often, with uncertain endings — are to be found old monasteries and convents, with high stuccoed walls and ponderous gates. One can often make his way into a bare, deserted-looking court-yard, giving access to a church of large, cold appearance, where the mass is regularly said for a meagre congregation of the faithful, from the poor who live around the ancient buildings. A characteristic feature of these places is the belfry, an arcaded gablet raised upon the massy wall, carrying the bells in its arches, open to the air (when a bell is intended to be heard, this is a way of hanging it which deserves more frequent adoption). Usually, as in that which I illustrate, they are decorated a little more freely than the rest of the exterior. In this example the details are enriched with deep-tinted glazed tiles, a beautiful blue, glowing with bronze reflections in the sunlight; then the bits of old red and brown brick, mingled with moss-green rain-stains, make up a glorious study for water-colors, which the print of course loses. Another monastery, S. Isabel, gave my pencil occupation. The great doorway at one side of a broad, dreary square, seemed to me to be a good specimen of the Spanish Renaissance when it is not overburdened with meaningless detail. Generally any attempt at richness in ornament results in the stone being tortured into such unnatural shapes that more disturbance than decoration is obtained for the architectural features to which it is applied. Here all is more modest and in better taste. The composition is good and well proportioned, has some originality, and there is good detail in mouldings and carving. The figures in the panel over the door are very good in execution as well as design. There are in Seville many such bits, more useful to the student than the exuberant works oftener illustrated.

CORDOVA.

The route from Seville to Cordova reveals several picturesque bits of scenery, with ruins of towers and castles now almost as rugged as the hills which bear them. One I noted in the little sketch above made near Almodovar. It is another of the works of Don Pedro the Cruel; a most picturesque pile, one of those which made me think my travelling was too hurried, since I had not time to stop and sketch it better; but travelling in Spain is full of these thoughts, the country is so rich in subjects for pencil and brush.

Soon I was in the marvellous old city of Cordova, duly lost in the bewildering maze of narrow, crooked, winding alleys of which it is composed. They are positively the most perplexing I ever saw in Europe; Morocco has some to equal them perhaps, but even there the ways are not more systematically misleading. Cordova's streets not only lack definite direction, they seem to be laid out especially to misdirect; an enemy might carry the walls by storm, and then in endeavoring to reach the interior of the place would get into streets leading back to the breach. But how delightful it is to ramble about those paved passages: to start from the hotel with some definite objective — the cathedral perhaps, or the bridge; — to note carefully the bearings of one's destination, the time o' day, and the position of the sun; and after all these preparations to walk into two or three "blind" alleys, and one interminable lane, and at last realizing that you are hopelessly lost, to be compelled to consult a small boy and engage him to pilot you to the desired place; or better, perhaps, if you have time to persevere alone, lost though you be — what if you do not get to the cathedral that morning? — you will probably strike a street you remember about lunch time and find the hotel after awhile, unless you look for it. Once in Cordova when I was thus thrown out of my reckoning — I had started half an hour before to go somewhere, and had explored a good mile of street — I found my hotel in front of me so unexpectedly that I thought it had a twin counterpart. And there is a great open square used as a market-place, and generally thronged with people; I walked all round that square one day outside it, before I could find the way in. Such are the old streets of Cordova.

Who has not heard of the mosque, the forest of columns so extensive that a great Christian cathedral has been built in its midst, and is concealed there as it might be in a wood? It is enchanting. The poetical descriptions, even if exaggerated seem to be justified, and one feels reluctant to condescend to bare facts about it. However, I learned some few, proper to note here. The mosque was begun in the year 786, displacing the old basilica which had itself taken the site of a Roman temple of Janus. So this is a historic site indeed! In 961 the mosque was enlarged, and again in 988. The great court-yard, 210′ x 430′, was built in 937, and with its orange trees and fountains, and lofty, picturesque belfry-tower is now a beautiful place in itself. From it the mosque is entered by three doors in the ends of three of the nineteen aisles, all of which formerly opened to the court. Inside, the varied columns lead the eye in every direction along vistas and perspectives, lateral, diagonal, transverse, of marble and porphyry, with superb effect. These columns are of many materials and sizes; some belong to the old temple, others to the basilica, others were brought from afar — spoils of war — many were made for their present position; their sizes, and shapes, and capitals differ, but only so much as to increase the effect and the interest in them. Then there is a very pretty play of light and shade in the irregular lighting of the building, some aisles gloomy and dark so that the view ceases in mysterious shadows, suggesting even greater depths than exist; and again other parts will be bright with the tinted light of some stained window or skylight. It is said that originally no light was admitted except at the sides. What beautiful and impressive vistas these must have been with their multitudes of swinging lamps! In some parts there are splendid specimens of Moresque detail in the curiously doubled arches, and in the Maksurah and the Mihrab, and in the screen of the Chapel of Villa Viciosa. It is impossible here to attempt their description; drawings only can show their complications of arch and column, and many exist already. The greater part of the mosque is less ornamented, such as is seen in the forepart of my sketch of a part of the interior. There are about thirty-eight columns in the length of each of the nineteen aisles; but the cathedral crossing the middle of nine of them intercepts five or six in each; while elsewhere doubled and grouped columns increase the number. It is said that originally there were 1200, and that now there are 1096; but I thought that including those of the court-yard about 800 would be nearer the truth, and I felt that as I could not say whether 800 or 1096 were the true number, it did not much matter as regards the effect. The "*Coro*," or choir, built in 1523–1593, was, it is recorded, protested against by the city corporation, but the Church had her way, with the king's (Charles V.) authority, but when the king visited the city later, he reproved the Chapter thus: "You have built here what you or any one might have built anywhere else; but you have destroyed what was unique in the world."

A most interesting ramble is that by the bridge over the River Guadalquivir. There is a specimen of Herrera's architecture in a great Renaissance arch or gateway which replaces an old Moorish one. It is decidedly more pleasing than most of Herrera's work, not so chilling and repellant; but part of its effect is owing to the picturesqueness of age. Its predecessor was the "Gate of the Bridge," probably a real stronghold, like those which in other places the Moors built to defend the passage. Passing this, the roadway of the bridge itself stretches across the ancient-looking stream, and seems to be almost as old, for it is crooked and out of level in every part, and its arches and masonry are the queerest mixture of Roman, Moorish, and modern handiwork. Looking to the left, up the river, the strangely grouped buildings of the city jostle one another on its banks, — small rectangular buildings mostly, with here and there a

[1] By Robert W. Gibson, Travelling Student of the Royal Academy. Continued from page 172, No. 407.

longer stretch of wall enclosing a garden, whence the rich verdure of the orange trees peeps over the top; and from among the whitened and tinted dwellings the Belfry and several other church towers rise in charming variety. Down the river one gazes upon a quaint series of stone dams and mills, some disused and fallen into utter ruin, all more or less decayed and time-worn, but some yet working in a plodding, sleepy, old-time manner, with movements more suggestive of venerable antiquity than even complete stillness would be. Many of these, too, are entitled to lenient judgment, for they also are the works of the Moors, and have served mankind in their primitive way for centuries.

Then, as we wander on over the uneven way, we come to a queer-looking castle upon the opposite bank, not very picturesque, being in too good a state of repair, but still in sufficient keeping with the surroundings. From here, and on the way back, the city is very well seen, and it is good to loiter and look a little, and think of the venerable stones around and underneath, and the strange strivings of humanity, of race against race, for generations and ages, which made the story these old relics illustrate. Meditation will not be much disturbed now, upon this viaduct where formerly crowds jostled on their busy way. An occasional swarthy peasant or market-dealer, with his mule or donkey, pannier-laden, will pass and look at you with lazy curiosity, and now and then a human voice will break into the silence from a little distance; but you can lounge and dream of the past for hours, without more serious interruptions than these. The city is not very big now, yet it is said that it once contained a million of inhabitants, and not far away, in the city of Zahra, stood a palace worthy the chiefs of the great realm of Cordova. It extended 2200 feet by 4000 feet, measured upon its enclosing walls, with gardens and courts and fountains far surpassing those of the renowned Alhambra; a mosque, seventy-four feet by one hundred and forty-six feet; halls of marbles and rare stones, with forty-three hundred columns supporting roofs of carved and gilded cedar, and a multitude of chambers decorated in richest arabesques and interlacing patterns. So say the historians of the Spanish Arabs of nearly a thousand years ago, and as they also described the mosque which exists, and thus prove the correctness of their records in that respect, we may believe what they relate of this wondrous palace, although only a few stones still remain of its splendors. Certainly this Cordova was a great kingdom, rich and powerful, and its history and legends are full of romantic interest, and deserve a few moments' pondering by the modern traveller here upon their ruined scenes.

PERUGIA.

RISING in a golden haze, each tower and long sweep of roof in silhouette against the sky, it seemed but a few miles away. To find after watching for the next mile-post, that it recorded 23 Kilometri da Perugia was like some ill-considered trick of Tantalus. The day had been a gray one, and the clouds, undecided whether to close their ranks or disperse altogether, at length appeared disposed to attack, and it was through one of the fast closing rents in their line of battle, that the sun's rays fell and glorified this city far away. The rent closed, a gray mist swept across the east, and we plodded on toward the point where we had seen our haven.

"*In Perugia sempre pioggia.*" The proverb was justified that night. Two more moist individuals than crept up the little brick-paved lanes and under dripping arches would have been hard to find. As we emerged from beneath an arch into the Corso, the sign of the Albergo dei Belle Arti seemed particularly attractive; it suggested by its name possibilities of the pleasant Bohemianism we had left behind us under the shadow of the Pincian, but it sadly belied all such hopes. In such circumstances, the only thing to be done was to make a virtue of necessity; and as the next day dawned bright and clear, we soon regained our wonted spirits.

Perugia, like Siena, stretches along the crests of several spurs of the Apennines, and creeps down their sides into the valleys between, but the law of gravitation is reversed, and the larger buildings crown the ridges. It still keeps well within its old walls, though north and south two small faubourgs are encroaching upon the meadows. Its heart is the Piazza del Duomo, and its chief artery the Corso, which runs south to the terraces of the Prefettura; from the Corso descend the quaintest possible streets, here and there widening into terraces, from whose walls the vistas over the great undulating country towards Chiusi, or towards the Apennines behind Assisi are one constant succession of delightful effects of changing shadows and beautiful color. From its position alone, its clambering up hillsides and down vales, Perugia is necessarily intensely picturesque, apart from its architectural features; but when to this natural advantage is added the effect of a series of buildings in which imagination and dignity of conception are combined in the happiest proportions, the result becomes very nearly ideal. Of distinctive, individual architecture that can be called Perugian, there is perhaps little: phases of both Gothic and Renaissance that resemble, and yet differ from other phases in other Italian cities are abundant. It is superfluous to condemn the restless character of the modern architectural (and popular) mind that, craving a conspicuous individuality, consequently descends to imbecile eccentricities. That matter will eventually settle itself. Why an acknowledgment of the value of good precedent should be considered equivalent to a lack of originality, is a question which admits of but one interpretation,—that the people who so consider it are ignorant. Perugia is an excellent example of work which is intrinsically good, and yet does not assert itself as isolated.

Upon the Piazza del Duomo are the Duomo, the Palazzo Comunale, and the remains of the old Palazzo del Podestá, which was twice destroyed by fire.

The Cathedral, of fifteenth-century work, has never been completed; a diaper of alternate white and dark marbles forming a dado of some 12 feet in height is carried around the exterior. Judging from work elsewhere in Perugia, and from the fact that a portion has been finished in the same manner higher on the north wall, it doubtless was intended to cover the entire walls with this diaper, the effect of which would certainly have been disagreeable. Diaper-work of large design is good when complying with two conditions; first, that it should be contrasted directly with finer work; second, that it should have a dominating tone throughout. Age supplies this tone frequently, but even the mellowing influence of time fails to harmonize white and very dark marbles, such as are used on the exteriors of Perugian churches.

Upon the south of the Duomo is a bad seventeenth-century entrance, with a fairly good wooden door, at the side of which is a pulpit. The interior is badly proportioned, and poor in color; the transepts are short, and the columns too high for the vaulting.

Symonds in his "Renaissance in Italy" (Vol III, pages 51-53), says the Italians "never rightly apprehended the specific nature of Gothic architecture . . . instead of one presiding all-determining idea, we must be prepared to welcome a wealth of separate beauties wrought out by men of independent genius, whereby each part is made a master-piece, and many diverse elements become a whole of picturesque, rather than architectural, impressiveness." The Palazzo Comunale of Perugia is one of the few contradictions to the statement, but it is a decided one. Begun in 1281, continued while Arnolfo del Cambio was moulding by his genius the tower of the Foraboschi into that daring tower of the Palazzo Vecchio, while Maitani wrought his fancies into the façade of Orvieto, its construction went on during that period when dignity and power of expression were the pre-eminent characteristics of both the people and their art; its simplicity is classic; its proportions so just that it requires a mental effort to appreciate their delicacy. In perfectly proportioned buildings the satisfaction derived from the adjustment of parts is so fused into the impression made by the complete whole, that an immediate consciousness of an attempt to balance proportions nearly invariably implies that they are ineffectually disposed. Nothing could be better than the two stories of windows, with delicate columns separated by a broad, contrasting mass of wall, or the broad steps leading to the great door. The door upon the Corso is particularly fine in proportions. The bell-tower, a comparatively recent addition, is manifestly superfluous. The restorations recently made here are excellent. Of the old Palazzo del Podestá, a few arches with piers, with octagonal, broad, simple caps alone remain. The Fonte Maggiore with its sculpture by Del Cambio, and Niccolo, and Giovanni Pisano, is rich with twisted shafts of all descriptions, and is most dignified in conception. Near the Corso the palaces are numerous; most of them are Renaissance, though some are Gothic, the Palazzi Baldella and Baldeschi are the best upon the Corso, while to the east, upon the Piazza Sopramura the Palazzo del Capitano has a fine entrance and balcony, and the Tribunali is especially good in proportions. It is this quiet, careful study of proportions that makes these buildings in Italy of the fourteenth and early part of the fifteenth centuries of so much more value to a student than the wealth of imagination displayed in after years or in other lands. The perception of the Greek appeared anew in the Italian, and concerned itself with the matter at hand, adapting the new conditions to its will. Such buildings as these, as unconscious of their own simplicity as of their beauty, are precisely among the class of works which the student mind, prone to a love of detail and "bits" instead of entities, is very apt to glance at casually, possibly pronounce good, and pass over for some seductive piece of *tarsia* or mosaic. Description of such

work is necessarily meagre; drawings, good though they may be, seem thin and poor; details, though refined, fail to tell their story; the impression of the work itself can alone fully justify all praise bestowed upon it.

