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NINETY-NINE years ago, only ten days after the battle of Yorktown, a resolution was passed "by the United States in Congress assembled," providing for the erection, on the battlefield, of a "marble column, adorned with emblems of the alliance between the United States and His Most Christian Majesty; and inscribed with a succinct narrative of the surrender of Earl Cornwallis to His Excellency, General Washington, Commander-in-chief of the combined forces of America and France, to His Excellency, Count de Rochambeau, commanding the Auxiliary troops of His Most Christian Majesty in America, and His Excellency, Count de Grasse, commanding-in-chief the Naval Army of France in Chesapeake." Unfortunately the resources of the new-born confederation did not equal its enthusiasm, and no steps were ever taken to carry the resolution into effect until this year, when, by an act approved June 7, last, an appropriation of one hundred thousand dollars was made, to be expended, under the direction of the Secretary of War, in erecting the monument or column referred to, with the proviso that the material used, instead of being necessarily marble, might be such as the Secretary should deem most suitable. By the second clause of the act, the Secretary of War was instructed to appoint a commission of three persons to "recommend a suitable design for the said monument, and to prepare a sketch of the emblems," with the "succinct narrative" specified, subject to the approval and adoption of a select joint committee, consisting of thirteen Senators and thirteen Representatives, this joint committee to have also, charge of selecting a site for the monument, and of making arrangements for a fitting celebration of the centennial anniversary of that great victory. In pursuance of these instructions, the Secretary of War, Mr. Ramsay, has appointed Mr. Richard M. Hunt, of New York, Mr. Henry Van Brunt, of Boston, and Mr. J. Q. A. Ward, of New York, to constitute the commission. Most of our readers will agree with us that a better selection could hardly have been made.

GENERAL DI CESNOLA, now Director of the Metropolitan Museum of Art in New York, seems to have given occasion, through some undue zeal or indiscretion in regard to the objects entrusted to his care, for an interesting discussion, which may be found, with illustrative cuts, in the August number of the *Art Amateur*. It appears that Mr. Gaston L. Feuardent, a well-known dealer and expert in antiquities, on visiting the Museum lately, observed that one of the statuettes from Cyprus, belonging to the collection gathered by General di Cesnola himself, had been recently altered by the addition of a mirror held in the left hand, which at the same time grasped the folds of the dress. Mr. Feuardent, who had for a long time had the custody of this collection, and was not only very familiar with the objects contained in it, but had particularly studied, and even lectured upon this very statuette, spoke of the alteration that had been made, thereby calling forth a note from one of the General's subordinates, denying that anything had been done beyond "washing" it. To this Mr. Feuardent rejoins in the article referred to. He shows that the figure is one of a common type, symbolizing Hope, in which the divinity is represented as bearing a flower,

the sign of promise, in one hand, and with the other holding up the folds of her robe, to indicate *movement*, showing that Hope cannot be retained, but eludes our grasp. The mirror, on the other hand, is the well-known attribute of Venus, and in early Greek times, not of the clothed and chaste Venus, but the sensuous deity, who was distinguished by being represented naked, or nearly so, and as Mr. Feuardent says, the placing of a mirror in the hands of the figure in question is a "barbarous anachronism." The restoration of several other statuettes is sharply criticised; incongruous heads and limbs having been fixed upon trunks which lacked those members, perhaps to the satisfaction of the vulgar, but, Mr. Feuardent thinks, to the lessening of their archaeological value.

To the assertions of Mr. Feuardent, General di Cesnola replies in a form which lawyers would probably call a "general denial," and promises that the matter shall be brought before the Trustees for investigation. Some of the newspapers, notably the New York *Tribune*, discuss the matter in a way not remarkable either for magnanimity or discretion. General di Cesnola himself, unless a reporter does him injustice, rather ungraciously suggests a slur upon Mr. Feuardent, by calling him a "mere dealer," which the *Tribune*, in its editorial columns, improves upon after a style familiar to its readers, saying that the "dealer" in question "has great need of free advertising," and that "a very pretty display of his ignorance is made by the 'expert's' testimony;" this "expert" being Mr. Balliard, the repairer and restorer of antiquities to the Museum, as to whose antiquarian knowledge we are only informed that he "has done some intricate work for Messrs. Tiffany & Co., and other collectors." This testimony, which consists in a conversation with a reporter, explains the discovery of the mirror on the statuette by saying that it was concealed under a hard crust, which was removed with some difficulty in the washing process, to which all the objects were subjected after being removed to the new Museum. When cleaned, the different heads and bodies were reunited, Mr. Balliard consulting General di Cesnola in cases where his own judgment was at fault. It would seem that among the thousands of disconnected pieces it must be difficult not to make now and then such mistakes as Mr. Feuardent speaks of, — putting old men's heads on youths' bodies, for instance, — without any such intent to deceive as General di Cesnola thinks Mr. Feuardent attributes to him, and in some cases only a very thorough knowledge of the subject will detect the incongruity, so that if the discussion can be carried on with decency and good temper, archaeologists will be glad of the opportunity which it gives for two such learned experts to try their skill.

CHICAGO seems likely to be the next American city to be furnished with an elevated railroad, a charter having been obtained, and preliminary steps taken for the construction of one or more lines. With that city, perhaps, if rapid transit is possible at all, it must be by means of an aerial road, the slight elevation of many districts above the lake making an underground line out of the question. Meanwhile, it is said that even London, with its great extent of subterranean railway, to which a new inner circle is on the point of being added, seriously contemplates the experiment of an elevated road; in what district, and through what streets, we have not learned. It is to be hoped that the directors of the Chicago scheme will turn their attention to ameliorating the inconveniences which have attended the New York railways. If it should prove practicable to move the trains by means of electric currents transmitted through the rails, thus dispensing with heavy engines, smoke and steam, and a great part of the noise, much will be gained, and evidences may be observed of an effort toward this end. Not only have Mr. Edison and his German rival made considerable progress in serious, and apparently successful experiment, but it is said that a nephew of Mr. Cyrus W. Field has patented a number of inventions in this branch of electrical engineering, a fact which, in view of the great influence and interest of Mr. Field in elevated road construction, would seem to indicate that these corporations will be ready to adopt such improvements as are found practicable. With the diminution of weight in the locomotives might well come modifications in the construction of the tracks, in the direction of greater lightness and slenderness, and we do not doubt that all these will in time be accomplished.

THE Committee on Site, chosen to report on the most available positions for the buildings of the World's Fair, in 1883, has prepared descriptions and notes of something like a dozen places, all more or less suitable, but without expressing any official opinion upon the merits of each, leaving that to be formed by each Commissioner for himself from the facts presented. The location which is described at the greatest length is the beautiful region which includes the Morningside and Riverside Parks, and extends from One Hundred and Tenth Street to Manhattan Street, on the west side of the city. Not far from this is another open space, including Manhattan Square, and extending from the Eighth Avenue to the Boulevard. This, as well as the Washington Heights site, which extends also westward from the Eighth Avenue, will have the great advantage of being directly on the line of the elevated railroads, which will land passengers at the very doors. How essential such convenience of access is to the success of these affairs may be learned from the example of the Philadelphia Exhibition. It is not that long, slow horse-car rides, or expensive carriage transportation, or fatiguing walks, frightens away people from the great show; but they do perceptibly restrict those repeated visits by which the coffers of the corporation are filled. Perhaps it might be as pleasant for the visitor to take his morning journey to some seashore place, two hours journey or so from his house or hotel, as are one or two of the sites proposed, and stay about the Fair buildings till night, but it is far more profitable for the management to place their show in the spot which is, above all, most easily and quickly reached from all parts of the city, so that their patrons may spend an hour in the morning and a few leisure moments in the afternoon, returning perhaps in the evening, and still have most of their time left for business or pleasure elsewhere. There are few who, if doing so involved no additional fatigue or loss of time, would not prefer to make three or four short visits to such an exhibition, in preference to one long one, and as their admission fees are correspondingly multiplied, it is certainly the part of financial wisdom to encourage and gratify this preference.

It is probably well known to our readers that the investigation made by the official Board of Trade into the causes of the melancholy failure of the Tay Bridge resulted in a report which attributed the catastrophe partly to its erroneous design; but still more to the defective execution and supervision of the work, for both of which faults the engineer, Sir Thomas Bouch, was indicated as responsible. Since the publication of this verdict, a claim has been made that the official inspection and approval of the bridge, which was made before it was opened to traffic, by the representative of the Board, Major-General Hutchinson, relieved its designer and builder of further responsibility, and threw it upon the Board. We are familiar with such arguments here, and it will be instructive to note the manner in which they are answered in this case. Mentioning in the first place, that the Board has no power of examining and approving designs before their execution, or of supervising the construction while in progress, their report points out that it would be impossible to hold an inspector responsible for defects of workmanship, which were either under water, or were painted over and concealed at the time of his visit, and that as to design, unless the form of a structure transgressed accepted rules, the inspector was not authorized, provided it resisted the tests to which he subjected it, to enter upon the merits of the principles upon which it was built. Nor is it desirable, the Board thinks, that any further authority should be laid upon them. If they are to be held responsible for the design and supervision of railway structures, they must employ a staff "as experienced, as numerous, and as highly remunerated as the engineers by whom these structures are now designed and executed"; while to entrust the duty of correcting and guaranteeing such designs to a public department would "check enterprise, and substitute for the real responsibility which rests on the railway engineer the unreal and delusive responsibility of a public office."

AFTER so many difficulties, losses and delays, the completion of the St. Gothard tunnel seems to be farther off than ever. The weak portion under the village of Andermatt, which no vaulting seems capable of holding up, still gives trouble, and it is announced that the line cannot be opened for business before April of next year. This, instead of the unexpectedly early completion which was supposed a year ago to be certain, is a delay of six months beyond the contract time, and the builders incur thereby a penalty of some two hundred thousand dollars,

which the railway company proposes to demand from them. To this the contractors object that as the company's own lines are not nearly ready, they suffer nothing by the delay, so that an attempt to collect the penalty will be pure extortion; a view with which we heartily sympathize. Furthermore, the contractors assert that the delays, negligence and interference of the company were themselves the cause of their inability to proceed more rapidly with the work, and that the failure to make the payments at the time promised has involved them in great losses, so that the private property of the late M. Favre, without whose courage and perseverance the tunnel would not have been built at all, has been entirely swallowed up, and his family is ruined. Although the main claim, that of penalty for delay, has not yet accrued, and of course is not yet before the courts, several smaller questions have been in litigation, and without exception have been decided in favor of the contractors. Meanwhile, the project for a third tunnel continues to be discussed in France, who hardly likes to see Germany so near Italy as the St. Gothard road will bring her. The general opinion is decidedly in favor of the Simplon line. By this route, the distance between Paris and Milan would be but eight hundred and fifty-one kilometres, against one thousand and ninety-five by the Mont Cenis, and one thousand and seventy by the St. Gothard, while the tunnel would have the great advantage of being near the base of the mountain on both sides, so that trains would be saved all the expensive and tedious ascent and descent which is necessary to reach and leave the earlier ones.