Nowhere in all Italy is the power of a controlling mind more manifest than in the Umbrian and Etrurian cities; north and south, rich color and dainty fancies exercise their charms; the façade of Pavia, the marbles of Venice, the mosaics of Palermo, Ravello and Salerno appeal to the sensuous delight of the eye, and by their delicacy and refinement nearly persuade the senses that they are all sufficient; but the Umbrians in their architecture as in their painting, struck deeper, and stirred emotions which, though they might defy analysis, convinced with their sense of supremacy by their very presence. It seemed impossible for these Umbrians to do otherwise; the spell was upon them. Benedetto da Majano beginning by making delicate *tarsia*, ended by raising the Strozzi. Arnolfo del Cambio working on the confused bas-reliefs of the Pisanos, at length conceived the Palazzo Vecchio. These men above all things loved the inspiration of the Greeks, (Ghiberti even reckoned time by Olympiads,) yet they worked naturally and without pedantry. Whether this was the inevitable fruition of the time or the intense individuality of the men will be long disputed; but the study of both cannot fail to be of the greatest value to the student.

Besides the palaces, what remains in Perugia consists largely of picturesque bits. Of the churches, nearly all of which have choir-stalls of beautiful carving or of *tarsia*, S. Agostino is the most interesting in plan, being circular, with a dome carried by sixteen columns, and with chapels around its circumference. The Oratorio of S. Bernardino (1459) has a very fine façade of colored marbles and terra-cotta, of which the bas-reliefs and decoration, though over-rich are still agreeable, because of their slightness of relief. S. Ercolano is a peculiar octagonal structure. Outside the Porta S. Pietro is the Basilica and monastery of S. Pietro de Casinensi founded about 1000 A.D. It has a transept and a flat gilded ceiling. Above the nave columns are a series of poor paintings by Vassillachi, and the decorations and color of the church are decidedly bad, but despite of this it is effective, as all basilicas invariably are. Behind the church is a picturesque monastery. The tower (evidently a fifteenth-century erection) needs but a slight alteration of proportions to be made an excellent one: alternate narrow courses of brick and stone are used in the upper portion as in Seville, Toledo and other Spanish towns. S. Domenico just within the gate has a rather good window in the apse. There are considerable remains of the old walls, some of which have been utilized as retaining-walls to support the terraces; others, especially the round towers, have been converted into houses. The old Etruscan gate is one of the finest in all Italy, its breadth and simplicity are so happily contrasted with the loggia erected upon the remains of one of the towers after the conflagration. It makes an impressive entrance. Near the Piazza d'Armi is the old church and monastery of Santa Giuliana: the guide-books scarcely mention it, yet it has a charming double cloister of excellent proportions, with brickwork used very cleverly. The monastery is now used as a Military Hospital, but a request to see the "*Chiostro*" would meet with the pleasantest response from the old sergeant at the gate, who has his share of the universal Italian delight in having strangers admire the things of his "*patria*." The cloister has a wealth of octagonal caps and corbels, some forty of good design, and the tower is exceptionally good.

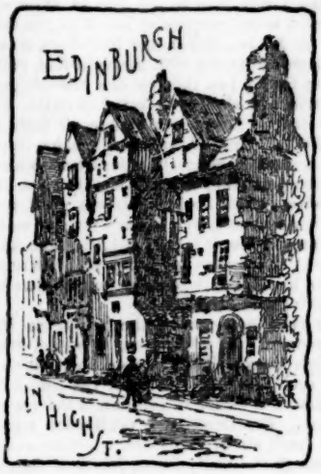
It was pleasant in the shadows of the cloisters as the sun got low, late on summer afternoons, to sit and watch the gray-robed sisters of the hospital in their white caps, helping a convalescent creep out to the wall of the Piazza d'Armi, where he would wistfully watch the Bersagliere march and wheel to the quick note of their bugles. Far away to the south a white tower caught the last rays of the sun. It was the old convent church of the blessed St. Francis of Assisi, the church which Giotto and Cimabue had made rival in its wonderful color the marbles of St. Mark's and the mosaics of the Capella Palatina. It sent its invitation across the miles of campagna to us upon the walls of Perugia, and at last we turned our faces toward it and left those walls behind us.

C. Howard Walker.

Cremation at Lisbon, Portugal. — In consequence of a want of cemetery accommodations and of the proximity of her burial grounds to populous quarters, the Municipal Council of Lisbon has passed a resolution by which the cause of cremation will be advanced. In times of epidemic cremation will hereafter be made compulsory in Lisbon, though in ordinary times it will be optional; but once in every five years the remains of interred bodies will be burned.

Ancient Rome and Modern London. — Professor Lanciani, the archæologist, has drawn a comparison between ancient Rome and modern London founded on his own examinations and on history, in which he calls attention to their similar situations on a river and to the respective heights of their soils. Rome, he says, had her "city" in the sense that London has hers, and when Augustus reorganized the municipal administration the limits of the town had so much exceeded the circle made by the walls of Servius Tullius that four of the fourteen districts into which the city was divided were entirely outside the walls, but in spite of this the names of the old gates survived as similar names now survive in London, which has also far extended itself beyond its early borders. At one time the buildings of Rome occupied a space of about the same size as is covered in our day by the buildings of London.

LOW CEILINGS.[1]



The height of the ceiling affects both the owner and the occupier of a dwelling, but chiefly the occupier, for, whereas it affects the owner's pocket only, it affects both the pocket, the comfort, and the health of the occupier. If the owner is perfectly free, he will simply adopt the height of ceiling which he thinks will enable him to get the largest return from his property. It by no means follows that he will adopt a low pitch; but if the ground he builds upon is dear, and the demand for houses great, he will be tempted to make the stories low and increase their number; and in so doing he will be doing what is at once best for himself, and also — unless he make the rooms small as well as low — what is best for the community.

But in most of our large towns and populous places a person about to build is not free. He must build in conformity with regulations limiting the total height of his building, and prescribing, among other things, the height of ceilings and the cubic capacity of rooms. Hampered by such restrictions, he cannot suit his houses to the requirements of the districts where they are wanted; he must make them as Parliament has been pleased to prescribe, however extravagant or unsuitable for the people who require them, and he must get a profitable return for his expenditure from these very people, who don't wish extravagance, and can't afford to pay for it, but who, in the circumstances, either *must* pay for it or do without dwellings. For example, if the Police Bill drafted by the Corporation of Glasgow became law, a man having land bounded by a new street forty feet wide would not be allowed to erect a tenement of dwellings in that street more than two stories high, with this necessary result, that his return for the cost of land and buildings must be got from two tenants instead of from four or six. If left to his own discretion he would at a small additional outlay, make his buildings, say, four stories high, and — profitably to himself — accommodate on the same ground twice the number of tenants at lower rents. Now, assuming in the meantime that the four houses erected in this way were as good as the two made in conformity with the Police Bill, it must be perfectly obvious that, whether the owner made more out of the transactions or not, the erection of the four would be distinctly most advantageous for the tenants, and therefore for the community at large; because in this way twice the number of people would get accommodation where they want it — not where the Corporation say they ought to want it — and they would get it at a greatly reduced rent, both, I submit, considerations of the very greatest importance, and having a direct bearing on sanitary questions of great interest. Of course, if it could be proved that high ceilings and low tenements were essential to secure healthy conditions, a great deal could be said in favor of compulsory sanitation in that direction, although even in that case I should be prepared to say a great deal against it; but it has been abundantly proved — and this was very clearly brought out at the Newcastle Congress — that there is no necessary connection between density of population and a high death-rate; and I may say that the very same statistics — namely, those of the various improved dwellings' companies — which most conclusively prove this, as conclusively show that there is quite as little connection between low ceilings and a high death-rate, as in all these dwellings the ceilings are low and the stories numerous. Most people, however, in this part of the country at all events — I may venture to say most sanitarians — still cling to the idea that *cæteris paribus*, a room with a high ceiling is a more healthy dwelling than one with a low ceiling. Now, I wish to strike at the root of this prejudice, which as affecting legislation has had — and may, unless eradicated, still have — most pernicious results, and I hope to be able to prove that, other things being equal — that is, that, given two rooms of different heights, but of the same capacity, having the same size of chimney opening, the same area of window, door, and vent openings — the lowest will be the cheapest, the most commodious, the most comfortable, and the healthiest dwelling of the two.

I shall dwell chiefly on the sanitary aspect of the question, merely devoting a sentence or two to the other important points I have mentioned. One of these, the greater extent of floor area in a low than in a high room of the same capacity, is self-evident, and the advantage of this to the occupant is equally obvious. The economy of the low pitch is not quite so readily understood. For the sake of illustration, I have calculated the rents which must be charged for houses of 2,000 feet capacity in order to yield five per cent, arranged in three different ways; first, in tenements of two stories of ten feet;

[1] From a paper read by John Honeyman, F. R. I. B. A., September 27, 1883, at the Congress of the Sanitary Institute of Great Britain, held at Glasgow, and published in the *Architect*.

second, in tenements of three stories of eight feet; and, third, in tenements of four stories of eight feet; allowing a proportionate area of vacant ground in each case; and I find that in the first of these — the two-story tenement — the rent would require to be £9 6*s.*; in the three-story tenement it would be £8 5*s.*, and in the four-story tenement, £7 14*s.*; so that the artisan contented with an eight-foot ceiling might have a roomier house for £7 14*s.* than he can possibly get for less than £9 6*s.*, where restrictions already referred to exist. In other words, he is compelled to pay £2 8*s.* per annum, or fully a third more than might otherwise be required, and at the same time he must be content to occupy a smaller house in a less convenient locality, without one solitary compensating benefit, merely because some sanitarians, chiefly municipal, think such treatment good for him. To my mind it is unmitigatedly bad, and a very serious matter for our working classes. For observe, it is impossible to take this £2 8*s.* out of the owner's pocket; the tenant must pay every penny of it, as, of course, no builder in his senses is going to put up dwellings which will not yield him five per cent at least.

But the important question remains — would the low house be healthy as well as cheap and roomy? In my opinion it would, and in a greater degree than the high house. The means of ventilation, which alone are admissible in such dwellings, being of the simplest possible kind, it will be found that it is easier to ventilate a low room than a high one by their agency. Practically, the ventilation must be effected by the admission of fresh air by doors and windows — or round these when closed,— through the badly-fitting joints of floors and skirting boards, or by special inlets not intolerable to the inmates (if such can be devised), and by the extraction of air by the chimney. Such means have been found sufficient, except where apartments are overcrowded, that is, except where the chimney is insufficient as an extractor. We may take it that in any room having a door, a window, and an open fireplace, three or four people may sleep safely, and the condition of the air will depend not so much on the capacity of the room as on the area and draught of the chimney. Those who are familiar with the subject, will, I trust, excuse me if I say for the information of others in this mixed audience, that even such a capacity as is prescribed in our Police Bill — 400 cubic feet to each adult — is utterly insufficient unless we have along with that a constant and rapid change of air. But to effect this change so that the whole volume shall be kept up to a safe standard of purity, it is necessary that the fresh air should be properly distributed and permeate the whole apartment. This point I fear is sometimes lost sight of. For example, if we take a room of 2,000 cubic feet with five inmates, to keep the air, not as pure as we could wish, but in a tolerably healthy condition, at least 5,000 cubic feet of fresh air would require to be passed through the room per hour; and as an ordinary open fire will easily extract that quantity, there seems to be no great difficulty about it; but observe, it is quite possible to pass all that quantity through the room without purifying the atmosphere in any appreciable degree; we may let it all in at one side of the room and up the chimney at the other, leaving the air breathed by the inmates impure and poisonous, perhaps fatally; so that the more complete the distribution of the fresh air, the more beneficial will the ventilation be. Now the facility of distribution will depend to a large extent on the form of the room. If the room (always bearing in mind that we are speaking of rooms of the same cubic capacity) be high in proportion to its area, and the fresh air be admitted in the usual way referred to, the lower part only will be ventilated, and a large proportion of its atmosphere will remain impure; whereas, if it be low in proportion to its area it will all be well ventilated, and the inmates will get the full benefit of the room's capacity. In the other case they would not, as a considerable proportion of the high room would remain stagnant and foul; a condition objectionable on other grounds.

But, it may perhaps be said, granting that the air in the upper part of the room, say a fourth part of the total volume, remains unaffected, and that the 5,000 feet per hour allowance is distributed in the lower part only, is that not exactly where the fresh air is wanted? Certainly, but fresh air is not the *only* thing that is wanted in an artisan's house. Warmth and freedom from draughts are only second in importance, if indeed, they are second. There are delicate women and tender babes to be considered, as well as robust men, and our mortality tables painfully remind us of the fact that that consideration is far too much overlooked. No doubt by the passage of a given quantity of air through a room you can make a part fresher than the whole, but it is evident that as you reduce the part affected you necessarily increase the velocity and lower the temperature of the current; indeed, you can, without difficulty, carry this reduction so far that with the aid of a good-going fire, you may obtain a very high standard of purity, and a cold draught of perhaps 150 feet per minute in the only habitable part of the room, that is in the only part where the air is fit to be breathed. Our object of course must be to make every part of a room habitable, and to leave not one stagnant corner in it. In this way alone can we secure in the highest degree both essentials of a healthy dwelling — pure air and warmth. Now, we shall find that the lower the ceiling the more easily can this combination be secured.

Let us look a little more particularly at the superior facilities which the low room offers. The top of the door, from which I think the greater part of the air required should come, is necessarily near the ceiling, and the current will therefore completely disturb the upper stratum of air. The air from the window will have the same effect in a smaller degree, and both currents will be warmed by contact with the ceiling. We need never look to the floor as an air-warmer, except to a limited extent near the fire; a much larger area of the ceiling is heated, and in a low room there is not only a much larger area of ceiling to heat than there is in a high room, but the radiant heat upon it being more intense, it becomes an air-warmer of immensely greater power; and, obviously, this extra power in a low room can be used either to raise the temperature of the room, or to raise a larger supply of air to the same temperature. Besides, if in this way we are able to admit more fresh air near the ceiling, we shall also, in like proportion, be able to reduce inlets at a lower level, and to that extent get rid of cold draughts. Practically, the quantity which can safely be admitted is limited by the means of warming it — the more we can warm, the more we can safely admit. I insist very much on the importance — the absolute necessity — of this heating in connection with the ventilation of small houses. Some people seem to think that hot air and foul air are synonymous terms; it would be much more correct to say that cold air and foul air are synonymous. If we wish the occupants of small houses to admit plenty of fresh air, we must not only convince them that it is good for them; we must show them how to do it without sacrificing something else, which is good also, which is even better in their estimation — namely, comfort.

In conclusion, I desire earnestly to invite the attention of Scotch local authorities to this subject. It is clear that, if I am right in the views I have advanced; if it is the fact that from a sanitary point of view, a low ceiling is as good as a high one — much more if it is better — municipal authorities are utterly wrong when they prevent by legislation (as some have done, and others wish to do) the erection of low-ceilinged houses. It simply comes to this, that by such regulations they wastefully increase the rents which the working classes must pay for house accommodation, and thereby in the most direct manner encourage overcrowding with all its attendant evils: while at the same time they effectually prevent the erection of improved dwellings, such as are now common in London, and elsewhere in England.

THE ILLUSTRATIONS.

SKETCHES AT PERUGIA, ITALY. BY MR. C. HOWARD WALKER, ARCHITECT, BOSTON, MASS.

See article elsewhere in this issue.

INTERIOR OF THE MOSQUE AT CORDOVA, SPAIN; — ENTRANCE TO MONASTERY OF ST. ISABEL, SEVILLE, SPAIN. SKETCHED BY MR. R. W. GIBSON, ARCHITECT, ALBANY, N. Y.

See article elsewhere in this issue.

PLAN OF THE SEWERAGE SYSTEM OF KEENE, N. H.

See article elsewhere in this issue.

COMPETITIVE DESIGN FOR BILLINGS HALL, UNIVERSITY OF VERMONT. MESSRS. ROSSITER & WRIGHT, ARCHITECTS, NEW YORK, N. Y.

The authors of this unsuccessful design state that, as the plan embodies no unusual features they have indicated the general arrangement by the lettering at the bottom of the sheet.

SANITARY PLUMBING.[1] — VII.

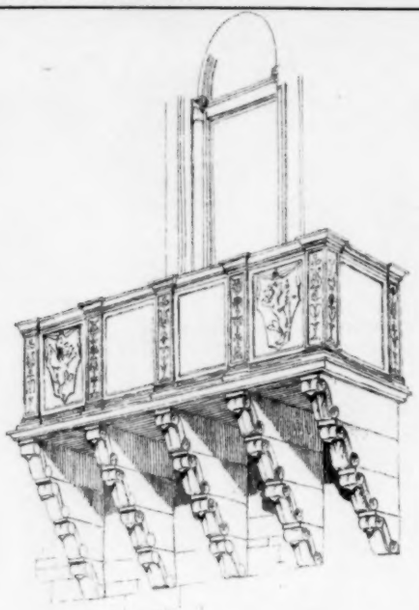
HOPPER-CLOSETS.

We come now to the class of water-closets which is independent of valves, gates, plungers, or mechanical seals or obstructions of any kind, and which accomplishes both the removal of the wastes and the exclusion of sewer-gas by the simple action of the flushing stream and by the water-seal which it forms.

These closets have received the general name of "hopper-closets." They do their work more effectively and by simpler means, and afford equal or better security against sewer-gas than the complicated machines heretofore described, and must be placed far ahead of them. There is no point in plumbing in which sanitarians are more in accord than in this. But it must be borne in mind that there is the greatest difference in the different kinds of hoppers, and it is to the improved kinds that we refer in our comparison with other closets.

Hopper-closets have usually been classified as "long" and "short" hoppers; *i.e.*, those having the trap above and those having it below the floor-level. The trap should, however, never be placed below the floor except where it is necessary to avoid

[1] Continued from page 190, No. 408.



SECTION

BALCONY - PALAZZO DEL PODESTÁ. (1472)

S. PIETRO IN CASINENSI
PERUCIA.

FIGURES UPON THE FOUNTAIN
BY
NICCOLO, AND GIOVANNI DI PISA.

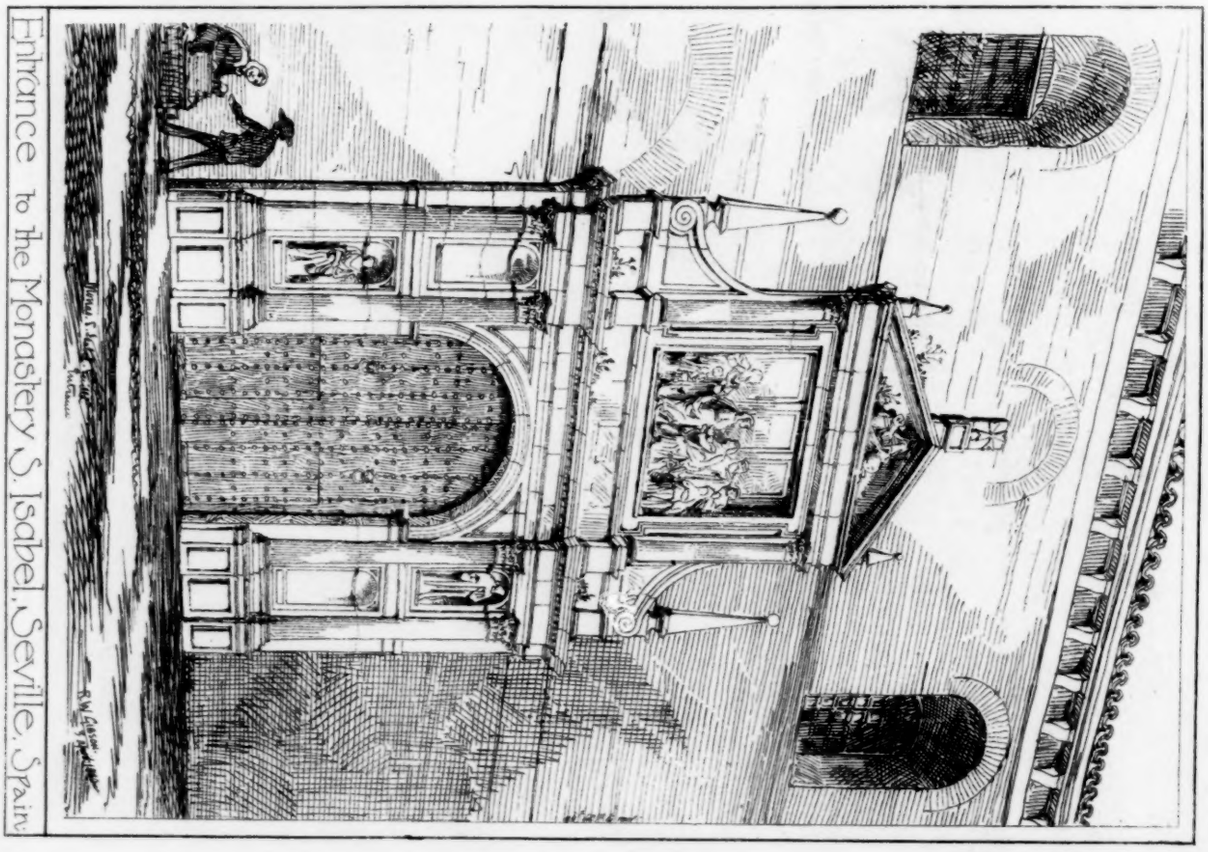
FONTE MAGGIORE (1277)
SECTION

* PERUCIA *

CHJ

The Heliotype Printing Co. 211 Tremont St. Boston.

The Mosque at Cordova — now Cordoba Cathedral — Exterior. Robert W. Gibson, Del. April 1880.



Entrance to the Monastery S. Isabel, Seville, Spain.

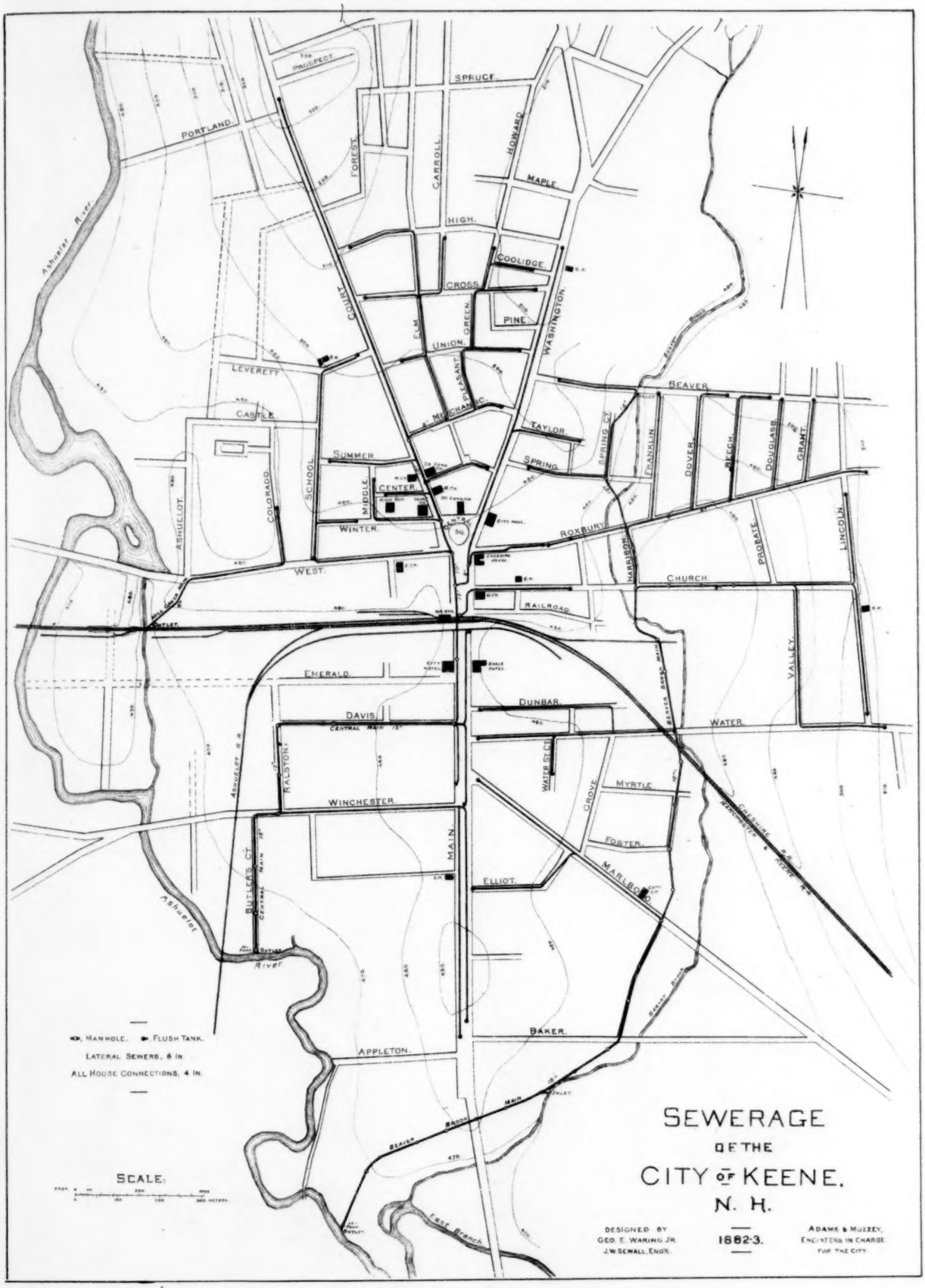
AMERICAN ARCHITECT AND BUILDING NEWS. OCT. 27 1883. No. 409

Billings Hall.

UNIVERSITY OF VERMONT.

Competitive Design submitted by Rossiter & Wright Architects.

The Heliotype Printing Co. 211 Tremont St. Boston.



The Heliotype Printing Co., 211 Devonshire St. Boston.

the effects of frost, and, as this is a condition which applies equally to all styles of closets, it marks no distinguishing characteristic, and can form no proper basis of classification for any special type.

Abandoning, therefore, this old classification, and adopting for our basis the most important characteristic features of the closet, we make two general divisions and further detailed subdivisions. The general divisions are: —

I. — Those which have *no standing water* in the bowl to receive and deodorize the waste matters and prevent their striking and adhering to dry surfaces. These we may call "dry" hoppers. The water stands only in the trap.

II. — Those whose bowls are formed to retain a *permanent body of water* so that no part of the interior can be soiled by waste matters striking them. These we may call "improved" hoppers.

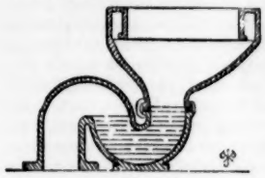


Fig. 9. — Short-Hopper.

This latter class is itself subdivided into a number of different kinds, in accordance with the different principles upon which the flushing streams are employed in emptying and cleansing the closet.

I. — "DRY" HOPPERS,

Or those constructed without standing water in the bowl.

Figure 9 represents a water-closet of this class having the trap above the floor, and usually called the "short"-hopper.

Figure 10 represents the same kind of closet with the trap below the floor called the "long"-hopper. It is intended to be used in cold places where the water in the trap can only be protected from frost by burying the trap in the ground. It is sometimes said that the wastes are more easily ejected from the trap of the long-hopper through the greater weight and momentum of the falling water. But what little is gained in this direction is far more than offset by the disadvantage of having an increased dry surface to be fouled above the trap, and as there is no difficulty in ejecting the contents of a trap above the floor when the flushing stream is properly constructed, this form of hopper is most strongly to be condemned. Even where great cold is to be guarded against, it is better to properly pack the trap *above* the floor, than to have a long, foul waste-pipe above the trap. The trap of the long-hopper is so low down as to be practically out of sight, and when unsealed by momentum, as frequently happens, the accident may easily escape discovery.