A RECENT report on the explosion of dynamite, which took place at the manufactory of Messrs. Nobel in January last, gives some interesting details of the means adopted for guarding the public, as well as the employés and property of the firm, from the ever-present danger which is inseparable from such a business. The works are situated in a deep valley, four miles from the city of Prague, in Bohemia. The place is surrounded by hills, which protect the neighboring villages, and is occupied exclusively by the buildings and work-people of the firm, no stranger being allowed to enter it; and for the purpose of isolating, as far as possible, the different divisions of the factory, two lofty embankments of earth cross the valley from side to side, dividing it into three portions, the first being occupied by the director's house and the structures in which the first processes of manufacture are carried on; the second by the mixing and packing houses, and the third by the magazines. The same system extends to the separate parts of the factory, all the workshops in the second division being surrounded by similar embankments, seventeen feet high, to isolate them in case of explosion. The value of these precautions was shown on the occasion in question. Five hundred kilogrammes—about two hundred and fifty pounds—of dynamite blew up in one of the mixing shops late at night; but, thanks to the earthworks, although the concussion was so violent as to give the city of Prague, four miles off, a severe shaking, no further explosion took place, and the neighboring workshops were not even materially injured.

SOME curiosity has been aroused by the announcement that ammonia, a reagent of great value in the arts, had been made by direct combination of its elements, nitrogen, and hydrogen, using air to furnish the nitrogen, and vapor of water as a source of hydrogen. These simple materials are combined by a process hardly less simple. A series of inclined flues are filled with coke, and heated to a temperature of 550° C. A mixture of twelve parts by volume of steam, and five parts of air is then forced through the flues, and on the passage the elements combine to form ammonia, which is condensed, together with water from the excess of steam, at the other end. The regulation of the temperature is important, as the ammonia will not form at a point below the standard, while a higher heat will decompose it again; but the manufacture in point of simplicity, leaves little to be desired. It is estimated that the cost of the ammonia so obtained will not be over two cents a pound. The ancient name for solution of ammonia, "hartshorn," suggests the mode in which it was originally prepared; that is, by the destructive distillation of the horns of deer and other animals. As its use, and the demand for it, increased, many organic substances were found capable of furnishing it, and later an inexhaustible source of supply was found in the refuse liquor of gas works. The processes for obtaining the pure product from the gas liquor are somewhat complicated, and the new mode, if it should be really as simple as it seems, will find great favor.

THE *California Architect* for July quotes an interesting decision of the Supreme Court of that State in regard to the duty of underpinning walls adjoining new works. It seems that in 1875 a certain Hood caused excavations to be made on his lot, adjoining the building of one Zeile, at the same time giving Zeile notice that the excavation would go below his foundations, and that he must underpin them. This Zeile refused to do, and Hood, on reaching the footings of the wall, was obliged to sustain it by temporary supports. Finally, Zeile, finding that Hood was determined to do no more for him, underpinned his own wall, and then brought suit to recover the cost of so doing—four hundred and ten dollars. Hood denied his liability, and brought a cross-action to recover one hundred and fifty-five dollars, the cost of the temporary supports that he had put in. The Court decided that Zeile should recover his four hundred and ten dollars, and that Hood was not entitled to anything for his temporary supports. Perhaps there may be important circumstances which do not appear in the report, but on its face the decision seems a little strange. It is hardly to be supposed that a man is entitled to build his house with foundations barely extending below frost, and compel his neighbors who want cellars under their houses to underpin his wall the whole depth, in addition to building their own walls independently. The question is one of considerable importance in large cities, and a clear understanding of the common law in regard to it is of great importance.

THE *London Builder*, speaking of the new basin just completed at the Victoria Docks, in that city, mentions incidentally a circumstance of considerable interest from a sanitary point of view. It seems that during the construction of the original basins, in 1855, the site was kept free of water by constant pumping, and the soil being gravelly, the ground-water naturally drained by degrees into the excavation. So far did the action extend, that although the total depth of the basin was only about forty feet, a certain well situated more than two miles and a quarter in a direct line from the works was much lowered while the construction was in progress, recovering again its original level after the walls were completed, and the pumping was discontinued. The inference which we should naturally draw from this, that if the ground-water around the well had contained poisonous matter, this matter would have flowed with it toward, and ultimately into the dock excavation, although it does not necessarily follow, is yet extremely probable, and this example should be sufficient to put on their guard those engineers and other persons who are disposed to think that deep wells form an unexceptionable source of public water supply. Judging from this illustration of the vast area which may be drained by an excavation of comparatively slight depth, if constantly pumped out, the deep wells which furnish water to many towns and cities must be liable at times to contamination from sources quite remote and unsuspected; a contamination the more dangerous on account of their very depth, it being well established that the soil, below a point a few feet from the surface, has little or no power of oxidizing or destroying the subtler kinds of organic impurity. In fact, in the city of Liverpool, which draws five or six million gallons daily from four deep wells sunk in sandstone rock, it is found that the water is deteriorating, and the time seems not far distant when even the ledges of solid stone will no longer be able to filter the supply so as to make it fit for use.

THE building of the *Ecole des Beaux-Arts* in Paris is to be enlarged at a cost of some two million dollars. On the left of the entrance are to be constructed a new and much enlarged *salle de concours*, eleven *ateliers*, with a new set of *loges* and other apartments necessary for the practical work of the school, and the rooms now occupied for these purposes will be devoted to collections. On the right of the entrance is to be constructed a grand *salle d'exposition*, or gallery, which will afford space for the increasing number of works of art, models, casts, and similar objects belonging to the school, together with other rooms needed for administration. The total number of *loges* is to be increased, and *ateliers* and lecture-rooms will be enlarged materially. Some changes in the neighboring streets are provided for; the new lines will allow for a widening of the Rue Bonaparte, and for a future extension of the Rue de Rennes. Only the portion devoted to the school work, on the left of the entrance is to be constructed at present; the other wing will be built at some future period.

THE EXHIBITION OF THE WORKS OF VIOLET-LE-DUC.

As co-operation and division of labor are the characteristics of this generation the works of Viollet-le-Duc will puzzle posterity, and its natural conclusion will be that to several men of that name are due the various and varied works of the late author of the *Dictionnaire Raisonné d'Architecture*. Even for us, from whose midst he has just passed, wonder tinged with incredulity is the prominent feeling after examining the exhibition of this remarkable man's labors now open at the Hotel de Cluny. I doubt if it would be possible to find in the combined efforts of any two men now living an accumulation of labor equal to that here shown. One is confronted with a mass of mere manual work which is extraordinary in itself, but which, as the results of wide researches and much travelling, surpasses all ordinary standards of possibility. This exhibition is composed of original drawings and water-colors, of photographs of his restorations, of illustrated publications, and of a large model of the Chateau de Pierrefonds. Among the drawings are 26 classic subjects, presented sometimes on several sheets. These having been done chiefly for an article on "Decoration as applied to Buildings," published last year in *L'Art*, cannot be said to have influenced the architect's artistic career, but the latter must rather be traced in the 416 mediæval studies and compositions; of these a single subject sometimes is illustrated by as many as 49 sheets. The studies of existing monuments as well as the designs for their restoration belong to the archives of the "*Commission des Monuments Historiques*" chiefly, for Viollet-le-Duc was one of its founders and most active members. I was surprised to find no drawings of buildings either in Germany or England, which is remarkable when we remember their importance, and especially that of England, in the study of Gothic architecture. He was, however, thoroughly familiar with all their mediæval works, as his dictionary shows. His many restorations also seem confined to France, if we except a spire at Lausanne, where also a few years ago he built himself a house. The only other works he executed in foreign countries were a tomb at Odessa, and another for Napoleon at Corsica. Under a different section we find catalogued 76 designs for church altars and ornaments.

The portion of the exhibition which aroused most curiosity was the water-color landscapes, which were found in portfolios after the architect's death, and which revealed an unexpected phase of his versatile talent. It was generally supposed that his mind was too positive and practical to find time to study the transient and picturesque aspect of nature, and this impression was in so far true that although there were 126 water-colors down in the catalogue, 92 were geological studies of Mont Blanc, and became the data for the publication of a fine map of that mountain, with an essay upon its formation and glaciers.

Many and varied as are the drawings, the exhibition is far from being a complete one. The Government promised to collect from the various workshops the working-drawings and full-sized details, which for the most part were executed by Viollet-le-Duc's own hand, but few of these were forthcoming. Yet even as it is, nothing but the most rapid precision in drawing can account for the work shown as his own handiwork. This rapidity and certainty of touch is, in fact, evident in all the drawings. Among the thousands of them in all stages, from that of the slightest pencil suggestion of a subject to the finished water-color on a large scale, it would be difficult to find a superfluous wash or uncertain line. We here see that the sharp, precise wood-cuts of Viollet-le-Duc's dictionary and other publications, were not labored efforts, but the swift sketches of an unerring hand, whose slightest notes are clear and vigorous. We can attribute, then, his prodigious fecundity to a restless energy and this extraordinary facility. The latter was the result of a natural talent, developed by unceasing practice, for his hand seemed always at work. It is said that even in conversation he was nervously sketching, and he rarely made a visit without leaving a *croquis* upon a scrap of paper or a fly-leaf. This trained precision of hand was typical of the energetic and positive qualities of his mind. Early leaving the academic training of the *Ecole des Beaux-Arts*, with its vague æsthetic aspirations, he became penetrated with the logical principles of Gothic architecture which were entirely congenial to his practical turn of thought. The habit thus encouraged of answering directly to the why and wherefore of each problem saved him from the vacillation which the search for æsthetic beauty encourages, and which, if it is inseparable from the highest artistic success, often paralyzes the activity of the artist. His drawings represent the full amount of time spent upon them, for they are rarely tentative, and show no evidence of a correcting hand; and since many sketches and measured drawings can be made during the time spent over a single original plan or design, this partially accounts for the great number of drawings exhibited. If we except those for restorations, which are rather archæological than creative, Viollet-le-Duc made few original designs.