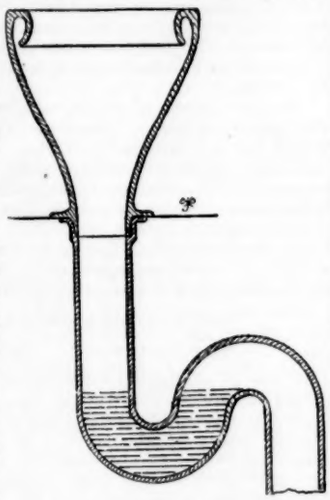


Fig. 10. — Long-Hopper.

It will be seen from the drawings that the surface of the water in the trap of these closets is entirely insufficient in area to receive the wastes, which fall upon the dry sides of the bowl and require constant attention and disagreeable labor to remove them.

On account of this defect dry-hoppers are sold at a low price, and they are bought to save in first cost, under a false idea of economy. *They should never be used*, in the better class of houses because the trouble necessary to keep them clean will not be endured; nor in the poorer class because the trouble will not be taken, and the closet soon becomes a nuisance in the house. Or if, by exception, cleanliness in this direction be insisted upon, the extra labor and consumption of water soon offsets the saving in first cost.

It is easy to see that the water required for cleansing the dry-hopper is very much greater than for the "improved" kind, whether the scouring be done by the strength of the flush or by manual labor, for, as is well known, soil adheres with the greatest tenacity to a dry surface. In view of this fact, dry-hoppers have to be constructed with a copious and powerful flush, and there is a strong temptation for the user and especially for servants having them in charge, to try to remove the tenacious substances by prolonged flushing in order to avoid a disagreeable manual labor. This practice occasions a waste of water far greater than most people imagine.

An effort has been made to overcome this objection by using a valve or cistern constructed to give a small preliminary wash before using. But this complicates both the construction and the operation and adds enough to the first cost to pay for a hopper of proper construction. The preliminary wash, moreover, is often insufficient for the purpose, and is always as far as it goes, wasteful of water.

The dry-hopper has also other serious defects, particularly in its method of connection with the soil-pipe, its flushing, and material. In view of what has already been said touching these points in connection with other closets a simple glance at the drawings and the preceding table of requirements will render this clear without further explanation.

II. — IMPROVED HOPPERS,

Or those having standing water in the bowl, may be subdivided into seven classes, which may be designated as follows: —

(*a*) "*Tilting-Basin*" closet.
(*b*) "*Air-Vacuum*" closet.
(*c*) "*Wash-down*" closet.
(*d*) "*Trap-Jet*" closet.
(*e*) "*Siphon*" closet.
(*f*) "*Wash-out*" closet.
(*g*) "*Self-Sealing*" closet.

(*a*) TILTING-BASIN CLOSET.

Figure 11 represents a water-closet of this class. Its peculiarity consists in having a double bowl, like the Jennings tilting wash-basins. The outer basin is connected with an ordinary S-trap and is stationary. The inner basin is pivoted to tilt after use and empty its contents into the stationary basin, whence they are supposed to pass out into the soil-pipe. The tilting is done by hand. This is a very bad and clumsy arrangement. The stationary bowl corresponds with the receiver of the pan-closet and has its defects. The inner bowl conceals the trap which should be visible; adds greatly to the complexity and cost of the closet without having any advantage; and necessitates a disagreeable manual labor in tilting. No attempt is made in this closet to remedy the defects in the manner and noisiness of flushing, insecure connection with the soil-pipe, improper construction and material which characterize the dry-hopper.

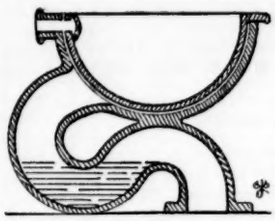


Fig. 11. — "Tilting-Basin" Closet.

(*b*) AIR-VACUUM CLOSET.

Figure 12 represents a water-closet of this class. A double trap is necessary to give the space in which the partial air-vacuum is formed. A cistern and valve of peculiar and complicated construction forms a necessary part of the apparatus, and constitutes the mechanism for producing the vacuum between the two traps. The air is drawn from this space between the traps through an air-pipe connecting with the cistern. Water rushes from the bowl and lower trap to fill the partial vacuum. The two bodies of water unite in the vacuum-chamber, forming a charged siphon which is supposed to empty the bowl; fresh water enters the bowl from the cistern through a second pipe and supplies the place of that which is withdrawn.

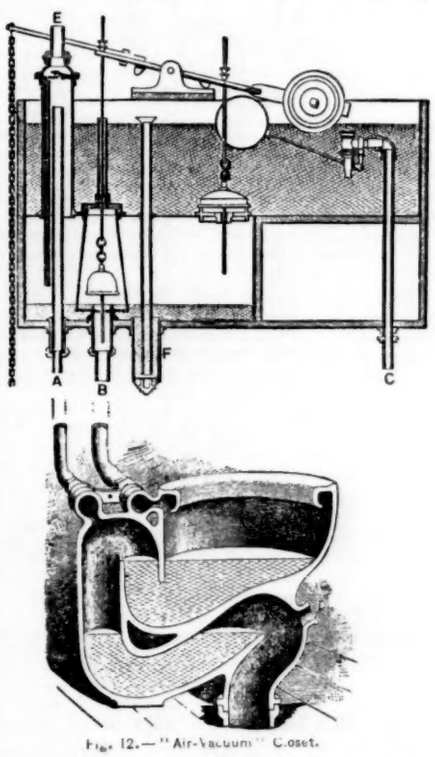


Fig. 12. — "Air-Vacuum" Closet.

The complicated and delicate machinery required to produce the vacuum and to supply and regulate the flush of this closet renders it peculiarly liable to get out of order and difficult to repair. The presence of a double trap is a disadvantage as increasing the cost and requiring a greater quantity of water for their entire cleansing and replenishment. The contents of the lower trap are invisible. The same defects of connection with the soil-pipe, material and construction exist here as in the hoppers already described.

(*c*) "WASH-DOWN" CLOSET.

Figure 13 represents a water-closet of this class. These closets depend for their flushing upon the power of a stream or of streams and separate jets striking the surface of the water standing in the bowl from above. The quantity and surface of the standing water must be small, as otherwise the flushing stream, however powerful and

copious, so applied proves inadequate to the task of ejecting the contents completely from the bowl and trap. The substances floating in the water are tossed and twirled about for some time before they come under the influence of the streams and jets calculated to submerge them.

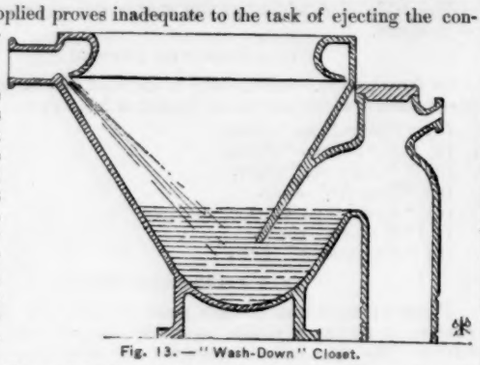


Fig. 13.—"Wash-Down" Closet.

The water "piles up" in the bowl and a great waste is occasioned.

The force of the water is not judiciously applied. When the surface of the water standing in the bowl is large enough to perform its office of receiving the dejections with certainty and thoroughness, their removal, if possible at all, is accomplished only with still greater wastefulness, and the roar of the cataract of water required forms no welcome music for the consumer.

(*d*) TRAP-JET CLOSET.

Figure 14 represents a kind of hopper-closet invented in England about half a century ago. In this closet the flushing stream is applied to much better advantage for emptying the basin and trap than in the preceding. To overcome the inertia of the heavy body of standing water in the bowl and trap, a jet of water is introduced directly into this water below its normal level, and in the direction of its outflow. A given stream or head of water acts far more effectively in communicating motion to an inert mass of liquid, when it enters directly within that body than when it strikes its surface from some point above or outside of it. In the latter case the force of the water is exhausted, partly by friction in passing through the air, which tends to divide it into a spray, and partly by the impact against the water surface, by which it is turned and partly reflected. The remainder of the flushing-stream enters from above in the usual way. The lower jet tends to prevent the "piling up" of the water in the basin.

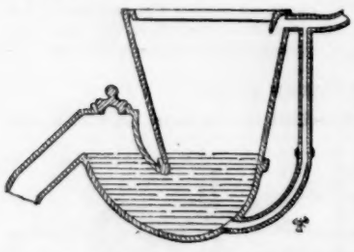


Fig. 14.—"Trap-Jet" Closet.

Excellent as is this closet in principle, and simple in form, it has never attained the popularity it would seem to deserve; but the construction of the jet and upper flushing is susceptible of great improvements; as it is, the complete ejection of the wastes can only be accomplished by using a very strong head and large volume of water; hence, the supply-cistern must be placed very high, and much higher than is usually convenient in private houses, and with some forms of the trap-jet closet used in this country a cistern and valve of peculiar construction are required. In Figure 14 the trap is very deep, square in section and supplied with a clean-out trap-screw at the crown.

Fig. 15.—"Trap-Jet" Closet.

Figure 15 represents another old form of English trap-jet closet, with a shallow trap, round in section. The standing water in the basin is too small in area, and the closet is not used in this country.

THE SEWERAGE OF THE CITY OF KEENE, N. H.

THE present population of the city of Keene is about eight thousand. Water-works were introduced in the year 1869, although Keene was not incorporated as a city until 1874.

The necessity of sewerage became soon apparent, and action was taken by the City Council in the year 1876 in reference to providing a proper system of sewers for the city. Phineas Ball, of Worcester, was employed to submit recommendations, and his careful and elaborate report was published by the City Council in 1876. It may be well to quote a few figures from this report. Mr. Ball's system provides for the drainage of 1,718 acres, and the following are the total lengths of the various sizes of sewers recommended by him: —

550	feet	40″ x 60″	brick sewer;	739	feet	32″ x 48″	brick sewer.
1,754	"	36″ x 45″	" "	2,872	"	24″ x 36″	" "
1,012	"	22″ x 33″	" "	8,075	"	16″ x 24″	" "
16,000	"	15″,	pipe "	19,278	"	12″	pipe "

The cost of this system, although not estimated in the report, would not be far from $150,000. It is evident that the considerations which led to the choice of so large sewers in this system were the admission of storm-water and the slight variations in level, which obtain over a large portion of the city.

Further action in the matter of sewerage was suspended until the year 1882, when the City Council employed Col. George E. Waring, Jr., to devise a system of sewerage similar to that designed by him and now in successful operation in the city of Memphis, Tenn. Col. Waring submitted a plan which provided for the drainage of substantially the same area as that included within the plan of Phineas Ball. In the specification accompanying his plan he states: "The system is arranged for the exclusion of all street, yard, roof and other surface and rain water, and is intended to carry all waste-water discharged from dwelling-houses, manufacturing establishments, etc., and the overflow of all fountains supplied from the city water-works. The system is to be completely flushed at intervals of not more than twenty-four hours, from flush-tanks having a discharging capacity of from one hundred and forty to one hundred and fifty gallons; one of the flush-tanks being located at the head of every branch of the sewers, and connected with the water-supply, so that it will be filled to the discharging level at intervals not greater than twenty-four hours, with appliances for reducing the intervals at the option of the city to six hours. All connecting pipes or drains between the sewers and houses, shops, etc., to be restricted absolutely to a diameter of four inches, and to be laid without a trap, obstruction or contraction, so that their extension through the soil or waste pipe of the house may afford a free channel for ventilation to the open air."

The City Council of the city of Keene passed the following resolution August 21, 1882. "Resolved: That the plan for sewerage submitted by Col. George E. Waring, Jr., be adopted, and a Joint Special Committee on Sewerage be appointed and authorized to make a contract with the Drainage Construction Company, of Boston, or such other parties as they may think best, for laying sewers in various streets as shown on the plan, and in accordance with the specifications submitted by Col. George E. Waring, Jr., and that the sum of $85,000 be raised and appropriated therefor." The plan called for the construction of the following lengths and size of sewers: —

8,800	feet of	15″	sewer;	1,950	feet of	12″	sewer;
1,248	" "	10″	"	530	" "	8″	"
60,520	" "	6″	"	all being pipe sewers.			

In view of the large territory in which sewerage had become an urgent necessity, and in view of the enormous cost at which even a limited system could be constructed on the plan recommended by Phineas Ball, it seemed to most of the citizens of Keene that the system as derived from Colonel Waring, was the best that could be obtained for an efficient and economical drainage of the city. The level condition of the surface of the basin in which a large amount of sewerage was demanded was a difficulty which any system must contend with in securing adequate grades for the sewers, and to meet this it was thought that by excluding all storm-water from the sewers, and allowing only sewage matter to flow through them, the frequent cleansing which the flush-tanks must give to the pipes would be amply sufficient to overcome this natural objection.

The surface formation in the city of Keene, embraced within the limits for which sewerage is provided, is such as to naturally divide it into two distinct districts, with separate outfalls for the sewers into the Ashuelot River, about three-fourths of a mile from the centre of the city. The districts are designated as the Central and Beaver Brook districts, the former embracing the central and western portions of the city, the latter the eastern section. A considerable portion of the central system is situated on nearly level land, whose elevation does not vary largely from heights of eight and ten feet above the water in the Ashuelot River. North of this level section the land rises gradually until an elevation of sixty feet above the river is attained. The Beaver Brook district is divided nearly in twain by the brook bearing that name, the land sloping upward on either side. The highest elevation of this brook within the sewerage limits is about eleven feet above the Ashuelot River, into which it empties. The location of the main sewers was, therefore, easily determined: the one to follow the general direction of the brook, the other to start from the Central Square and run in a southwesterly direction to the river. By referring to the map (*see Illustrations*), the reader will see the arrangement of the entire system as now completed.

The grade of the 15-inch central main from its outlet in Butler's Court to the Square is on the average about 1 foot in 310 feet. Most of the laterals connecting with the main have grades of over 1 foot in 250, excepting four or five short lines whose grades are generally 1 in 400. The largest grade, however, which could be obtained for the Beaver Brook main was 1 foot in 800 feet; the least for a few hundred feet from the outlet was 1 foot in 1,000 feet. The laterals to this main also have good grades, only a few lines having a grade of 1 foot in 400.

The plan which Col. Waring suggested for overcoming high water in the Ashuelot River (which during any period of heavy rain or thaw often rises from three to six feet above the outlets of the sewers) was to have a jet-pump near each outlet worked from the city water-supply. Whether this will be adequate to secure the desired result

can be determined only by a few years' experience, as no opportunity to test it has as yet been afforded.

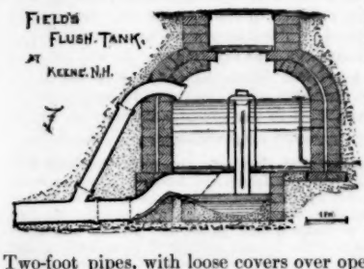
CONSTRUCTION.

Material: — All of the sewers are of the best quality of vitrified pipe, of sizes varying from six to fifteen inches in diameter. The pipe was subjected to rigid inspection, once in the yard and finally at the trench, before laying. The requirements of the inspection were, that they must be free from cracks (slight checks in burning excepted), that they should be perfectly smooth on the inside, straight and of uniform diameter. The kind of pipes used were the Boynton pipe (6-inch), of New Jersey, Akron pipe, Portland pipe, English and Scotch pipes. The following are about the percentage accepted of the different kinds: Boynton, 70 per cent, Akron, 80 per cent, Portland, 85 per cent, English and Scotch, 75 per cent.

Cement:—Most of the cement used was the Hoffman brand of Rosendale cement. Every barrel was tested by what is known as the "ring test," samples being taken from each barrel, mixed into a stiff paste, and allowed to set under water. Samples were accepted if they supported without impression a quarter-pound weight on a wire one-twelfth inch in diameter, within one-half hour of mixing, and all were rejected which failed to support a pound weight on a one-twenty-fourth-inch wire twelve hours after mixing. About five hundred barrels were tested, of which about ten per cent were rejected.

Man-holes: — In Col. Waring's plan only twelve man-holes were provided for the entire system, six on the Beaver Brook main, and six on the central main. We, however, deemed it advisable to increase the number, and man-holes were built at frequent intervals on the main, and at junctions of pipes where they seemed to us necessary. The inverts in the man-holes were formed of half-pipes bedded around and underneath with concrete.

Flush-tanks: — The flush-tanks were built with a uniform capacity of about one hundred and fifty gallons. The accompanying diagram shows the form in which they were constructed in Keene. On account of the severity of the climate it was deemed expedient to have a double brick wall with air-space between. Several tanks were in operation the past winter, and were not affected by the frost, which was several feet deep.



Access to the Sewers: — Two-foot pipes, with loose covers over openings extending about fifteen inches on the top of the pipes (forming hand-holes) furnish the means for access to the six-inch sewers, and are placed at intervals of one hundred feet on the sewer-line. Once in every three hundred feet these are replaced by stand-pipes or lamp-holes, with the vertical six-inch pipe reaching to within two feet of the surface of the ground. In this manner the flow of the current can be observed every three hundred feet, with little difficulty. Wherever curves occurred in the line, "hand-holes" were placed at each end of the curve to afford greater facility in removing any obstruction that might be lodged there.

Trenching: — Many varieties of soil have been encountered in laying the sewers in different portions of the city. In the highest streets the digging was almost wholly in sand with no water, and sufficiently compact in many places to require little or no bracing of the trench. Throughout the central part of the city more or less quicksand was found at depths below six feet. It occurred in three forms: first, as a blue, clayey quicksand; second, like ordinary fine sand readily running in water; and third, as a swampy sand with some mud intermixed. The first was by far the most troublesome, as when softened with water the entire bottom of the trench became yielding and uncertain. Close sheet-piling was used, and a good foundation for the pipe secured by sinking plank scows into the quicksand until a firm bottom was reached. A good method of laying pipe in this kind of trench was to use a square trough, wide enough to receive the pipe, which could thus be laid free of running sand around the joints. Ordinary brick-clay has occurred in many places in which, if softened by water, plank foundations were laid.

Pipe Laying: — To prevent the entrance of cement into the pipes at the joints a band of twisted oakum was pressed between the bell and spigot of the pipes. It was found unadvisable to put cement in the bottom of the bell of the pipe before inserting the spigots. All sizes of pipes were laid on a true grade by the use of the grade-line and rod. Stubs were driven alongside the trench fifty feet or less apart to nearly the surface of the ground, and the distance of the flow-line of the sewer below these given at each station.

Tile Drainage: — As this system excludes all surface or storm water a special care was taken to provide an efficient drainage of the soil by means of drain-tiles. The form of tile most used was round, nearly non-porous, in lengths of two feet, and of sizes varying from one-and-one-fourth inch to three inches. They were laid alongside the sewer-pipe, and at nearly the same grade, the joints being securely wrapped with muslin torn into strips three inches wide, and long enough to go twice around the pipe. Frequent outlet was given them into the sewer by means of running the tile into a pipe, or entering it at a man-hole.

The following statement shows the total amount of sewerage constructed in Keene under the contract of the Drainage Construction Company: —

9,065.55	feet of	15″	pipe sewer;	3,441	feet of	12″	pipe sewer.
1,178.5	"	10″	" "	2,742.5	"	8″	" "
44,788.5	"	6″	" "				

Forty-four flush-tanks and fifty-one man-holes have been built. The contract prices per foot of laying the above sizes — all material furnished by the contractors, and work done in accordance with the specifications are as follows: —

For 15″ pipe,		$2.05	per foot.	For each flush-tank completed,			$63.00.
" 12″ "		1.61	" "	" "	man-hole	"	40.00.
" 10″ "		1.34	" "	" "	outlet	"	200.00.
" 8″ "		1.06	" "	" "	inlet	"	100.00.
" 6″ "		0.90	" "				

The following additions and deductions were made from the original plan: 365.5 feet 15-inch sewer added; 1,491 feet 12-inch sewer added; 2,212.5 feet 8-inch sewer added; 61.5 feet 10-inch sewer deducted; 14,731 feet 6-inch sewer deducted; 39 man-holes added, and 14 flush-tanks deducted.

The number of families to whom sewerage is now accessible in Keene is 720; it is also accessible to seven manufactories and three hotels. All of the sewers in the city have been thoroughly tested by passing wooden balls through the pipes. These balls were two inches less in diameter than the pipes, and were driven through them by a stream of water from the city water-works. The system is now in satisfactory working order, and connections are being rapidly made by the citizens.

L. M. MUZZEY, *Engineer in charge.*

MICROSCOPIC ORGANISMS IN BUILDING MATERIALS.

SAN FRANCISCO, CAL., August 15, 1883.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs,— I have read the article on "Microscopic Organisms in Building Materials" in the *American Architect* for August 4, which came to hand to-day. I enclose an article from the San Francisco *Chronicle*, of recent date, of which I am the author.

"Having occasion to examine a brick that was taken from an old ruined and forsaken building, which was being torn down, I was somewhat startled upon adjusting a microscope upon a fragment to see each pore of the brick inhabited by a peculiar rod-like animalcule of the genus *bacilli*. These insects cannot be seen except by aid of the microscope, even when they live in the human system and prey upon our vitality, neither are they visible in the soil or substances in which they may live and hive, except through a powerful glass. Their motions when they were agitated by blows were as the links of a chain, reminding one of a system of joints to be extended and contracted. They were semi-transparent, with a light, scintillating column nearly two-thirds their length, extending from near their head to their pointed tails, probably their spinal column. As this brick was from the foundation, and being underground and next to the street sidewalk it illustrates forcibly the fact that, however hard-burned and well-made, porous substances should not be put underground for foundations or sewers. Solid rock, or concrete, or terra-cotta are the only proper building materials below the level of the sidewalks. If we wish a healthful city we must have healthful homes, healthful business houses and healthful apartments. It has been said that the fetid breath of any person disseminates the floating germs of the disease that caused that foul breath, and if so of a person, the same will be true of any porous building material where the dampness of any soil, or subsoil, has sufficient moisture to generate the germs, and there is putrescent matter floating and dropping about continually to keep the germs in active principle. Buildings should have stone foundations where exposed to any possible seepage from any drainage or from sewers."

I have repeatedly examined porous building materials, and in all cases where subject to exposure to human or animal evacuations I have found the organisms mentioned. The *bacilli* are the same that I have seen from human kidneys affected by Bright's disease, and more especially after persons had died, and where uric acid had been very prominent. In one case of Addison's disease an examination indicated the same animalculæ. I have a fondness for the curious, and mere accident caused me to examine a brick, and following up the clew thus obtained I have discovered the same conditions of life to exist in several instances.

Yours truly, W. W. GOODRICH.

[MR. GOODRICH stated in conversation that he first made the discovery some six years ago, and therefore his discovery possibly antedates that of M. Parize, which was published in our issue for August 4.— EDS. AMERICAN ARCHITECT.]

BUILDING IN ST. LOUIS.

ST. LOUIS, October 18, 1883.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs,— In the *American Architect* for 13th inst. is quoted from the Philadelphia *Bulletin* a comparison of the number of building permits issued in different cities during the year 1882, in which comparison St. Paul, Minn., heads the list with 4,000 permits, Philadelphia follows with 3,334, and New York modestly reports but 1,905.

In such a comparison St. Louis will appear to advantage. The number of permits in 1882 was 2,569, of which 807 were frame buildings, and 1,762 were of brick and stone. The aggregate value of these buildings as gathered from the permits somewhat exceeds eight million dollars.

As the temptation to undervalue is as potent here as elsewhere, the actual value of the buildings erected in 1882 may be roughly estimated at ten million dollars.

Very respectfully,

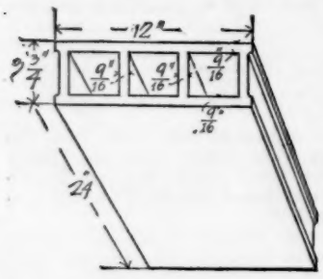
C. E. ILLSLEY.

CLAY ROOFING-TILES.

Washington, D. C., September 29, 1883.

To the Editors of the American Architect: —

Dear Sirs,— The iron roof of the new Pension Building at Washington is to be covered under metal with hollow terra-cotta sheathing tiles, 4″ x 12″ x 24″, with three rectangular holes running lengthwise through them. The actual size of specimens tested yesterday are as below: —



With 22-inch clear span the load was applied to a lath 2 inches thick resting across middle of the tile.

No. 1, burnt 2″ clay, broke at 2,394 pounds.

No. 2, two-thirds clay and one-third sawdust, broke at 1,940 pounds.

This is equal to 3,294 pounds per square foot of whole surface of tile thus supported for the tile of pure clay; and 1,940 pounds per square foot for the porous tile, burnt from a mixture of one-third saw dust and two-thirds clay. These tiles are made by the Potomac Terra-cotta Company, and are a sample from a kiln of such tiles made for the new Pension Building.

Such sheathing is cheap, strong and durable, and is a bad conductor of heat; therefore, it is believed to be a valuable roofing material, and if protected from sharp blows of hard substances by a wooden covering may be useful in fire-proof flooring.

Very respectfully, your obedient servant,

M. C. Meigs,

Sup. Architect and Engineer, New Pension Building, U. S. A.

SOIL-PIPES AND LIGHTNING.

Newport, R. I., October 23, 1883.

To the Editors of the American Architect: —

Dear Sirs,— Referring to the question raised by your correspondent, "W," as to danger from lightning in carrying soil-pipes through the roof, I can only say that I have never known of an accident resulting from the present almost universal practice. The top of the soil-pipe is rarely the highest point of the house; it is generally protected by lightning-rods on the roof and chimneys, and it is itself, in all properly-constructed work, continued with iron pipe some distance outside of the foundation-wall, so that, if struck, it would probably carry the electricity into the ground.

Geo. E. Waring, Jr.

Boston, October 23, 1883.

To the Editors of the American Architect: —

Dear Sirs, — I offer the following reply to your correspondent, "W," in your issue of October 6: The protection of houses from lightning is a subject on which but very little new light has been shed since the days of Dr. Franklin. Unfortunately for the householder, the work of applying the protection has fallen into the hands of a class of ignorant and conceited men, who, with their useless patent insulators and glib tongues, try to make up for their want of brains.

The supposed new risks encountered by the use of the modern iron soil-pipes, presenting a mass of metal in vertical lines, with questionable ground-connection for electric currents, have been brought to my notice repeatedly, not by actual electric discharges, but by the fears of householders. I believe these fears to be for the most part groundless, for the following reasons: —

The ground-connection of the soil-pipe is generally a better path for electricity than most of the lightning-rods are provided with in country houses, where no water or gas mains are available. A rain-water tank, if made of wood, as they are invariably in New Orleans and often in other places, is no ground-connection at all for an electric current, for the wood is a non-conductor. If the tank is of brick, and under ground, the case may be a little better, for the brick is then generally water-soaked from the outside, but its water-tight lining of cement is a poor conductor, and thus breaks the continuity, if actually water-tight.

But the soil-pipe is always supposed to discharge into a drain outside of the house, leading in nine cases out of ten, with country houses, to a cesspool which has constant electric connection with the ground. Its sides are open, whether of stone or brick, allowing a continuous flow of water from the drain into the surrounding soil, and however detestable such an arrangement may be for sanitary purposes, it certainly forms a good terminus for a lightning conductor. Water is known to be a good conductor, and there is always a continuous line of water from the metal soil-pipe to the mass of liquid filth which surrounds the cesspool in the pores of the soil. However little water may be flowing through the drain, its bottom is always *wet*, and such a wetted surface is a good conductor, provided its continuity is not broken by dry spots. These are not likely to occur in the inside of a house drain, so long as the house is occupied. The slimy lining of these drains is very tenacious of water, and always continuous.

Your correspondent, "W," is quite right, in my opinion, in objecting to the practice of terminating the upper end of a soil-pipe in a brick flue. Sanitary considerations condemn it, and the public have now generally adopted the practice of extending it through the roof. Such a projecting pipe, whether connected or not with the system of lightning-rods, forms, in my opinion, an additional protection against lightning; but in order to avail ourselves of its efficiency to the greatest degree, it should be so connected, by extending a branch to it from the nearest lightning-rod, when the roof is not covered with metal. If the roof be tinned, and the soil-pipe soldered to it, then the lightning-rods should also be soldered to the tin at some convenient point. Such an arrangement, with the ordinary soaking cesspool, would give the whole system of lightning-rods a better ground-connection, through the soil-pipe and wet drain, than a rain-water tank affords, and as good as any except a well, or a system of gas or iron water mains, which last are the best possible ones.