There is a very noticeable absence of plans in this exhibition, the only one of importance being that of the opera-house, which was sent in for the great competition for the Paris Opéra. This plan is commonplace and lacks simplicity and boldness of conception, while the façades are surprisingly poor and mean. It is curious to note that while in his writings he always urges the value of breadth and unity, his original designs fail in these very qualities, and are usually marred by obtrusive and inappropriate details. His most conspic-

uous failure is in this design of an opera-house, though being in the Renaissance style, it may be said to have taken at a disadvantage an enthusiastic Gothic designer; but even in his own style, his designs are rarely satisfactory. They are meagre and dry, lacking grace and spontaneity. His buildings are logical enough in their construction, as might be expected, but the decoration, though appropriately applied, does not appear to grow spontaneously out of the construction, as is so strikingly the case with that mediæval architecture which he best loved, and whose most uncouth ornaments are not offensive, owing to the *naïveté* with which they appear to grow, rather than are applied upon the walls. This perhaps explains why even the most perfectly copied Gothic ornaments are so rarely satisfactory when applied to modern buildings. Gothic architecture more than any other seems inspired by spontaneous enthusiasm; and it is precisely because local and contemporary influences are thus so prominent that imitations of this most free and graceful style look so cold and archæological. The more formal and academic a style is, the more successfully can its forms be imitated.

It is curious to note that the tombs he designed are not Gothic in style. Either he felt a desire to break through his Gothic routine, or else he considered the Gothic unsuitable to the solemn solidity of sepulchral monuments. He in several instances accepted the Grecian-Egyptian style of French modern funeral monuments, but, in his elaborate tomb of the Duc de Morny, he has launched out in the most extraordinary style, apparently inspired by Indian architecture, and with rather more than its indigenous fantastic character. It is whimsical and ugly. Of his designs in general it may be said, that they lack the good taste and grace which greater study of Greek detail would have given him.

Everything which thorough knowledge of mediæval architecture and its accessories could give Viollet-le-Duc, he had, and his clever use of these acquisitions will forever identify his name with Gothic art. This is his glory, and it is perhaps, enough. An archæologist remembers; an artist feels. Though I am not prepared to say he was not the latter, it cannot be denied that his knowledge predominated over his emotions; this is felt in all he did, to his advantage when knowledge was of the first importance, less happily in other cases.

It is sometimes said that his restorations were dry and missed the true mediæval spirit, and his work is contrasted unfavorably with that of Millet, whose restoration of the chateau of St. Germain certainly is full of Gothic flavor. But sentiment is a dangerous quality for a restorer, whose attention cannot be too much concentrated, for the benefit of future generations, on what we know—from still existing monuments—was done, for by trusting the imagination, however well inspired, he may create misleading data for posterity. Viollet-le-Duc's restorations are certainly most conscientious, and in some cases, as in the spire of Notre Dame de Paris, are of the greatest beauty. There are others where we feel that as an architect, he possessed invention rather than imagination, and this is especially notable in his restoration or rather rebuilding of the vast Chateau de Pierrefonds. Only the lower portion of the walls of this were standing, many partition-walls having entirely disappeared, as well as the numerous out-works. The chateau was a fine example of a complete fortress towards the close of the feudal period, when the nobles were forced to depend upon mercenaries in place of their surrounding tenants, and thus the habitable quarters have an important development. Nothing but captious criticism will deny the ability and ingenuity shown in this most important and complete of mediæval restorations, a full description of which would exceed the limits of my present subject. I will only say that as an archæologist Viollet-le-Duc was equal to his splendid opportunity and this one achievement would be sufficient to preserve his name among the distinguished ones of this century.

All the larger halls have been decorated. The designs are good and full in character, but the coloring is in general not agreeable. Intelligence and logic cannot supply the divine gift of the colorist, and the data supplied by the finest examples of ancient decoration are rendered worthless by missing the exact shade of any one of the important tints. Though the scheme of decoration in each case is well considered the result is generally crude and discordant. At first sight this coloring seems less successful than in his important work of decorating the chapels of Notre Dame, in Paris—of which he has published a monograph—where the color if it lacks charm, is not disagreeable; but it must be noted that in the latter the rich subdued tone from the stained windows, acts as a harmonizing medium, wanting in the highly lighted halls of Pierrefonds. It was probably the studies undertaken for these examples of secular and religious decoration which were the origin of his treatise upon "Decoration as applied to Buildings," the value of which is little affected by the lack of charm in his own coloring, for the scheme is generally good, and that is all that can be communicated or discussed, harmonies of color being as indistinguishable as those of sound. The advice the writer on polychrome decoration can give must be confined to the use of colors considered as values, or when classed as warm or cold tints. In a general way, then, the theories upon decoration of this careful observer and able writer are full of interest.

Had he not rebuilt Pierrefonds, Viollet-le-Duc would be more often quoted for his restoration of the fortification and walls of Carcassonne, as well as those of Avignon, the former a vast work and interesting as a perfect example of a fortified city of the middle ages. Beginning with archæological studies of fortification, this indefatig-

able worker pursued his subject down to the latest development of modern science. His important services during the siege of Paris and his subsequent *mémoire* upon it with other valuable contributions to the *Journal des Sciences Militaires* upon modern systems of defense, made him an authority in a practical science seemingly at a life-wide distance from his other occupations. Without dwelling upon the political influence which his prominence in organizing the defence of Paris gave him subsequently, and of which he was not slow to avail himself, I must testify to the important aid he, for a number of years, gave to the city of Paris on all subjects connected with the arts, while serving as one of the most active members of the Conseil Municipal.

In this connection I should refer to his continual and vindictive attacks upon the *Ecole des Beaux-Arts*. As one of these attacks in the English translation of his "Entretiens sur l'architecture" may be reproduced in America, I think it right to explain the circumstances. The *Ecole des Beaux-Arts*, like most academic institutions, is highly conservative and needs various reforms; criticism of it, even if violent, is not to be deprecated. The injustice and littleness, however, of Viollet-le-Duc's warfare against it were prompted chiefly by personal animosity to its staff of professors. Radical republican though he became after the Empire, before its fall he worked up into high favor with the Emperor, and lent his energies to apply the Imperial system of centralization to the *Ecole des Beaux-Arts*. The latter heretofore open to all artistic impulses was now to be restricted to an official art, only inspired by professors appointed by the Imperial favor. The first step towards this was made by the creation within the *Ecole* itself of *ateliers* presided over by professors appointed by the Emperor, so that the school would be no longer merely an arena in which pupils of any master competed before the appointed jury. French students are proverbially republican, and they quickly resented this Imperialism. Viollet-le-Duc, but shortly before appointed a professor, was recognized as a promoter of the innovation and such riotous demonstrations against him were made, that he, feeling himself without the moral support of the other professors was forced to resign. The bitter recriminations which followed carried the subject into other channels, and the origin of the quarrel lost sight of, the public ended by seeing only a dispute between the champions of classic and Gothic architecture, which was in fact only an accidental feature in the affair.

Fortunately for the fame of Viollet-le-Duc, his most unwarranted and savage polemics appeared in letters to the daily journals, and may be supposed consigned to oblivion with the immense amount of violent tirade which ease the indignation of his excitable countrymen. On the other hand he appears to advantage in the vigorous but courteous pamphlet catalogued among his publications as a "Réponse à M. Vitet," then librarian of the *Ecole*, who had written upon instruction in drawing, etc. As a literary man he is too well known to require my discussing his publications, all of which are characterized by vigor of thought and language.¹

After a review of such vigorous and able efforts directed towards the revival, if not of Gothic forms, at least of its underlying principles, the question naturally arises as to what the result has been upon contemporary architecture in France. Strange as it may appear, that result is as yet insignificant. This is the more striking if we consider the effect Mr. Ruskin's writings produced in England, when he began to advocate the study of mediæval art; for if we except the persuasive value of his eloquence, his works are less valuable for practical and scientific qualities than those of Viollet-le-Duc. Indeed, the former's most matured efforts seem amateurish beside the thoroughly digested scientific labors of the latter. This difference is sharply illustrated if we compare the Ruskin exhibition of drawings two years ago with this one of Viollet-le-Duc's. Take for instance the geological studies which Viollet-le-Duc made of Mont Blanc, so that he may be deprived as much as possible of technical advantages, and compare these with Mr. Ruskin's studies of rock formation, drawings of which he is particularly proud. What a difference between the latter's conscientious but labored effort to train hand and eye to accurate delineation, and the masterly precision of the architect's hand, which needed neither

¹ As the titles of some of these works may not yet be known at home, I will give the list of those in the catalogue, which, however, makes no mention of the articles which he was constantly contributing to the journals on current topics.

Dictionnaire raisonné de l'architecture française du XI au XVI siècle.
Dictionnaire raisonné du Mobilier français de l'époque Carolingienne à la Renaissance.
Entretiens sur l'architecture.
Mémoire sur la défense de Paris.
L'art Russe.
Modèles du dessin.
Description et Histoire du chateau de Pierrefonds.
Description du chateau de Coucy.
La cité de Carcassonne.
Lettres sur la Sicile.
Lettres d'Allemagne.
Intervention de l'état dans l'enseignement des Beaux-Arts.
Réponse à M. Vitet.
Histoire d'un dessinateur.
Histoire d'une maison.
Histoire d'une forteresse.
Histoire de l'habitation humaine.
Histoire d'un hôtel de ville et d'une Cathédrale.
Le Massif du Mont Blanc, et Carte.
De l'étude de la géographie et de la topographie dans l'armée.
La fortification passagère dans les guerres actuelles.
Un mot sur les guerres de montagne.
De la décoration appliquée aux édifices. Published in collaboration.
Description de Notre Dame.
Monographie de Notre Dame de Paris et de la nouvelle Sacristie.
Chapelles de Notre Dame de Paris.
Habitations modernes.

to retouch nor correct! And so, aiming to instruct and convince, Viollet-le-Duc writes clearly and brilliantly without overshooting the mark, as Mr. Ruskin has often done in his beautiful and discursive — poetry shall I say? for its character, in spite of what its author would claim for it, is rather to exhort and denunciate than to teach. Yet the author of the Stones of Venice became an influential teacher, and leader in a revolution against classic art, while the great Gothic champion in France has left behind an insignificant following.

To explain these facts it is perhaps not out of place to point out how different in the two countries is the position of literature in regard to art. The art of England has been and is essentially literary. Its aim is generally to illustrate; hence a work of art in the Royal Academy without a title is a hopeless puzzle to both artists and public, while a happy quotation goes far to insure its success. With this intimate connection between literature and the fine arts, it is not strange that distinguished writers have always greatly influenced English artists. In France the conditions are quite different, partly because French artists have less general culture than their rivals across the channel, but more especially because there it is felt that a fine work is more instructive than any theories, even be they those of the artist himself. Thus the failure of Viollet-le-Duc's own designs with many people outweighed the influence of his writings. This is most unfortunate, for French modern architecture sorely needs the constructive sincerity which greater attention to Gothic buildings would arouse. But even those few architects following the example set by Labrousse a generation ago by sincere and logical designs — no advance upon his Bibliothèque St. Geneviève has yet been made — even these opponents of classic conventionality would not frankly ally themselves with the brilliant essayist whose original designs condemned his theories. But into the academic art of France new life must be infused, or a hopeless decadence will set in. Mediæval decoration now in vogue will set the tide, and as the eternal principles of truthful construction and logical decoration reassert themselves, the value of Viollet-le-Duc's works will be appreciated, and I believe his name will outlive that of any of his contemporaries in France, while his Dictionnaire raisonné will in all countries be an event in the history of the last half of the nineteenth century. R.

SUGGESTIONS FOR THE SANITARY DRAINAGE OF WASHINGTON CITY.¹—I.

WASHINGTON, like other places, was adopted as the site for a city for reasons among which sanitary advantages had no conspicuous place. It has grown to be a great capital without reference to these sanitary advantages — indeed, largely in spite of their absence, but to secure them is now, from our point of view, its most important and most pressing duty.

It needs but a casual survey and slight consideration to see that the difficulties to be overcome are quite distinctly marked. Aside from the heavy rainfall to which the locality is subject, it lies across the outlets of a wide outlying drainage area, whose storm-waters pour upon it in torrents. Much of the city is level, and its heavy soil at different points retains moisture almost to the point of saturation. A large part of its area lies so near to the level of tide-water as to prevent satisfactory drainage even were the soil more porous. Incidental to the elevation and to the conformation of its surface, the obstacles to the free and complete removal of its natural waters have served also as obstacles to the removal of its artificial pollution. The waste incident to human life constitutes here as elsewhere a most dangerous element of a problem whose solution is the sanitary engineer's chief task. There are difficulties in Washington which do not obtain to the same degree in higher-lying towns. The rivers by which your borders are swept, in addition to the degree to which their shoal shores prevent the requisite drainage of the city, accumulate deposits which, exposed at low tide, maintain in your immediate neighborhood a most prejudicial decomposition of organic matter fouled by the outflow of the sewers. The emanations from this decomposition in such close proximity to the heart of the city are a recognized and palpable source of ill-health which has attracted the attention of all who have discussed the subject.

The first of the difficulties referred to, — the pouring of torrents of storm-water from the outlying country into the city, — is now receiving at the hands of the engineering authorities of the District, such complete and adequate treatment, that it is unnecessary to consider it here.

So far as the remaining elements of the problem come within the domain of engineering art, what we have to consider is a system of improvements which shall, first, turn the pestiferous river flats and swampy shore into dry and wholesome earth; second, dry the soil; and, third, properly remove its foul sewage. Proper outside conditions being secured, it will remain to give such attention to the defective interior and exterior drainage of houses as will remove the present menace to health and life from that fertile source.

While it is easy to formulate the required improvements, their proper execution must involve the most careful consideration, and to perfect the details of a comprehensive scheme adequate to secure them all, is far beyond the limits of an evening lecture. All that I propose is to give an outline of the manner in which I think the

desired results may be secured, that you may consider whether or not the most desirable end would justify the necessary means.

In carrying out, and even in suggesting, a project for improvement, there is one obstacle of an artificial character which is more important than at first sight it appears to be. Human nature is alike the world over, and the tendency to make use of existing works, to adopt make-shifts, and to avoid the condemnation of costly improvements is universal.

So far as the removal of the household drainage of Washington is concerned, the sewers constructed for this purpose are — perhaps by no means always or generally — but they are very largely, unsuited to the best performance of this duty. In the recommendations that I shall lay before you, I shall for convenience and for simplicity, and for reasons which will become obvious as we proceed, assume that the larger of the present sewers of Washington are valuable only for the removal of storm-water from the roofs of houses, and from the surface of the ground, and that the system for carrying away house drainage, manufacturing wastes, etc., must be very thoroughly revised and amended. In the development of the details of a working plan, it would rest with the projector to determine to what degree the present sewers could be made useful for this purpose. I imagine that, the question of cost being set aside, they would be much less generally used than would now be supposed; and that the more the subject is studied, the more important, and in the long run the more economical, it will seem to relegate the question of cost to a very secondary position. Work now being done should have in view the establishment of a perfect sanitary condition throughout the whole city, which will remain effective for all time. When we consider what Washington is, and is always to be, no question of cost is worth consideration as compared with absolute and permanent healthfulness. Economy being regarded in its larger sense, mere cheapness has no place.

To consider, first, the fundamental difficulties of shore and low-level outlets, it seems to me that the example of Holland points the way to their easy and complete solution. Following the example of that remarkable country, we need try no experiments, and we need invent no new processes. We see there executed, — on a scale which makes the Washington work seem insignificant, and with a complete development of all details, — a well formulated system for securing an absolutely good and permanent result. It is not a little remarkable that the Dutch system of artificial drainage, which has been equivalent to filling in the whole low country to a depth of from five to twenty feet; which has been in operation from immemorial time; which has reclaimed from the sea nearly a million acres; and which has always excited the interest and admiration of the rest of the world, should have remained so exclusively Dutch. The method has crossed the North Sea and invaded the Lincolnshire fens, and it has travelled a little way along the German and Danish coasts; but with rare exceptions, other countries have adopted it only in an extremely tentative and ineffectual way. The great success of these works in Holland seems to have been ascribed to some mysterious peculiarity of the nature of the Dutch people. But water has the same weight there that it has here, and windmills and steam-engines have the same power here that they have there. Mechanical forces undergo no change by exportation, and there is no other reason than confirmed habit which leads us so generally to adopt the costly wheelbarrow and cart, where the Dutchman would use the cheaper pump.

There is no doubt that the Potomac flats might be rendered healthful and valuable by being filled, in the manner and to the depth that has been suggested, with fresh upland earth; but there is no special advantage in such an elevation of this territory which may not be equally well secured by the sufficient lowering of the ground-water of that area, and in one respect there is a disadvantage.

Three hundred years ago all of Holland west of Amsterdam and north of Rotterdam was a series of lakes and swamps, divided by narrow stretches of half-drained land, and protected against the North Sea by the sand dunes along the coast. To-day, in that whole area there is only sufficient water left for interior navigation. Nearly three hundred years ago the Beemster Lake of 16,000 acres was drained to a depth of nearly 20 feet, and it has ever since remained one of the most fertile districts of the earth. Thirty years ago Haarlem Lake, covering 44,000 acres, was brought to the same condition; and it is now in contemplation to add to the dry land of the kingdom 480,000 acres now covered by the Zuider Zee. Many of the reclaimed districts lie along the banks of the Rhine, which offer dangers and difficulties with which those of the Potomac can bear no comparison; while the original cost of the work is vastly greater than would be that of a similar reclamation of the Kidwell Bottoms and the Anacostia Flats. In Holland where the reclamations during this whole century have averaged about 4,000 acres a year, the motive for undertaking these works has been almost solely to secure land for agricultural use; the motive here, where it is necessary to reclaim not more than 2,500 acres, is one compared with which any economical use is insignificant.

The projects of Major Twining, Engineer Commissioner of the District, and of the Board of Survey of 1872, indicate the necessary means for the enclosure of the Potomac Flats, and suggest a similar treatment along the Anacostia, most of the area enclosed to be filled with earth, so that the whole of it, except some lakes

¹ Being portions of the seventh Toner Lecture, instituted to encourage the discovery of new truths for the advancement of medicine. Delivered at the Smithsonian Institution in Washington, May 26, 1880, by G. E. Waring, Jr.

and ponds, shall become solid dry ground, not much below the level of the lower parts of the city.

The Dutch method would be to construct corresponding defences, earth embankments, protected bulk-heads, or otherwise; to leave the enclosed ground at its present level, and to drain it by artificial power to a sufficient depth to secure the same result as to dryness that would be secured by the filling which has been recommended. I have no hesitation in suggesting the adoption of the latter method. The soil of the Kidwell Bottoms needs only to be drained to become, under atmospheric action, in all respects as good for any use to which it may be desirable to put it, as any other dry and solid ground.

For all practical purposes, the difference of level is not of the least consequence, especially as the whole area would probably be devoted to the uses of a public park. The effect would be simply to substitute a dry and pleasant meadow for the present noisome mud flats. The project might include a channel along the Potomac water front of the city below the public grounds, as at present; and a rectification of the main channel of the Potomac and of the channel of the Anacostia. The improvement of the latter stream should include the canalization of the whole river to a point at least three-fourths of a mile above Benning's bridge, or, better still, to the limits of the District. The canalization should provide an ample outlet for flood-waters, but the wide stretch of flats and marshes along both sides of the river should be thoroughly drained by artificial means. Tributary streams from either side, and the outlets of storm-water sewers, should be carried to the water-way at its natural elevation, — the current, especially in the case of the new Boundary Avenue sewer, being checked by a sufficient ponding of its outflow. So far as practicable, all upland water should be made to flow to the channel without descending into the drained lands. As in Holland, so here, the deep drainage of the reclaimed territory should be by open canals or ditches, which, in the case of the Kidwell Flats, might well be made of an ornamental character. The water in these canals would be kept pure by the introduction of a sufficient flow from the river. Except during violent storms, the pumping need be done only at low water, when but a slight lift would be required. It would be easy to connect nearly if not quite all of the drainage streams of the reclaimed land at one point for removal, at a single pumping station.

Aside from the economy and simplicity of this system, it would secure the very great advantage of affording easy deep drainage to those large areas of the city which now lie but slightly above tide level. This means of outlet being secured, there will be no difficulty in rapidly reducing the ground-water level by natural or artificial drainage sufficiently below the present grade for all sanitary purposes. In short, the carrying out of this improvement would be practically equivalent to raising the whole city six or eight feet above its present level, and giving it high and dry ground to the shore of a clear running stream on each side.

The reclamation of the flats east of the channel of the Anacostia is by all means to be recommended, as these flats must in time become, if they are not already, sources of malaria too near the city to be disregarded. Such of the reclaimed land as is not needed for municipal purposes, would, from its fertility and its nearness to the market, have an agricultural value fully compensating for the original and permanent cost of its improvement.

The flats about the city being brought to a proper condition, the next object that claims our attention is the drying of the soil of those parts which are now conspicuously subject to saturation.

There are two leading objections to the saturation of the soil of an occupied site: The first and most clearly defined is the now recognized influence which soil saturation has in the production or aggravation of diseases of the lungs. It has been clearly shown by Dr. Bowditch, and confirmed by other observers, that there is a direct relation between consumption and a wet soil in the vicinity of the dwelling. It is known, too, that the condition of the atmosphere caused by excessive wetness of the ground is unfavorable as regards other diseases of the respiratory apparatus. In Washington in 1879, out of a total death list of 4,309, 1,341 deaths — being over thirty per cent of the total mortality — were due to consumption and pneumonia. It would be too much to say that these diseases are to be completely eradicated by a thorough drainage of the soil; for constitutional taint, exposure in other places, and various other causes must still have their influence. But these diseases, which for years past have invariably stood as the first two of the mortality list may certainly be enormously reduced in their fatal effect.