Edward S. Philbrick.

TO MIX CONCRETE.

Gallatin, Tenn., October 17, 1883.

To the Editors of the American Architect: —

Dear Sirs,— Will you please publish in your journal the ingredients and proportions of each to use in making concrete steps. The lower step (or to be better understood, the carriage step) of my front doorsteps is broken, and I desire to replace it. The composition of this step has in it sharp sand and gravel, much of the latter being larger than a pea. The house I occupy was built in 1825, and there is much of this same concrete used for many purposes, such as immense pillars, doorsteps, cisterns, and the garden walks; and all are in good order; and naturally I desire to replace the step mentioned with something equally as good. The sharp sand and gravel I can get in abundance from a stream close to my house. It will be necessary, I suppose, to have a wooden frame to shape and lay it in. What would be the time the concrete would require to be protected from usage? We rarely have frost in the ground before the latter part of December. Yours respectfully, A. B. C.

[Take one part *fresh* Portland cement (Saylor's American Portland will probably be easiest obtained in good condition) and two parts of the finer portion of the gravel, screened for the purpose. Mix thoroughly in the dry state, turning over and over, until no streaks of the cement powder are visible; then add water enough to make a stiff paste, and stir in quickly a quantity of the coarse ingredients of the gravel, separated by screening and thoroughly washed beforehand, equal to that of the cement and sand paste. Incorporate as thoroughly but rapidly as possible, and place in the box which serves as a mould, ramming gently to be sure that no cavities are left in the mass. Then cover the whole with sand, or with a wooden cover, to prevent the sun and wind from drying the top into dust, and leave as long as possible undisturbed. Six months would not be too long to leave the block to harden, but if that is inconvenient, the process may be artificially hastened by uncovering the concrete at the expiration of three or four weeks and pouring over it, in successive doses, all of a moderately strong solution of silicate of soda that it can be made to absorb. After a thorough saturation with this the block will quickly harden, and can be used in a week or two.

Of the precautions to be observed in this sort of work, the proper mixing is the most important. The incorporation of the dry sand and cement cannot be too thorough and prolonged, as any group of sand-particles not coated with cement will form a fatal flaw in the block. After adding the water, on the contrary, everything must be done as quickly as possible, since the cement begins in a few minutes after wetting to take its initial set, and cannot be afterwards disturbed without permanently destroying its cohesion. The water should therefore be put in all at once, in quantity about equal to the mixed cement and sand, and stirred in immediately; then adding the pebbles, which should not be dusty, and may even with advantage be damp from washing, the whole should be incorporated with quick but well-directed movements, and the mass put into the mould. It is best to grease the mould, and to work the first portions of the concrete with a trowel into the angles, to make sure of sharp arrises.

If there is any danger of frost, the work should be postponed, or if already done, the concrete block in its mould should be buried in sand, as the fresh concrete freezes very easily, and is destroyed as far as the frost penetrates. — Eds. American Architect.]

NOTES AND CLIPPINGS.

Large Organ for the Cathedral of Riga. — An organ which has just been built in Germany is believed to be the largest in existence. It counts 174 registers and is worked automatically by an Otto gas-motor of four-horse power. Its height is 20 metres, its width is 11, and its depth 10. Its largest wooden pipe is 10 metres long and of a cubical capacity of 2,000 litres. The instrument is to be set up in the Cathedral of Riga. For the St. Stephen's Cathedral of Vienna the same builders are soon to construct a still larger organ. The well-known organs of Boston, Ulm, and St. Petersburg were built by the same men.

"Begone about your Business." — An old dial in the Temple, London, bore the curious motto, "Begone about your business." The maker, wishing to know what motto the Benchers required for the dial, sent his lad to ascertain it. The boy applied while the Benchers were dining, and one of them, annoyed at the unseasonable interruption, said, shortly, "Begone about your business." The lad, thinking that this was the desired motto, reported it to his master, and the dial accordingly bore this novel inscription as long as the building upon which it was placed remained.

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.]

286,580. REVERSIBLE LATCH. — Clark E. Billings, Middlesex, Vt.

286,584. WINDOW-FRAME. — William W. Boyington, Highland Park, Ill.

286,597. CHIMNEY-TOP. — Wendelin Faulstich, Belleville, Ill.

286,600. PIPE-TONGS. — Dan P. Foster, Waltham, Mass.

286,610. COMBINED BIT-BRACE AND WASHER-CUTTER. — Isaac W. Heysinger, Philadelphia, Pa.

286,614. DOOR-LOCK. — William D. Hughes, Washington, D. C.

286,621. METHOD OF APPLIANCE FOR CONTROLLING AND PREVENTING FIRES IN BUILDINGS. — William H. Maxwell and J. Milton Stearns, Jr., Brooklyn, N. Y.

286,644. FIRE-ESCAPE. — John D. Seagrave and Eustis R. Faller, Worcester, Mass.

286,648. HOT-AIR MAGAZINE. — Joseph H. Spurrier, Joplin, Mo.

286,653. WRENCH. — Henry Artemas Thompson, Farmington, Me.

286,683. RATCHET-BRACE. — Joan Chantrell, Bridgeport, Conn.

286,684. SAFETY-APPLIANCE FOR ELEVATORS. — Robert A. Chesebrough, New York, N. Y.

286,714. DOOR-BELL. — Enoch Lawson, San Francisco, Cal.

286,728-729. BRICK-KILN. — Clark D. Page, Rochester, N. Y.

286,746. WASTE-TRAP. — Samuel E. Thomas, Brooklyn, N. Y.

286,760. ELEVATOR. — Emil Bachmann, New York, N. Y.

286,774. DOOR-HANGER. — Caleb Brinton, Chicago, Ill.

286,780. STEAM-RADIATOR. — George Clark, West Troy, N. Y.

286,828. SHUTTER-FASTENER. — Peter Keffer, Redding, Pa.

286,840. BIT-STOCK. — George C. Paine, Boston, Mass.

286,842. WRENCH. — Granville W. Pittman, Keokuk, Iowa.

286,847. PIPE-TONGS. — Henry Rhyn, Cincinnati, O.

286,850. FIRE-ESCAPE. — Albert N. Sande, Chicago, Ill.

286,857. SASH-CORD FASTENER. — Henry Smith, Jr., Baltimore, Md.

286,858. LIQUID PAINT. — Roderick H. Smith, Dunkirk, N. Y.

286,859. FASTENER FOR THE MEETING-RAILS OF SASHES. — Thomas S. Smith, New Haven, Conn.

286,874. WATER-CLOSET. — Louis Waefelaer, Hoboken, N. J.

286,892. BRICK-MACHINE. — William Andrus, Keokuk, Iowa.

286,894. PLANE. — Fortune L. Bailey, Freeport, Ind.

286,909. SASH-HOLDER. — Miles Commander, Elizabeth City, N. C.

286,912. GATE-HANGER. — Charles Daniel, Butler, Mo.

286,913. WRENCH. — Robt. W. Davis, Elmira, N. Y.

286,918. WHITE PIGMENT. — Joseph B. Freeman, White Hart Lane, Tottenham, County of Middlesex, Eng.

286,931. ROLLER SASH-BALANCE. — Robert B. Hugunin, Hartford, Conn.

286,535. DOOR-LATCH. — Frederick J. Lee, Oswego, Kan.

286,951. STENCH-TRAP. — Randolph McBee, Washington, D. C.

286,964. HOLLOW AUGER. — Jas. A. Rodman, Lebanon, Tex.

286,975. GREASE-TRAP. — John Tucker, New York, N. Y.

286,981. FLOOR-JACK. — Joshua H. Williams, East Craftsbury, Vt.

286,884. MOULD FOR GLASS TILES FOR FLOORS, ETC. — Laurin D. Woodworth, Youngstown, O.

10,393 (*Reissue*). APPARATUS FOR DRYING AND SEASONING LUMBER. — John Owen Smith, Jamison, Ala.

SUMMARY OF THE WEEK.

Baltimore.

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

Sophia Quantmyer and N. Walpmor, 2 three-st'y brick buildings, n e cor. Washington and Jefferson Sts., fronting e s Washington St.

Jacob Schmidt, two-st'y brick building, rear of 49 Union St., n s, between Druid Hill Ave. and Pennsylvania Ave.

J. E. Thomas, 10 two-st'y brick buildings, s s Cross St., between Dexter and Nanticoke Sts.

Peter J. Miller, 9 three-st'y brick buildings, s s Edmondson Ave., w of Schroeder St.

John McElroy, 3 three-st'y brick buildings, w s Hanover St., n of Fort Avenue.

J. S. Magarity, 2 three-st'y brick buildings, n s Madison St., w of Bond St.

Canton M. E. Church, brick church, s w cor. Dillon and Canton Sts.

John Raumberg, 2 three-st'y brick buildings, e s Belair Ave., s of African Burying Ground.

John McKee, three-st'y brick building, e s Vincent Alley, n of Lexington St.

Chas. Watterscheidt, three-st'y brick building e s Eutaw St., between Saratoga and Clay Sts.

Geo. R. Presstman, 5 two-st'y brick buildings, e s Dawson St., s of Lancaster St.

Jas. D. Hodge, 24 two-st'y brick buildings, w s Stricker St., commencing s e cor. Baker St.

Dr. J. T. King, two-st'y and basement brick building, w s Stockton Alley, s of Harlem Ave.

Boston.

BUILDING PERMITS. — *Brick. — Emerson St., Nos.* 7-13, near H St., Ward 14, for Henry Southers, 4 dwells., 18′ x 30′, two-st'y flat; William T. Eaton, builder.

Unnamed St., near Pelham St., Ward 17, for Est. Barney Cory, 4 dwells., 16′ 4″ x 40′ 8″, two-st'y mansard; J. J. McNutt, builder.

Longwood Ave., cor. Huntington Ave., storage, for A. Folsom & Son, 53′ 8″ and 66′ x 90′ and 128′, two-st'y flat; Gottlieb Merz, builder.

Commonwealth Ave., near West Chester Park, Ward 22, for Trustees of Park Entrance Lands, 2 dwells., 30′ and 25′ 7″ x 77′, four-st'y flat; G. F. Shepard, builder.

Silver St., No. 304, Ward 13, for Francis Jones, dwell., 21′ x 28′, one-st'y mansard; Lyman Locke, builder.

Silver St., No. 302, Ward 13, for Thomas Leavitt, dwell., 21′ x 28′, one-st'y mansard; Lyman Locke, builder.

Columbus Ave., Nos. 162-172, Ward 11, for Carter, Dinsmore & Co., store and factory, 66′ x 100′, five-st'y flat.

Wood. — Lewis St., Nos. 64-66, cor. Magazine St., Ward 2, for Mary McDavitt, dwell. and store, 25′ x 35′, two-st'y flat; A. & J. McLaren, builders.

Whitney St., near Conant St., Ward 22, for Michael Griffin, dwell., 24′ x 39′ 3″, three-st'y hip; T. O. Grady, builder.

Harvard St., rear, near Brighton Ave., Ward 25, for Gideon P. Brown, greenhouse, 16′ x 64′, one-st'y pitch; C. B. Bowers, builder.

North Beacon St., cor. Everett St., Ward 25, for Mrs. Sarah W. Whitney, dwell., 34′ x 35′, two-st'y pitch.

Congress St., near A St., Ward 13, for James & Abbott, 3 lumber sheds, one, 16′ x 175′; one, 16′ x 75′; one, 16′ x 100′, one st'y flat; Clark & Lee, builders.

Brown Ave., near Allen St., Ward 23, for John H. Apel, dwell., 30′ x 35′; two-st'y pitch; W. S. Mitchell, builder.

Brown Ave., near Allen St., Ward 23, for Theodore Schmitt, dwell., 30′ x 35′, two-st'y.

Saratoga St., near Moore St., Ward 1, for John J. O'Donnell, store, 20′ x 30′, one-st'y flat; Edward Turner, builder.

Saratoga St., cor. Moore St., Ward 1, for William Harrington, store, 22′ x 50′, two-st'y flat.

Lexington Ave., rear, near Union St., Ward 25, for John Behan, storage, 13′ x 40′, one-st'y flat.

Gilbert St., near Centre St., Ward 23, for Owen Nawn, dwell., 26′ x 35′, three-st'y flat; Owen Nawn, builder.

Rutherford Ave., rear opp. Dunstable St., Ward 4, for Eastern R. R. Co., repair shop, 18′ x 40′, one-st'y flat; H. Bissell, builder.

Baker St., near Spring St., Ward 23, for Stephen McNeil, dwell., 24′ x 30′, two-st'y hip; Stephen McNeil, builder.

Union Ave., rear, near Green St., Ward 23, for Maria Roan, 2 dwells., 17′ 5″ x 28′, two-st'y pitch; T. C. Cangley, builder.

Beech St., rear, near Washington St., Ward 23, for Conrad Etter, stable, 16′ x 24′, one-st'y pitch.

West First St., No. 172, near B St., Ward 13, for A. P. Morse, stable, 31′ x 42′, two-st'y flat; Clark & Lee, builders.

Saratoga St., No. 629, Ward 1, for Mary Hardman, dwell., 22′ x 30′, two-st'y flat; W. Goodwin, builder.

Western Ave., near Waverley St., Ward 25, for James A. Hathaway, 6 dwells., 13′ 3″ x 18′ and 20′ x 30′, two-st'y pitch; B. Wood, builder.

Wakulla St., cor. Rockland St., Ward 21, for J. V. N. Stults, and H. W. Mansur, dwell., 26′ and 36′ x 45′, three-st'y flat.

Boylston Ave., near Porter St., Ward 23, for A. Schuman, dwell., 30′ x 36′, two-st'y pitch; Jacob Luippold, builder.

Summer St., No. 34, Ward 3, for John R. Murphy, dwell., 20′ 6″ x 28′, three-st'y flat; Donovan & Brock, builders.