The other disadvantage of a wet soil is less clearly defined, and its effects are less readily separated from those of other causes of ill-health and of death. Precisely what processes are going on under the surface of the ground — what is the kind, extent, and character of the decomposition of organic matter there taking place — has not yet been determined with scientific accuracy. We have theories only, but they are well founded and reasonable, and they command the confidence of those whose business it is to consider such matters. Whatever the processes, it is undoubtedly true that a deleterious condition of the contained air of the soil is due to the character of the decomposition within that soil of the organic matter which may have been added to it by vegetation, or which may have reached it from the off-scourings of human life. We know that the oxygen of the atmosphere is the great scavenger on which we must depend to destroy these injurious matters in the

ground; we know that its penetration into the soil is impossible when this is filled with water, and that its entrance is more and more free, and its action more and more effective, in proportion as the interior spaces of the earth are rapidly emptied of the water which they may receive from rains. We know, too, that the downward movement of water through the soil carries with it to the drainage outlets below, whether natural or artificial, the oxidized products of decomposition, and that as the water descends the spaces which it had occupied are filled with fresh volumes of air. We know, too, that the good effects which attend such descent of water in the soil, are substituted for the bad effects of a rising from below of the water of saturation, which fills the pores of the earth, and prevents or impedes the necessary work of atmospheric destruction.

There are parts of your city, some low-lying and some high-lying, which have so little inclination of the surface that rain-water does not readily flow away, but remains to soak slowly into the ground, which is of so nearly an impervious texture that the underground escape is extremely slow, if it is not practically absent. In many districts much of the water by which the earth is wetted, lies clogging its pores, until removed by a chilling evaporation, accompanied by the escape of unwholesome gases from the unclean earth. So far as this defective drainage exists in Washington, and it is by no means exceptional, the best or even tolerably good sanitary surroundings cannot be hoped for. In so far as the atmosphere of the city is insalubrious, it is not to be doubted that its insalubrity is directly or indirectly due more largely to the saturated condition of wide areas of its soil, than to the more offensive emanations of the sewer catch-basins and the odorous nuisances which still exist.

As a rule, in my judgment, the damp lands of the city should be drained by an independent system of pipes entirely disconnected, except at their outlets, with the sewer system. It is usual I know, to leave purposely or accidentally, sufficient openings to secure the admission of soil-water into the sewer, and so to effect a rude and incomplete, but still valuable drainage of the ground. Efficient drainage of the whole area cannot be secured by this means, even were it not, as it certainly is, extremely objectionable, for the reason, among others, that a sewer which will let ground-water into the conduit in wet weather, will let sewage matter into the ground in dry weather, adding an important and foul contribution to the organic matter which the earth is already charged with destroying; and adding to the danger of tainting the ground-air, with which the atmosphere about our houses, and especially the atmosphere of our cellars, is in free communication.

No scheme for the sanitary improvement of Washington can be considered even tolerably complete unless this very simple matter of the thorough drainage of the soil is duly and skillfully provided for. In the construction of new work much may be accomplished by laying agricultural drainage tiles in the same trenches with the sewers, but ordinarily more than this will be necessary, and it is always especially important to establish such a relation between the subsoil drains and the sewers, where the latter must serve as outlets for the former, as shall fully protect the drains against any inflow or regurgitation of sewage matters, as these might readily escape from the tiles into the ground.

THE ILLUSTRATIONS.

OLD HALF-TIMBERED HOUSE, BAYEUX, FRANCE.

This illustration is a reproduction of a copy of an accurately measured drawing made on the spot by Messrs. W. S. Fraser and S. E. Kirby.

CENTRAL OFFICES OF THE BALTIMORE AND OHIO RAILROAD COMPANY, BALTIMORE, MD. MR. E. F. BALDWIN, ARCHITECT, BALTIMORE, MD.

This design is now being carried into execution at the corner of Baltimore and Calvert Streets as here shown, except that the tower on Baltimore Street is to be omitted, the side pavilion being repeated in its stead.

DESIGN FOR A CABINET BY MR. CICERO HINE, OTTAWA, CAN.

To this design was awarded a prize in the late exhibition of the new Canadian Academy of Arts.

HOUSE AT MARBLEHEAD NECK, MASS. MESSRS. HOWE & DODD, ARCHITECTS, BOSTON, MASS.

THE VENTILATING FIRE-PLACE.¹—VII.

"THE cost of fuel annually required in the United States for mechanical and manufacturing purposes, mainly for the generation of steam, cannot fall short of sixty millions of dollars. Estimating it at fifty millions, an invention, or discovery which would save one fourth of this amount, would increase the national wealth by twelve millions five hundred thousand dollars per annum. The cost of fuel for culinary purposes, warming dwellings, etc., is of course much greater."²

According to table XI, taken from the Smithsonian Reports, we see that a metal stove with vertical pipes with circulation of air taken from the outside, or inside, is capable of utilizing 93 per cent

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

² J. Jenkins's Improvements in Heating.

of the heat generated by the fuel. The "distributor" is such a stove, and is therefore, following the authority quoted, able to save nearly

TABLE XI.
CLASSIFICATION OF HEATING-APPARATUS IN REGARD TO HEATING EFFECT.
(See Smithsonian Reports, 1873, p. 308.)

Forms of Apparatus.	Percentage of heating effect.	Remarks.
Ordinary Fire-Places	10-12	Carry off foul air, but do not directly bring in fresh air. Effect of system healthful.
Ventilating Fire-Places	33-35	Carry off foul air, and directly introduce moderately warmed fresh air. Healthful system of heating.
Common stoves without circulation of air. {	90	} Produce a very insufficient change of air. Unhealthful system.
Cast-Iron, } Coal burning } Coke	83	
Porcelain, burning wood, slightly healthful .	87	
Metal stoves, with circulation of air taken from the outside or inside. {	68	} Do not produce sufficient change of air, and heat too much the air they introduce. Very injurious system of warming, if pipes be of cast iron; slightly healthful if of sheet iron.
Model in use in schools in Paris with vertical pipes, Chausse-not's model .	93	
Heaters with pipes for circulation of hot air. {	63	} Cannot directly produce a sufficient removal of foul air, and in general, supply overheated air, but may easily be modified so as to give out air at 86° or 104°. System injurious when not combined with means of ventilation.
Horizontal	80	
Vertical		
Apparatus for circulation of hot water. {	65-75	} Easily adapted for the establishment of regular direct ventilation.
When the pipes and radiators are very numerous, with large surface compared with that of the heater.		
When the boiler, furnace, and all the radiators or pipes are contained in the place to be warmed.	85-90	

all the heat of the fuel. In practice, however, such a result will rarely be obtained, and the greatest percentage reached by the writer with the distributor during the summer months, has been a little under 80 per cent. In winter, when the air brought in contact with the pipes is much colder, a greater saving can be made, but no opportunity has as yet been presented to make experiments in the winter, the apparatus suited for accurate test having been completed only in the spring of the present year.

The distributor is connected with the masonry of the fire-place by simply embedding its lower connecting pipe in mortar and brickwork for several courses. The expansion and contraction of the metal must then take place upwards. To allow of this, at the top, where the iron pipe rejoins the brick flue, it should be fitted into a piece of tin pipe half a meter long, with just room enough to slip in it when heated. The tin pipe should be firmly bedded in the brick flue with cement. The iron should enter the tin flue a distance at least equal to its own diameter. When the tin pipe rusts away, the smooth cement in which it was set will have become hard enough to take its place, and serve the same purpose. The tin pipe should be built in by the mason when the chimneys are built. Copper may be substituted for tin where it is thought that the unprotected cement would be likely to be decomposed by the smoke and moisture.

EFFECT ON THE DRAUGHT OF ABSTRACTION OF HEAT FROM
THE FLUE.

It may be asked, whether the utilization of the heat of the smoke-flue, by means of the distributor, would not injure the draught of the chimney in direct proportion to the amount of heat abstracted from the flue.

The heat abstracted from the distributor is not lost by immediate dissipation in the outer air, as is the case with that taken from the surface of an ordinary flue of brick or iron, especially when exposed, but is at once returned again to the flue through the open fire-place, after warming the rooms of the house. The entire house becomes the chimney, the rooms, and outside walls forming, as it were, a kind of outside coating, and the heat is simply transferred from the outside to the inside of the flue, after passing through the rooms, or double coating, in its passage. Were the foul air removed from the house through independent flues, and from the ceilings of the various rooms to be ventilated, as is customary, the case would be different. We have presupposed that the walls of the house are rendered as impervious as may be to heat. This can, of course, be only partially accomplished, by vaulting the walls, doubling the windows, back plastering, etc. Even then, a certain amount of heat will be lost through them, but the interior of the house will always be warmer than the exterior, and the draught in the chimney strong in proportion to the excess.

Even without this it is clear that the abstraction of the heat alone

could not be sufficient to destroy the draught, because, if it were, no fire in any ordinary chimney could ever be *lighted* without smoking, since the brick flue has at the time of lighting received absolutely no heat from its own fire-place, and experience shows that, with properly constructed flues, the difference between the ordinary temperature of the house, and the exterior air, is in winter sufficient to produce a chimney draught of fifty or sixty meters a minute. Indeed, with good chimneys a difference of one or two degrees is sufficient to produce a good initial draught. The friction against the smooth sides of the distributor slightly diminishes the *rapidity* of the current, but hardly more than that in an ordinary chimney against the rough flues of brickwork.

To illustrate the movement of the warm air currents formed in heating and ventilating rooms by direct and indirect radiation, the writer had a model of a house made of glass, wood, and metal. The model was about .75 m. high, and contained three rooms with fireplaces, and independent flues, as shown in section, Fig. 219. The glass sides were made double at all openings to exclude the outer air. Small oil lamps served as fires. The smoke-flues were constructed of metal from top to bottom, and passed through a fresh-air chamber just large enough to contain all the flues and allow of a free circulation of air about them when the fires were lighted. The fresh air entered this chamber at the bottom of the stack, was heated around the flues, and then entered the various rooms through registers in the chimney-breast near the ceilings, as indicated by the arrows. Thermometers placed along the ceilings and floors of the rooms showed a remarkable equality of temperature, in different parts of each, with a gradual increase in ascending from the lowest to the highest room, and in all, as long as the fires were burned in any one.

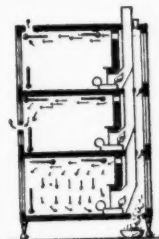


Fig. 219.

The movement of the currents could be followed with the greatest accuracy by tinging the air with ammonia fumes, generated over nitric acid, or with the smoke of damp gunpowder ignited. When the flues in the top and middle rooms were cold, or stopped with corks, the hot-air currents in these two rooms were interrupted, no ventilation was effected, and their temperature immediately began to fall. Upon uncorking openings at the top and sides of these rooms, the currents again started through them, but the air and heat escaped before it reached the lower parts of the rooms, and at these points the mercury remained nearly stationary, showing clearly the folly of the common mode of exhaust ventilating at or near the ceiling, in winter. In order to make certain that the currents observed in the model were similar to those found in actual buildings, the following experiment was made. Cold air, made visible by the smoke of damp straw, was brought against, and heated by, the distributor, and entered the room through the upper register, as usual. The warm air acted precisely as described in the case of the furnace-flue, forming regular strata at the top of the room, which descended as they cooled, and passed out of the fire-place opening upon reaching its level, but no part of it before. The experimenter was able, by lying down, to remain in the room until the smoke strata touched the floor, after which the observations had to be made from the outside, through the glass panels of the door or window. The air colored by the smoke was cooled before entering the distributor chamber, by being conducted under the snow in a flue ten meters long, in order that its movement should be determined solely by the heat of the distributor. Where the warm air strata came in contact with the windows, the downward movement at these points was somewhat more rapid, but the effect was produced only on a very small quantity of air immediately in *contact* with the glass, as the column rolled up by it, no heat being given up by the air by *radiation* to the glass, so that the distortion of the layers was hardly perceptible, though the windows were not double. It is sometimes claimed that the warm air should be delivered on the window, or cold side of the room, and the foul air withdrawn on the opposite side, on the ground that by this means a temperature more equal in different parts of the room can be produced. If the supply could be near the bottom of the room, under the windows, and if at the same time hot air were a *radiator* of heat, this might be the case. But neither is the fact. The fresh air cannot be introduced at the bottom, because its entrance there would be objectionable in summer, spring, and fall, on account of the draughts it would occasion, annoying and dangerous to those nearest its inlet, when the outer air introduced were cooler than the air of the room. Two supply-registers would be necessary, one below the windows for winter and one above for summer.

Hot air is *not* a radiator of heat, any more than it is a receiver of radiant heat, whereas, on the contrary, the cooling effect of window surfaces, as now constructed, is due rather to radiation, than to the admission of cold air. The mere passage of a column of warm air in front of these windows does not materially warm them, nor in the least obstruct the loss of heat by radiation from the occupants of the room to the cold glass.

It is even claimed that there is a positive disadvantage even in winter, in placing the supply under the windows, on account of the interruption to the regular flow of the air which would be occasioned by the conflict between the rising column of warm air and the cool air falling near the windows. The natural ventilating currents would

be disturbed, and the regularity and amount of air change would be correspondingly reduced. But such a theory would seem to be based on the supposition that the air moves in currents rather than in horizontal strata, whose gradual and uniform descent is little influenced by the conflict referred to. The two opposing currents near the windows would rather tend in part to neutralize each other, and the cold air entering through window cracks, however small in amount, might still be annoying were it not tempered by mixture with a portion of the incoming warm air. So tempered, its baleful influence at the floor level would in a measure be prevented.¹

Nevertheless, this advantage is not sufficient, in well built and tightly fitted rooms, to compensate for the extra expense and loss of carrying the warm air flues to the outer walls of the house. This is usually considerable, because the heat generator is as a rule in the middle of the building. If two supply-registers were used, one above for summer, and one below for winter, the first cost would be still greater, and the difficulty of management, and the consequent liability to neglect, would be an important objection. The arrangement would lose the advantage of automatic action. Were the room warmed by direct radiation, the case would be different. A direct heat-radiator placed under the windows, would radiate heat on the one hand to the occupants of the room, and on the other to the windows, and more than compensate for the return radiation to the windows from the occupants.

For the same reason fire-places, being also direct radiators, when built on the outer walls, especially under windows, have an advantage frequently lost sight of. Where it is thought necessary to provide for a supply of fresh air in spring or autumn, for days when the outside air is too cool to allow of opening the windows, and yet not cold enough to require artificial heating, an exhaust register should be provided at the top as well as at the bottom.

"EN CHARRETTE."

It was the week of the *charrette*, and an awful *charrette* even for these putting-off Frenchmen. Monday it began and Saturday noon it ended, having grown more feverish day by day.

I was *négre* for P., a most industrious fellow who labored under the great disadvantage of having made an unfortunate sketch "*en loge*"; he had on his hotel-front an octagonal bay which did not "arrange itself." It was a private house on an irregular piece of ground—a hard thing to work out, if your sketch be unfortunate, — and though most of the fellows were fore-handed enough, they got fearfully "*en charrette*," or "in a hand-cart," to speak in my native tongue.

Tuesday, Wednesday and Thursday were busy days; four first-class men, working for a *concour* prize on a *projet* sketch, sat up all night, and worked till four o'clock Christmas day, which is working hard; and to show what good fellows they are, these fellows were at work the next day "niggering" for the second-class men as if nothing had happened, ready for another night of it, and one of them got it.

I was much interested in C., as it was his first *projet*. His sketch was not very good; too few windows, and he was afraid to get, as they say, "*hors de concour*" by changing anything. However much the *patron* may dislike your sketch, he must counsel you so as to make the most of it, putting in all that you have indicated.

The fellows get very foxy, and make things that they can develop into a niche, or a window, or a bird-house, or anything; but if you only put in five windows and need seven, you are in a fix. One fellow had been off and had worked seriously only two or three weeks on a two months' *projet*; but he is a funny, happy-go-lucky fellow, and will always "arrive" as they say: that is a great word, and many a discussion or bet is made as to whether M. or G. *arrivera*, or will get his *projet* done.

The *coupes* or sections are generally done in less than a day by a *négre*, as many of the fellows cannot do them even if they had weeks to do them in, and they never have any time, — never.

This was a hard *projet*, and seriously interfered with Christmas. Thursday night I worked till eleven o'clock, and then went with the fellows across the river to St. Eustache, where they have stunning music and a grand mass on Christmas eve; but, alas, we came too late; the church was packed full and hundreds were turning away. Then we thought of St. Sulpice in our own Quarter, and back we went across the Pont Neuf, across the still frozen Seine, where every night a frost-like snow covers the bridges and trees, and in the moonlight looks wonderfully beautiful. A dash in the moonlight, and a race with a fat *boulangier*, and *père* and *garçon* and *bonne*, all running for the *messe de minuit*. All go, — and so in a hurry! — round the

great shadows of St. Sulpice, cold and imposing, the moon shining through the openings in the great high towers and throwing a pale light out beyond the massive shadows. Stunning old place! But we had little time to admire. The old bell in the tower turned and squeaked, then rang out, and it was midnight; it was Christmas day, and we three or four students squeezed by the beggars into the great solemn church, just as the immense organ pealed forth a joyous song of praise, and my old feelings of a church and church glory came back. There is nothing like it.

The nave was lighted and packed full, and the aisles full of a moving crowd, with here and there an old woman praying on her chair in the corner, unconscious of the world. In the chapels were little side-shows going on, with a little altar, a little priest, and a little congregation. The big church full of shadows, of music and of devotion — and of ignorance I may add — was impressive. The organ is stunning and the organist one of the best in Paris. I was delighted and serious, and wished you had all been there. Then came Noël, that beautiful Christmas song, sung by a man's voice, and it rolled through the nave and aisles in a manner to make us all rejoice in being there. But it ended quite too soon.

Christmas day came cold, a little brighter, a little less thick. I worked till four o'clock, when I went down to the Seine to walk on the ice. Such a pretty, amusing sight. The quays and bridges were covered with people, it being a *fête*, all watching the throng who were walking and sliding on the ice. They had made long slides, and men, women and children were running and sliding on the ice and having no end of a good time, and I joined them, first having walked across the Seine from the Rue Bonaparte to the Louvre; and it seemed so queer to be walking there and looking up at the old bridges under which H. and I sailed in "The Swallows," in the summer.

The effect of the long line of the Louvre and the pavilion at the end was stunning, and the faint glow in the west, the high houses and all, in the gloaming, made another picture to remember, more strange than most that have delighted me here.

Friday morning I left my room for quite a number of hours, as I spent Friday night at the *atelier*. Eighteen of us stayed. One A. M. brought in all the "*anciens*" to *faire nègre*, and two great lazy fellows who never turn up to work, came this time for D., who is an amusing fellow, and called his big *nègres* "*mes sâles cochons de nègres*," and the two noisy, singing fellows worked side by side with their sleeves rolled up, and they *blagued* their *patron* and all the crowd, and kept us all laughing, making no end of fun. Then came time for drinks, and to hear D.'s "*agence*" *blague* him because he would not order three sodas and three little cakes, or *babas*, apiece. "*Quel sâle de cochon! Quel gros porc de patron!*" then after he had ordered drinks and cakes for his *nègres* or *agence*, the moment these were gone began, "*Charrette! Mais, qu'est-ce qui arrive? Mais, que j'ai soif, soif, soif!*" The *blague* between *patron* and *négre* was something astounding. My *bon patron* paid for a *baba* and a drink of soda in a café in the evening, but he was awfully fussy and painstaking. I have enjoyed dining with these fellows, and have learned much this last week, though I have not had a moment for myself.

Friday evening was a busy one. G.'s details were not all begun even in pencil. E., the man who had been up all Wednesday night, was on deck again, doing a sheet of detail for G. M., whom they *blague* all the time, was awfully "*en charrette*" and continually trying to get me to nigger for him; they roughed him awfully. N. came in, another big *ancien*, with a most irrepressible, high, child's laugh. He came and stayed till midnight, and made lots of fun, and we sang and finally gave him the "*danse Américain*," which delighted him no end, and they all thought it *épatant*. Then B., the funny man, related the *petite histoire* de M., de C., de L. et de W., which caused great merriment. They made fun of anybody and thing, and so the night wore on; two o'clock came, and we supped — cold turkey and bread — very good it was. Such a picturesque sight! All the candles and bottles in the middle of one of the tables, and the fellows in their caps, "*bonnets de colon*," arms bare and collars open, sitting round or dancing in the deep shadows of the unlighted parts of the room.

In the gray dawn we went out for coffee, and I walked along the streets and saw the milk-men and the *chiffonniers* and the news-dealers, and all the early risers. I went down and saw the Seine. It is always beautiful, and the morning light up the river shone on the tall poplars with their coats of frost, and all the bridges and walls of the quays were covered with soft white frost, and I felt early and out of place, though the bridges and the buildings fading into cold blue distances were fascinating in tone and values: a little later the great red sun rose, touching everything with a gentle pink light, and the day of *charrette* had come. Then came the scramble and rush. *Colle forte, colle à pâte* everywhere, all the drawings to be finished, glued with strong glue to the *châssis* or frames like oil pictures, and bands of gray paper pasted round the edges and over the *châssis*, — a job where there are fifty or sixty drawings to mount, and twenty fellows who all think their drawings the most important, and only three "*rapins*" who don't care a hang anyway. Some men lost their heads, others worked on stronger than ever.