North Beacon St., cor. Everett St., Ward 25, for Albert T. Sinclair, dwell., 24′ 6″ x 34′ 8″, two-st'y pitch; Stephen Ellis, builder.

Hancock St., near Garden St., Ward 23, for Ferdinand Schmidt, dwell., 22′ x 30′, two-st'y pitch; W. S. Mitchell, builder.

Meehan St., near Washington St., Ward 23, for Pat. Crosby, dwell., 19′ and 26′ x 30′, two-st'y pitch; John Gately, builder.

Erie Ave., near Elmo St., Ward 24, for John H. Gigie, dwell., 20′ x 35′ 6″, two-st'y pitch.

Laurel St., near Ottawa St., Ward 21, for Andrew Anderson, dwell., 30′ x 57′, three-st'y flat; Andrew Anderson, builder.

Laurel St., near Ottawa St., Ward 21, for Andrew Anderson, dwell., 27′ 3″ x 51′ 6″, three-st'y flat; Andrew Anderson, builder.

Pickering Pl., Nos. 1-4, Ward 14, for Lyman Locke, 4 dwells., 20′ x 30′, two-st'y flat; Lyman Locke, builder.

Brooklyn.

BUILDING PERMITS. — *Van Buren St.*, n s, 90′ e B'way, 4 two-st'y and basement frame dwells., tin roofs; cost, each, $2,000; owner, architect and builder, Samuel H. Yost, 116 Palmetto St.; mason, A. A. Fordon.

Broadway, s e cor. Lafayette Ave., three-st'y frame store and tenement, tin roof; cost, $5,000; owner, Joseph Lawson, 162 South Third St.; architect, T. Engelhardt; builders, A. Sachs and J. Frisse.

Elm St., s e cor. Evergreen Ave., three-st'y frame store and tenement, tin roof; cost, $4,000; owner, Wm. Walsh; architect, F. Holmberg; carpenter, P. Schell.

Hancock St., s s, 140′ w Tompkins Ave., 4 two-st'y and basement dwells., tin roofs; cost, each, $5,500; owner, Robert Little, Willis Ave., New York City; builder, Chas. H. Fenton.

Nostrand Ave., s w cor. Jefferson St., four-st'y brownstone store and tenement, tin roof, wooden cornice; cost, $14,000; owners, Charles Gerken & Bro., Third Ave., cor. Pacific St.; builder, James Powell.

Marcy Ave., n w cor. Monroe St., three-st'y brownstone front dwell. and one-and-one-half-st'y brick stable, tin roofs; cost, total, $8,000; owner, Wm. Richter, on premises; architect and builder, John Brown.

Herkimer St., s w cor. Suydam Pl., 3 two-st'y frame dwells., tin roofs; cost, each, $2,500; owner and builder, S. I. Jarvis, 802 Herkimer St.; architect, A. Hill.

Chauncey St., n s, 350′ e Patchen Ave., 2 three-st'y frame tenements, tin roofs; cost, each, $4,000; owner and architect, Joseph Smyth, 417 Second St., E. D.; builder, Phillip Sullivan.

South Portland Ave., w s, 100′ n Hanson Pl., two-st'y brick stable, tin roof; cost, $6,000; owner, Thos. R. Ball, 15 South Oxford St.; architect, W. A. Mundell; builders, Cornelius Cameron and Wright & Brook.

Withers St., s s, 140′ e Humboldt St., three-st'y frame double tenement, tin roof; cost, $4,000; owner, Hoffman; builder, J. Rueger.

Bleecker St., n s, 200′ e Bushwick Ave., two-st'y frame tenement, tin roof; cost, $3,900; owner, F. Haase, Lorimer St., cor. Ainslie St.; builder, Jno. Rueger.

Stanhope St., n s, 150′ w Central Ave., 4 two-st'y frame dwells., tin roofs; cost, each, $1,200; owner, architect and builder, Henry C. Bauer, 721 Bushwick Ave.

Willoughby Ave., s s, 80′ w Steuben St., 2 four-st'y brownstone front tenements, felt and gravel roofs; cost, each, $6,000; owner, Geo. W. Brown, 728 Fulton St.; builder, L. E. Brown.

Macdonough St., s s, 425′ w Reid Ave., 3 two-st'y brownstone front dwells., gravel or tin roofs; cost, each, $5,000; owner, Geo. Adams, 961 Broadway, E. D.; architect, R. H. Heasman.

Ralph St., n s, 160′ w Evergreen Ave., two-st'y frame tenement, tin roof; cost, $2,500; owner, P. G. Menahan, 791 Bushwick Ave.; architect, F. Weber; builder, Thos. Goodwin.

Broadway, s w cor. Bartlett St., four-st'y iron and brick front store and warehouse, tin roof, iron cornice; cost, $17,500; owner, J. Reinhart, Broadway, cor. Bartlett St.; architect, A. Herbert.

Eleventh St., e s, 40′ w Seventh Ave., 3 two-st'y brownstone front dwells., tin roofs; cost, each, $3,200; owner, Samuel Squires, Fourteenth St., between Fourth and Fifth Aves.; builder, C. B. Sheldon.

Buffalo Ave., w s, 90′ s Herkimer St., 7 buildings, and Herkimer St., s w cor. Buffalo Ave., 21 buildings, in all 28 two-st'y frame dwells., tin roofs; cost, each, $1,500; owner, architect and builder, C. P. Skelton, 1909 Atlantic Ave.

Hamilton Ave., e s, 90′ n Luqueer St., two-st'y brick store and dwell., felt and gravel roof; cost, $3,000; owner and builder, J. F. Nelson, 26 Manhasset Pl.

Pulaski St., n s, 100′ w Stuyvesant Ave., 4 two-st'y frame tenements, tin roofs; cost, each, $3,000; owner, Hon. Chas. Naeher, Meserole St.; architect, F. Holmberg.

Stuyvesant Ave., n w cor. Pulaski St., three-st'y frame dwell., peak roof, slated; cost, $6,000; owner, Hon. Chas. Naeher, Meserole St.; architect, F. Holmberg; builders, not selected.

Vernon Ave., n s, 85′ w Sumner Ave., 2 two-st'y brownstone front dwells., tin roofs; cost, each, $4,000; owner, John Langie, Willoughby Ave., near Sumner Ave.; architect, A. Hill; builder, S. C. Phillips.

Halsey St., n s, 510′ e Bedford Ave., three-st'y brownstone front dwell., tin roof; cost, $9,000; owner, Sarah M. Covel, 234 Cumberland St.; architect and builder, F. B. Jackson.

ALTERATION. — *Smith St.*, s e cor. Schermerhorn St., new stairs on Schermerhorn St., new stairs and entrance on Smith St., interior alterations, etc.; cost, $10,000; owner, Brooklyn Saengerbund, on premises; architect, Carl F. Eisenach.

Chicago.

CHURCH. — Dixon & Townsend are architects for St. John's Reformed Episcopal Church, to be built on Langley Ave.

FACTORIES. — Treat & Foltz, architects, have completed plans for the factory to be built on South Jefferson St., for M. Benner: cost, $28,000.

W. W. Boyington is architect for the factory to be built at 51 South Jefferson St., 72′ x 120′, four-st'y; cost, $16,000; owner, M. Laflin; builders W. & A. Wells.

H. R. Wilson is architect for Mrs. N. Allen's four-st'y factory, on Carroll Ave.; cost, $8,500.

HOUSES. — Burnham & Root, architects, have plans completed for dwell. for A. A. Sprague, on Prairie Ave.; cost, $40,000.

S. Guy Sea will build a two-st'y dwell. in the North Division; cost, $25,000.

A. Fiedler is architect for the two-st'y dwell. to be built for Dr. T. J. Bluthardt, on Lasalle Ave.; cost, $12,000.

L. G. Halberg, architect, made the plans for two-st'y dwell. for Mrs. Williams, on South Park Ave.; cost, $12,000.

Louis Wolff is architect for the four dwells. to be built on Lexington St., for F. Madlener; cost, $12,000.

Furst & Rudolph, architects, made the plans for J. Heissler's three-st'y dwell. and store on State St.; cost, $10,000.

WAREHOUSE. — Geo. E. Edbrooke is architect for the seven-st'y warehouse, 160′ x 187′, on North Clark St., cor. River St., for Hiram Sibley; cost, $500,000.

BUILDING PERMITS.—M. Hearn, two-st'y store and dwell., 765 Indiana St.; cost, $4,000.

F. Brun, two-st'y flats, 101 Hulbert St.; cost, $3,000.

Mrs. N. Allen, four-st'y factory, 665 Carroll Ave.; cost, $8,500; architect, H. R. Wilson.

A. A. Sprague, two-st'y dwell., 2708 Prairie Ave.; cost, $40,000; architects, Burnham & Root; builder, Thos. Nicholson.

J. Heissler, three-st'y dwell. and store, 3444 State St.; cost, $10,000; architects, Furst & Rudolph.

M. Laflin, four-st'y factory, 51 South Jefferson St.; cost, $16,000; architect, W. W. Boyington; builders, W. & A. Wells.

Rick & Sauder, three-st'y flats, 159 Fremont St.; cost, $4,000.

F. Madlener, 4 two-st'y dwells., 3 to 9 Lexington St.; cost, $12,000; architect, Louis Wolff.

David Walker, two-st'y dwell., 311 Robey St.; cost, $3,000.

J. W. Kindt, two-st'y dwell., 292 Lincoln Ave.; cost, $5,000.

Geo. W. Wilson, three-st'y dwell., 289 West Ohio St.; cost, $5,000.

S. Guy Sea, two-st'y dwell., 203 and 205 Rush St.; cost, $25,000.

Hiram Sibley, seven-st'y warehouse, North Clark St., cor. River St.; cost, $500,000; architect, Geo. E. Edbrooke; builders, W. A. Wells & Son.

J. Clifford, three-st'y store and flats, 351 East Division St.; cost, $6,000; architect, H. Hanson.

Mrs. Williams, two-st'y dwell., 3426 and 3428 South Park Ave.; cost, $12,000; architect, L. G. Halberg.

S. Bates, three-st'y addition, 131 Fourth Ave.; cost, $3,500.

Mrs. B. S. McVoy, three-st'y dwell., 440 Lasalle Ave.; cost, $8,000; architect, M. L. Beers.

Mrs. M. C. Dobbins, factory, 267 and 269 Twentieth St.; cost, $4,000.

M. Bedner, four-st'y factory, 260 to 264 South Jefferson St.; cost, $28,000; architects, Treat & Foltz; builder, E. Earnshaw.

John McMillan, two-st'y flats, 440 South Oakly St.; cost, $3,000.

John Lyberg, three-st'y flats, 271 Wells St.; cost, $5,000; architect, John Otter; builder, C. Lind.

John Jansen, 5 cottages, Oakly St., near Frankfort St.; cost, $5,000.

J. J. Schock, two-st'y dwell., 1527 West Madison St.; cost, $5,000.

C. Binefeld, two-st'y dwell., 102 Rees St; cost, $3,000; builder, M. Kuehl.

R. Porter, 2 two-st'y dwells., 3747 and 3749 Lake Ave.; cost, $9,000.

St. John's Reformed Episcopal Church, one-st'y church, 3702 Laugley Ave.; cost, $6,000; architects, Dixon & Townsend.

Peter McDonald, 2 two-st'y flats, 540 and 542 Leavitt St.; cost, $5,000; architect, C. C. Miller.

Thos. Morse, 2 two-st'y flats, 622 to 626 Twenty-seventh St.; cost, $5,000; builders, Smith & Goebel.

Wm. Hill, three-st'y dwell., 371 Twenty-third St.; cost, $3,000; architect and builder, S. P. Russell.

John Fritz, two-st'y and basement flats, 3609 Forest Ave.; cost, $4,000.

C. Woelfler, dwell., 758 North Park St.; cost, $8,000; architect, Theo. Karls; builders, Riplinger & Son.

Dr. T. J. Bluthardt, two st'y and basement dwell., 453 Lasalle Ave.; cost, $12,000; architect, A. Fiedler; builder, Jno. Cox.

Cincinnati.

STORE.—A store 49′ x 120′ is to be built on Fourth St., bet. Vine and Walnut Sts., five-st'y; the building will be occupied by John Church & Co., dealers in musical instruments; Mr. Samuel Hannaford, architect.

STABLES.—The C. Moerlein Brewing Company are to build a new stable on the cor. of Henry and Dunlap Sts., 100′ on each street, four-st'y and basement; cost, $25,000; architect, Geo. W. Rapp. Mr. Rapp has also prepared plans for a frame stable for Mr. Thos. Pogue on Nassau St., Walnut Hills; cost, $1,000.

New York.

APARTMENT-HOUSES.—For Mr. De Lancey Nicoll a five-st'y apartment-house, 25′ x 41′ 9″, is to be built on the n e cor. of Broadway and Forty-ninth St., from designs of Mr. Jas. Brown Lord.

On the n e cor. of Second Ave. and Ninety-second St., a five-st'y brownstone apartment-house, 25′ x 90′, is to be built by Mr. Hugo Gorsch, from designs of Mr. Wm. Graul.

A four-st'y flat house, 20′ x 51′, is to be built by the Trustees of St. Patrick's Cathedral, at No. 276 Mulberry St., from designs of Mr. James E. Ware.

On the s s of Thirtieth St., 100′ e of Eleventh Ave., six-st'y tenement, 28′ 11″ x 84′ 4″, is to be built for Rosalie Steinhardt, from designs of Mr. Geo. B. Pelham.

BREWERY.—Mr. L. Levi will build, on the n s of Seventy-first St., 200′ w of First Ave., on the rear premises, a distillery, brewery and stable, to cost over $150,000.

EXCHANGE.—Mr. H. K. Thurber and four others have been appointed a committee to take charge of the erection of a new building for the Mercantile Exchange.

FACTORY.—A five-st'y brick factory, 25′ x 100′, is to be built on the n e cor. of Sixty-fourth St. and Second Ave., for Mr. Henry C. Meyers, of Syracuse, from designs of Mr. J. H. Valentine; cost, about $30,000.

BUILDING PERMITS.—*Jacob St., No.* 25, five-st'y brick store, tin roof; cost, $12,000; owner, Estate of Henry Mangels, A. M. Mangels, executor, 185 Washington Park, Brooklyn; architect, Wm. B. Tubby.