E. was still drawing G.'s details at ten o'clock; at eleven o'clock I was finishing P.'s plans and he, his façade; such howls, such studies of character! I enjoyed it; men who a week ago covered their drawings all but a hole to work through, sat on their drawings and slung round color as if it did not cost anything, and the floors ran with glue and paste, and men flew by shouting, and dangling glued sheets, or

¹ The cooling action of the windows and walls is by no means "the sole reliance in all self-acting or automatic heating-apparatus." It is not a reliance at all, but rather a hindrance. The ventilation with such apparatus is determined by the height of the hot-air and exhaust flues, and the warmth or levity of the column of air they contain, as overbalanced by the density of the corresponding cold-air column of the exterior, and is only slightly influenced by local currents in any room. The velocity of movement of the warmer column is retarded in proportion as it is cooled by the walls of the various rooms through which it is conducted in its passage. The room of a house must be taken as merely a local enlargement of the warm-air flue, in passing through which enlargement air is cooled, and its velocity retarded in proportion to the thinness, porosity, and conductivity of the walls. To show the truth of this we will suppose the walls of our room to be artificially cooled below the temperature of the outer air to such a degree that the warm air from the flue coming in contact with them, is cooled until the levity of the warm-air column is no greater than that of the exterior. Stagnation would clearly be the result. Artificially heat, however, the outer walls, and notwithstanding the friction induced by irregular and conflicting local currents, the velocity of the entire column would be increased in proportion to the amount of heat imparted by the heated walls.

pasted bands. That place was jammed full, every table, every stool had a drawing on it or a *châssis*, and such cursing!

Ten o'clock came and some worked on, rendering, others glued, shouted or cursed, and "descended" their drawings to the court. There were no inquiries as to *Qu'est-ce qui lâche, or qui arrive?* they were all going in for dear life. Three men on one drawing! Half-past eleven, and G. sat on his table, his nightcap on, with his *chassis* for a frame, and asked the crowd if they thought he would arrive; but E. put a wash all over his drawing and was holding it by the fire, the doors and windows were open, the cry of "*charrette*" was heard. *Le petit G.* was howling in his biggest, fiercest voice to "descend" the *projets*.

I was putting "green sass" into P.'s garden pots, he putting in the balustrade on the roof, and then we cut them off, straight or crooked, and rushed for "*colle à pâte*." Most of the crowd were howling in the court. One *charrette* had gone, G., *le petit*, was wild, F. *du midi*, was mad with excitement, and hazing the *rapins* terribly, as he is up for *sous-messier* in G.'s place.

We put on the paste. I spread it with my hands, and slapped the plans on to the paper stretched on the *châssis*, and rubbed it down with my handkerchief over the beautiful black walls which would run so easily; but there was no time to lose, let it run if it must. P. and E. were done in a few minutes—almost seconds—and then there were C.'s drawings, and I went at them, pasting bands and putting them on with my hands,—I do like to do things neatly! Those three done, and yet poor belated G. was singing away, and with E.—all that were left of the crowd—I helped him, and we pasted bands on his unfinished details, (too bad, since E. had drawn them with such *chic*.) Wet and puckering, we descended and put it into the *charrette*, which gives name to and bears such an important part in all this hasty day, and the last cart starts and the last trusty few in blouse and cap, or as it may be, run on ahead or stay behind to urge the cartman.

I ran for the school to overtake C. and W., who were carrying two great *châssis* five feet long,—they were too wet to put in the cart. Think of it! The work of two months finished up in that way, and taken fairly dripping to the school!

At the school the last *charrette* comes too late. They will not open the doors; poor P. almost cries. We pound, the door is opened a crack, we rush in before the *gardiens* can shut it; too late to refuse, they are received, and P. is wild with joy. Outside all the school *ateliers* are howling, shouting, glueing and pasting. It is a dirty scene, indescribable: but 'tis done, and what a relief, and how tired and played out we all feel. *Patron* and *negre* embrace and swear eternal friendship, and go to get a wash, a bite and a nap—and they are all three needed—the best of their kind for a long time. An hour and a half later, after grub, a visit to the *atelier*, etc., four fellows draw up a sofa in front of C.'s fire; three minutes later four fellows are fast asleep.—*Extracts from a private letter.*

THE REGULATION OF PLUMBING AGAIN.

NEWPORT, R. I., August 3, 1880.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Sir: In my recent communication I was unfortunate in my manner of expression, if I seemed to do injustice to your interest in sanitary reform. The efficiency of your efforts in this direction have been so manifest that it seemed unnecessary to refer to them.

I venture the suggestion, however, that in your comments, on page 50, you fall a little short of your own previous standard. Obviously, Boards of Health must, and before long they will, insist on the most healthful methods of house draining, and they will certainly have the power to enforce their regulations. No difficulty was experienced in Memphis in securing obedience to the most rigid regulations. The use of the pan-closet is there prohibited by law. When this law was passed the plumbers had large stocks of these closets on hand, and with but feeble expostulation they returned them all to the manufacturers, and no one now thinks of recommending or using this abominable device in that city. What has been done there can be done elsewhere.

Boards of Health should be cautious not to claim too much; but when the inherent badness of any element of the work (such as the laying of a drain under the cellar-floor) has been fully accepted by the best authorities, this element should be at once and emphatically prohibited. It is not a question of "entering a man's private house and compelling him to incur a heavy expense for the sake of his own bodily comfort," but to insist that no man shall keep in his private house any recognized cause of possible injury to his own health and to that of his neighbors. Civilized communities now compel the removal of small-pox patients. I submit that they have the same right and the same duty in connection with any work in a house which constitutes a menace to the people.

Your exception in favor of the use of the pan-closet in certain cases is, I think, not defensible. Whenever a sufficient amount of water can be obtained to supply any closet, it can be accumulated in a flushing cistern and used for "an abundant and sudden flushing" for a hopper-closet. The supplying of such a flush is an essential element of success. I have seen no device for flushing any closet by a constant stream during use that I thought satisfactory, and the hoppers to which you refer are an abomination which should be prohibited by law.

G. E. WARING, JR.

NOTES AND CLIPPINGS.

MINERAL LAND LAWS.—A Washington despatch to the Boston *Herald*, says that some time ago a man in lower California staked out a mining claim on land previously granted to the Southern Pacific Railroad by the Government. He found a bed of limestone upon it, and immediately formally entered his claim under the mineral land laws. Commissioner Williamson of the General Land Office was called upon to determine whether this entry was a proper one. If a limestone bed could make land mineral land the entry was properly made, and the man's right superior to that of the railroad company, to whom no grant of mineral land can be made by the Government. Commissioner Williamson has decided that the entry could not be made; that limestone beds do not constitute land mineral lands within the meaning of the law, and that, therefore, it is but agricultural land, and of right under the grant belongs to the railroad. Should he decide otherwise, the Commissioner thinks his office would be overrun with entries of limestone, potters' clay and gravel lands under the mining claims laws.

RATES ON CEMENT.—The following circular in regard to rates on cement has been issued by Commissioner Midgley, of the Southwestern Railroad Association: "Misunderstanding has arisen as to what rates should govern on shipments of cement, in car lots, to Missouri River points. Until otherwise ordered, the rates quoted in tariff No. 38, of this association, dated July 1, on salt, cement, and plaster, in car lots, viz.: 65 cents per barrel from Chicago, 50 cents from Peoria, and 35 cents from Mississippi River points, will govern. Shipments of Portland cement will be charged one-third more per barrel than the above rates."

CREMATION AT GOTH.—The Cremation Society at Gotha has dissolved, and the Municipality has taken the management of the Columbarium. The crematory has been in operation there since 1878, and thirty bodies have been cremated. The cost of incinerating one corpse, is \$7.50—\$5 for fuel, \$1 for help, \$1.50 for use of retort. Urns are furnished by the relatives, and are in dimensions thirteen inches high and fifteen inches wide. They are deposited in the Columbarium for twenty years, and then must be removed. The crematory—building and appurtenances—cost \$22,000.

THE VALUE OF LONDON BUILDING SITES.—The value of land in London is illustrated by two recent sales. At the auction mart, Tokenhouse yard, Messrs. Edwin Fox & Bousfield sold, by direction of the First Commissioner of her Majesty's Works, premises in Seething lane, Tower street, at £4 17s. 4d. per square foot, or at the rate of £211,962 per acre. They also sold, by direction of the Court of Chancery, ten freehold houses in Ely place, Holborn, occupying together about 13,412 feet, all with vacant possession, the leases granted ninety-nine years ago having expired. The total amount of sale was £34,570, being at the rate of £2 11s. 9d. per square foot, equal to £112,167 per acre.

THE PRINCE IMPERIAL'S MONUMENT.—Owing to the pressure which has been brought to bear upon him in reference to the erection of a monument to the late Prince Napoleon in Westminster Abbey, Dean Stanley has decided not to insist upon his original project. It is now said that the statue will be placed in St. George's Chapel, Windsor Castle, with the Queen's approval. To this it is not thought any serious objection can be raised in any quarter.

THE CHANNEL TUNNEL.—The report of the directors of the South-Eastern Railway Company contains the following reference to this tunnel:—"The experiments made by the French engineers, after great pains and labor, tend to show that the geological measures are not only in the same position, but are of the same thickness on each side of the Channel; and the stratum known as the 'Old Gray Chalk' in England, and as the 'Craie de Rouen' in France, is impervious to water, and is without fissures. These are the foundation facts in this interesting question, for if a tunnel can be made without pumping or timbering, and entirely, from side to side, through the gray chalk, then an apparently formidable and even hopeless work becomes matter of close calculation. As the researches of the French engineers confirm the view for years past taken on your behalf,—namely, that the proper point of departure for any future tunnel is at the outcrop of the gray chalk on the South-Eastern line between Folkestone and Dover, and not at St. Margaret's Bay to the east of Dover, where the gray chalk, dipping to the northward, does not crop out,—your directors have deemed it advisable to make arrangements for a series of important experiments which, so far, have shown favorable results."

PROPER SIZE FOR HOUSE SEWERS.—An interesting series of observations has been made by Sewer Commissioner Moore, of St. Louis, to determine the necessary sizes of sewers to carry off house sewage exclusively, irrespective of surface drainage or storm-water. The present sewerage system of St. Louis provides for all the drainage from whatsoever cause; but it has been found expedient, looking towards immediate extension, to arrange certain additions to the system for the purpose of conveying house drainage alone. A certain neighborhood was selected, through which Compton Avenue sewer, with a diameter of 74 feet, passes. On this area of 440 acres were 1,370 houses, population 11,000. The observations were taken by constructing a small dam, with a section of 12-inch pipe running through it on the bottom of the sewer. All the flow in the sewer was made to pass through the small pipe, and it was found that in the middle of the day when the flow is highest, as a rule, the water was only 6½ inches deep in the small pipe. The weather and soil were dry enough to insure that nothing but the waste from the dwellings passed into the sewer. Another sewer was tried, 34 by 44 feet, in a fairly built up neighborhood of 155 acres, with the result that a pipe of 9 inches in diameter gave a maximum depth of flow of 6½ inches and a minimum of 4½ inches, giving an average of, say, 5½ inches. While the quantity of the flow shown seems small, it, however, indicates a consumption equal to about 80 gallons of water per day for every man, woman and child.—*Sanitary Engineer.*

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.]