Washington St., No. 79, five-st'y brick tenement, tin roof; cost, $10,000; owner, Isabella V. Hogan, 35 West One Hundred and Nineteenth St.; architect, A. Spence.

Union St., n w cor. Wolf St., 3 three-st'y frame tenements, tin roofs; cost, $4,000; owner, John Spellman, Highbridge; architect, John E. Kerby.

Kingsbridge Road, s s, 100′ s N. Y. C. & H. R. R. Co. track, 3 three-st'y brick dwells., tin roofs; cost, $1,800; owner, Isaac G. Johnston, Spuyten Duyvel; architect, Ed. A. Quick; builders, J. & G. Stewart and S. F. Quick.

West Twenty-sixth St., Nos. 505 *and* 507, 2 four-st'y brick tenements, tin roofs; cost, each, $8,000; owner, James Moore, Tenth Ave., between Sixtieth and sixty-first Sts.; architect, Jos. M. Dunn; builders, Van Dolsen & Arnott and John Smith.

Eleventh Ave., s w cor. Fifty-ninth St., one-st'y brick slaughter-house and one-st'y brick storage-house, gravel roofs; owner, Timothy C. Eastman, No. 6 East Seventieth St.; architect, J. E. Terhune.

One Hundred and Nineteenth St., s s, 215′ e Fourth Ave., five-st'y brick tenement, tin roof; cost, $16,000; owner and architect, R. Rosenstock, 209 East One Hundred and Twenty-seventh St.

Courtland Ave., w s, 59′ n One Hundred and Fiftieth St., three-st'y frame tenement, tin roof; cost, $4,500; owner, Louis Mitschel, Courtland Ave., between One Hundred and Forty-eighth and One Hundred and Forty-ninth Sts.; architect, Adolph Pfeifer; builder, not selected.

Seventy-sixth St., s s, 199′ 4″ e Madison Ave., 6 four-st'y brownstone front dwells., tin roof; cost, each, $3,000; owner, Chas. L. Guilleaume, 22 West Eleventh St.; architects, Thom & Wilson.

Lexington Ave., n w cor. Forty-fifth St., 7 four-st'y brick dwells., tin roofs; cost, total, $150,000; owner, Thos. B. Gilford, 473 Lexington Ave.; architects and builders, Chas. Graham & Sons.

Forty-fifth St., n s, 211′ w Lexington Ave., five-st'y brick flat, tin roof; cost, $52,000; owner, architects and builders, same as last.

Kingsbridge Road, w s, 1000′ n N. Y. C. & H. R. R., two-st'y frame dwell., tin roof; cost, $3,000; owner, Albert E. Putnam, Kingsbridge; architect and builder, Samuel L. Berrian.

East Twenty-ninth St., No. 226, five-st'y brick flat; tin roof; cost, $20,000; owner, Teresa C. Burke, 226 East Thirty-ninth St.; architects, Babcock & McAvoy.

East Seventeenth St., Nos. 531, 533 *and* 535, 3 five-st'y brick tenements, tin roofs; cost, each, $13,500; owner, Thomas E. Tripler, 233 East Eighteenth St.; architect, F. W. Klemt.

West Sixtieth St., No. 217, five-st'y brick flat, tin roof; cost, $20,000; owner, Julia Mullaly, 211 West Sixtieth St.; architect, C. F. Ridder, Jr.

One Hundred and Fiftieth St., s s, 500′ w Courtland Ave., three-st'y brick dwell., tin roof; cost, $3,000; owner and builder, John C. Cooley, 547 One Hundred and Fiftieth St.

Prescott Ave., e s, 1120′ North Bolton Rd., two-st'y frame dwell., shingle roof; cost, $3,000; owner, Henry P. Carlson, Inwood; builders, S. B. Smith, and Emory & Forsyth.

Ludlow St., No. 87, five-st'y brick tenement and store, tin roof; cost, $14,000; owner, Johanna Noelke, 311 Fourth St., Jersey City, architect, Wm. Graul.

One Hundred and Seventeenth St., n s, 250′ e Second Ave., brick tenement and store, tin roof; cost, $18,000; owner, Eugene T. Twigg, 1850 Lexington Ave.; architect, Elbert D. Howes.

ALTERATIONS.—*Courtland St., No.* 31, repair damage by fire; cost, $4,100; owner, Union Theo. Seminary, E. M. Kingsley, Treasurer, 30 Clinton Pl.; builder, Henry Wallace.

Fulton Market Block, bounded by South, Fulton, Front and Beekman Sts., sheds around the building; cost, $5,500; owner, City of New York; architect, Douglas Smith.

Philadelphia.

HOUSES.—*Wyncoop St.*, cor. Sycamore St., Jno. Dignan, Esq., will build 20 three-st'y dwells., from plans by Hazlehurst & Huckel, architects.

WAREHOUSE.—J. B. Stevenson, Jr., is building a five-st'y warehouse, 43′ 8″ x 120′ 8″, at the junction of Pennsylvania R. R. and Reading R. R. (or Trenton Ave.); plans by Hazlehurst & Huckel, architects.

BUILDING PERMITS.—*Jefferson St.*, between Main and Lena Sts., 4 two-st'y dwells., 14′ x 40′; J. D. Caldwell, contractor.

Vine St., No. 2049, three-st'y addition to factory, 32′ x 60′; A. B. Lewis, contractor.

Philip St., n of Cumberland St., five-st'y factory, 30′ x 45′; S. Humphries, contractor.

Duncan St., cor. Stiles St., two-st'y dwell., 17′ x 20′; Andrew Hughes.

Palethorp St., cor. Cambria St., one-st'y chemical building, 16′ x 40′; Thos. Old.

Twenty-second St., cor. Henrietta St., hospital-building, 22′ x 64′; Watson Rose, contractor.

Germantown Ave., Nos. 2547 *and* 2549, two-st'y carriage factory, 37′ x 66′; J. S. Gerhard, owner.

Tenth St.; cor. Dudley St., 2 two-st'y dwells., 15′ x 42′; Andrew Miller, owner.

Forty-sixth St., e of Lancaster Ave., two-st'y dwell., 16′ x 46′; B. Boyle, owner.

Thirty-first St., n of Jefferson St., three-st'y dwell., 30′ x 30′; J. Bloechlinger, contractor.

Tioga St., above Eighteenth St., Sunday-school building, 35′ x 45′; Benj. Walton, contractor.

Lawrence St., n of Cumberland St., two-st'y store and dwell., 20′ x 65′; Jno. Cairns, contractor.

Ninth St., cor. McKean St., three-st'y factory, 50′ x 100′; Burt Bros., owners.

Germantown Ave., cor. Berks St., three-st'y store and dwell., 20′ x 65′; J. S. Shea, contractor.

Thirty-first St., cor. Jefferson St., boiler-house, 36′ x 40′; F. A. Poth, owner.

Mercine St., cor. Cambria St., two-st'y factory, 26′ x 76′; Shegog & Quigley, contractors.

Leverington St., bet. Webster and Clay Sts., 3 three-st'y dwells., 14′ x 32′; S. S. Keely, contractor.

St. John St., No. 495, three-st'y dwell., 16′ x 32′; Jno. Berner, contractor.

Washington St., n of Ripka Ave., three-st'y dwell., 16′ x 20′; W. R. Davis, contractor.

Tenth St., s of Ontario St., two-st'y dwell., 18′ x 30′; C. Wilkey, contractor.

Thirty-first St., n w cor. Master St., three-st'y ice-house, 50′ x 100′; Jno. Kramer, contractor.

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

Tenth St., cor. Erie Ave., two-st'y storehouse, 30′ x 70′; Chas. L. Loney, contractor.

Manayunk Ave., cor. Adams St., 4 two-st'y dwells., 14′ x 30′; Jas. Harper.

Ripka Ave., cor. Mansion St., two-st'y stable, 18′ x 36′; Jno. Benner.

Hutchinson St., n of Lehigh Ave., two-st'y stable and carriage-house, 16′ x 49′; Lewis Walter, contractor.

Third St., n of Cumberland St., two-st'y addition to factory, 35′ x 48′; H. French, owner.

Reese St., n of Susquehanna Ave., two-st'y dwell. 16′ x 39′; D. C. Schuler, contractor.

Queen St., Nos. 32 *and* 34, third-st'y addition to factory, 42′ x 87′; Watson & Robinson, owners.

Woodland St., w of Fifty-fifth St., two-st'y dwell., 18′ x 45′; Wm. Bunch, Jr.

Wissahickon Station, Philadelphia & Reading R.R., three-st'y factory, 40′ x 150′; Jno. Wilde & Bro.

Highland Ave., cor. Main St. (Chestnut Hill), two-st'y stable, 60′ x 62′; McLeod & Loughery, owners.

Columbia Ave., between Fifth and Randolph Sts., two-st'y office, 40′ x 55′; Jas. McCartney, contractor.

Adams St., e of Kensington Ave., box factory, 40′ x 150′; Wm. Schoenleber.

Clearfield St., n s, w of Frankford Road, two-st'y dwell., 14′ x 37′; Duryea & Childs, contractors.

Leithgow St., Nos. 2209 *and* 2211, two-st'y stable, 27′ x 32′; Schultz & Gorman, contractors.

Berks St., w of Germantown Ave., 2 three-st'y dwells., 17′ x 44′, and 3 two-st'y dwells., 16′ x 44′; Brockelhurst & Ewing, contractors.

St. Louis.

BUILDING PERMITS.—One hundred and sixty permits have been issued since our last report, forty-nine of which are for unimportant frame houses. Of the rest, those worth $2,500 and over are as follows:—

Dr. E. Chase, two-st'y brick dwell.; cost, $4,800; C. B. Clark, architect; R. Shimmick, contractor.

Thos. J. Walsh, two-st'y brick dwell.; cost, $2,500; T. Walsh, architect; J. P. Gillick, contractor.

Christina Winkelmeyer, two-st'y brick dwell.; cost, $3,000; G. M. Theobolt, contractor.

C. H. Peck, three-st'y brick dwell.; cost, $8,000; C. H. Peck, architect and builder.

M. Dwyer, two-st'y brick dwell; cost, $2,500; I. W. Lister, contractor.

Meyer & Stratman, three-st'y brick livery stable; cost, $10,000; E. Thomson, contractor.

H. W. Beck, one-st'y brick warehouse; cost, $2,600; F. C. Bonsack, contractor.

St. Louis Mutual House-Building Co., No. 3, two-st'y brick dwell.; cost, $3,825; Mortimer, architect; Kaiser, contractor.

St. Louis Mutual House-Building Co., No. 3, two-st'y brick dwell.; cost, $6,000; Mortimer, architect; F. Gruene, contractor.

A. Eichele, 3 adjacent two-st'y dwells.; cost, $15,000; Grable, architect; A. Uhri, contractor.

Mrs. A. A. Blair, two-st'y brick dwell.; cost, $2,500; Grable, architect; T. Murphy, contractor.

Theo. Beyert, two-st'y brick dwell.; cost, $3,750; H. W. Kirchner, architect; H. Nagel, contractor.

C. Günter, two-st'y brick dwell.; cost, $3,000; Schultman & Gross, contractors.

Calvin Burns, three-st'y brick dwell.; cost, $6,000; Taylor, architect; Kergin Bros., contractors.

L. Sicher, two-st'y brick dwell.; cost, $4,000; Beinke, architect; Hemminghaus & Vollner, contractors.

Norman Brown, two-st'y brick dwell.; cost, $6,000; Simmons, architect; F. G. Gorman, contractor.

John U. Musick, two-st'y brick dwell., cost, $4,000; C. Etts, contractor.

Anheuser-Busch Brewing Association, one-st'y brick wash-and-boiler-house; cost, $7,000; E. Jungenfeld, architect; sub-let.

Anheuser-Busch Brewing Association, one-st'y brick wash-house; cost, $8,000; E. Jungenfeld, architect.

St. Louis University, basement of church building; cost, $30,000; Thos. Walsh, architect; sub-let.

Mrs. L. N. S. Ames, two-st'y brick dwell.; cost, $2,500; Geo. Green, contractor.

Pat. Mulligan, two-st'y brick dwell.; cost, $2,700; Geo. M. Roeder, contractor.

Geo. M. Munger, two-st'y brick store; cost, $15,000; H. W. Kirchner, architect.

Mrs. Harriet Pullis, 3 adjacent two-st'y brick dwells.; cost, $12,000; F. Weston, architect; Cramer & Co., contractors.

H. L. Fox, two-st'y brick store; cost, $10,000; J. W. Barnes & Co., contractors.

Henry Shaw, six-st'y brick store; cost, $4,500; Geo. J. Burnet & Son, architects; S. H. Hoffman, contractor.

St. Louis Mutual House Building Co., No. 3, two-st'y brick dwell.; cost, $6,300; E. Mortimer, architect; A. McKechnie, contractor.

Washington, D. C.

BUILDING PERMITS.—Only the following permits for new buildings costing $3,000 have been issued since last report:—

Virginia Ave., cor. Ninth St., s w, 8 two-st'y brick dwells., for A. W. Barker; cost, $30,000.

Fourth St., between East Capitol and South A Sts., two-st'y brick dwell. for Mr. Burrows; cost, $4,000; J. H. Edelin, builder.

G St., between Sixth and Seventh Sts., s w, two-st'y brick dwell. for J. H. De Atley; cost, $3,000; Wm. Price, builder.

Eighth St., between D and E Sts., n w, three-st'y brick store, 26′ x 100′, for Chas. Baum; cost, $8,000; C. A. Didden, architect; A. H. Corbett, builder.

Bids and Contracts.

BALTIMORE, MD.—The following is a synopsis of bids for labor for completing the first story of the post-office and court-house, opened September 21, 1883:—

M. A. McGowan, $13,537 (*accepted*).
W. H Johnson, $14,453.
M. Giblin, $15,000.
Rees Evans, $17,145.52.
G. O. Cooke, $17,900.
Joseph G. Loane & Co., $18,200.
Justin McCarthy, $18,982.

CHARLOTTE, MICH.—Messrs. Healy & Millet, of Chicago, have the contract for decorating the Universalist Church; cost, $600.