- 230,603. COUNTER-SINK. — D. Fletcher Barber, Newton, Mass.
- 230,619. GRADUATED MEASURING RULE. — Samuel Darling, Providence, R. I.
- 230,634. GLAZIERS' POINT. — George W. Hubbard, Windsor, Vt.
- 230,634. PIPE-TONGS. — Hazen J. P. Huntoon, Cambridgeport, Mass.
- 230,640. FOLDING AND EXTENSION MEASURING-ROD. — Wm. W. Massey, Elyria, Ohio.
- 230,651. WATER-CLOSET. — Henry Owen, London, England.
- 230,655. SOLDERING-IRON HEATER. — George Quinton, London, Ontario, Canada.
- 230,673. SMOKE-STACK. — Arthur Staples, Lowell, Mass.
- 230,681. RAIN-WATER CUT-OFF. — William Warren, Sae City, Iowa.
- 230,685. SEWER-TRAP. — William P. Austin, New York, N. Y.
- 230,704. SERVICE-BOX FOR GAS AND WATER PIPES. — Friedrich Jarecki, Erie, Penn.
- 230,729. COLORING AND HARDENING BRICKS. — Jacob Ambuhl, Morristown, N. J.
- 230,735. BORING AND MORTISING MACHINE. — Cornelius R. Brinckerhoff, Rochester, N. Y.
- 230,746. HAND-DRILL. — George B. Clark, Bethesda, Ohio.
- 230,755. DOOR-HANGER. — George R. Kidder, Ann Arbor, Mich.
- 230,768. STEP-LADDER. — Charles H. Miller, Erie, Penn.
- 230,807. WIRE OR ROD CUTTER. — William H. Palmer, Elizabethtown, and William A. Root, New York, N. Y.
- 230,819. DEVICE FOR DRYING LUMBER. — Charles C. Roberts, Cleveland, Ohio.
- 230,832. SKY-LIGHT BAR. — Fred Ruemping, Kansas City, Mo.
- 230,839. WELL-CASING. — Henry Shear and Henry M. Toomey, Arcola, Ill.
- 230,830. EARTH-AUGER. — Edward A. Smith, Greeley, Col.
- 230,837. HEATING-FURNACE. — John L. Treffren, Santa Cruz, Cal.
- 230,840. HATCHWAY-GUARD MECHANISM. — T. Frank Tyler, Lynn, Mass.

SUMMARY OF THE WEEK.

Baltimore.

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

Maria Hoover, 3 two-sty brick buildings on Sterret St., between Eister St. and Columbia Ave.

Tracy Bohmer, 1 three-sty brick building, on Mulbury St.

Geo. A. and C. D. Blake, 4 three-sty brick buildings, on John St., near St. Paul St., 18' front each.

Chamber of Commerce Building Co., 1 four-sty brick and stone building, cor. Holiday and Second Sts., 82' x 180'.

J. P. Presley, three-sty brick building, on Scott St., near St. Peter St.

Strawbridge M. E. Church, extension of present building, on Biddle St., west of Garden.

HOUSE OF CORRECTION. — The sum of \$20,000 being appropriated by the Legislature at the last session, for new buildings at House of Correction, the Board has decided to proceed at once to make the necessary preparations for this purpose.

Boston.

BUILDING PERMITS. — *Brick.* — Newbury St., Nos. 211 and 213, for Luther M. Merrill, 2 dwells, 24' x 50', three stories high; Silas W. Merrill, builder.

Newbury St., Nos. 215 and 217, for Silas W. Merrill, 2 dwells, 25' x 50', three stories; Silas W. Merrill, builder.

Wood. — Zeigler St., No. 92, for Warren Lathrop, 1 dwell, 24' x 32', three stories; Edw. C. Allen, builder.

A St., No. 19, for David A. Ring, 1 dwell, 21' x 32', three stories; P. F. Hanlon, builder.

Columbia St., near Bird St., for John Horsfield, 1 dwell, 18' x 19'; John Horsfield, builder.

Tupelo St., No. 9, for Mrs. Wm. Barton, 1 dwell, 20' x 30'; Wm. Barton, builder.

HOUSES. — A block of four private residences, owned by Sumner K. Mead, N. W. Rice, Henry Shaw, and A. H. Caton, is in course of erection on Commonwealth Ave. They will cost about \$25,000 each. Mr. Chas. K. Kirby, of Boston, is the architect, and Mr. A. H. Caton, of Boston, the contractor.

Brooklyn.

BUILDING PERMITS. — *Seventeenth St.*, Nos. 210 and 212, 2 two-sty brown-stone dwells, 20' x 40', cost, \$2,500; owner, Thomas Pitblado, 213 Seventeenth St.; builders, Wm. Corrigan and Edward Parsons.

Butler St., 5 two-sty brown-stone dwells, 17' x 42', cost, \$4,000 each; owner, etc., John V. Forter, 146 Park Pl.

Seventeenth St., 2 two-sty brown-stone dwells, cost, \$2,500 each; owner, Thomas Pitblado, 213 Seventeenth St.; builders, Wm. Corrigan and Edward Parsons.

Ninth St., 2 two-sty brown-stone dwells, 18' x 43'; owner, M. Mulady, 576 Quincy St.; architects, Parfit Bros.; builder, P. Ward.

Hewes St., 3 three-sty brown-stone dwells, 20' 10" x 42', total cost, \$25,000; owner, etc., L. Sammis, 138 Penn St.

Eckford St., cor. Nassau Ave., 1 three-sty brick store and tenements, 25' x 50'; owner, David Reese, 116 Nassau Ave.; architect, James Mulhaul; builders, Israel Reed and Thomas Walling.

Norman Ave., cor. Manhattan Ave., 1 three-sty brick store and dwell, 25' x 51'; owner, Michael Neuman; architect, Fred. Weber; builder, Jos. T. Gately.

Greene Ave., 3 three-sty brown-stone dwells, 18' x 45'; owner and architect, J. Doherty, 538 Quincy St.

President St., 2 three-sty brown-stone dwells, 12' 6" x 50'; owner, Mrs. H. Mackemer; architect, R. G. Foster.

Cumberland St., No. 198, 1 three-sty brown-stone dwell, 33' x 67'; cost, \$20,000; owner, J. C. Wemple; architect, John Antrum; builder, Thos. B. Rutan.

Park Ave., 4 two-sty frame dwells, 22' x 40'; cost, \$2,000 each; owner, etc., George Loeffler, 138 Floyd St.

South Eighth St., southeast cor. Second St., 3 four-sty brick stores and dwells, 20' 2" x 51'; owner, John Hoelt, on premises; architect, W. H. Gaylor; builders, S. J. Burrows and Gilmore & Trevor.

Marcy Ave., cor. Rodney St., 1 three-sty brick tenement, 25' x 40'; owner, Mr. Herrschulff; builder, C. L. Johnson.

Melrose St., 1 two-sty brick convent and orphan asylum, 28' x 64'; owners, Sisters of St. Dominic, cor. Graham and Montrose Aves.; architect, William Schickel; builders, B. Kauth & Bro. and F. J. Berlenbach.

Floyd St., 1 three-sty frame tenement, 25' x 50'; cost, \$2,900; owner, Mrs. N. Schneider, 162 Park Ave.; architect, John J. Hoeffer.

Chicago.

BUILDING PERMITS. — Gustav Stock, two-sty brick addition, 23' x 50', 612 Carroll Ave.; cost, \$2,000.

E. Haen, three-sty brick dwell, 25' x 48', 705 N. Franklin St.; cost, \$2,800.

Florence McCarthy, two-sty brick dwell, 21' x 50', Western Ave. and Twenty-Third St.; cost, \$3,500.

J. Lauritzen, two-sty brick store and dwell, 21' x 69', State St., cor. Thirty-Sixth; cost, \$3,000.

C. J. Hambleton, three-sty brick dwell, 25' x 56', 458 Dearborn Ave.; cost, \$12,000.

C. Phillips, two-sty brick dwell, 21' x 82', 2451 Wentworth Ave.; cost, \$5,000.

Wm. E. Hall, two-sty brick dwell, 23' x 68', Prairie Ave., near Twenty-Ninth St.; cost, \$6,000.

H. A. Hanson, two-sty brick dwell, 22 1/2' x 51', Evergreen Ave., near Milwaukee; cost, \$3,700.

G. Cadwell, 2 two-sty brick dwells, 21 1/2' x 48', Western Ave.; cost, \$4,400.

Ed. C. Howard, 2 two-sty brick dwells, 20 1/2' x 42', 939 and 941 Warren Ave.; cost, \$5,000.

D. K. Pearsons, two-sty brick dwell, 14 1/2' x 48', Clark St. and Burton Pl.; cost, \$2,700.

John Smith, two-sty brick dwell, 23' x 50', 3539 Fifth Ave.

H. Pecke, two-sty brick dwell, 22' x 51', Clark St. and Fullerton Ave.; cost, \$2,200.

C. L. Garner, two-sty brick dwell, 22' x 51', Clark St. and Fullerton Ave.; cost, \$2,200.

F. Paekow, two-sty brick store and dwell, 25' x 72', State St., cor. Thirty-Ninth; cost, \$4,000.

John W. Polley, two-sty brick dwell, 39' x 44', Park Ave., near Paulina St.; cost, \$10,000.

J. W. Storch, two-sty brick dwell, 22' x 44', 4 De Puyser St.; cost, \$2,440.

G. Bessey, two-sty brick factory, 54' x 95', Ashland Ave., near Leavitt St.; cost, \$2,500.

J. McCarthy, two-sty brick dwell, 20' x 44', May St., cor. Good; cost, \$2,100.

Clement & Sons, three-sty brick stores and dwells, 172' x 80', State St., near Fourteenth; cost, \$25,000.

A. E. and S. F. Kent, 4 three-sty brick stores and dwells, 84' x 90', 429 to 435 Clark St.; cost, \$24,000.

R. W. Windsor, three-sty brick store and dwell, 24' x 78', Wabash Ave., cor. Thirty-First St.; cost, \$9,000.

Miss — Fitzpatrick, two-sty brick dwell, 44' x 45', Dearborn St., near Thirty-Sixth St.; cost, \$4,000.

John Felke, two-sty brick dwell, 21' x 54', 582 Larrabee St.; cost, \$3,900.

J. H. P. Dodge, four-sty brick stores and dwells, 50' x 70', Clark St., near Indiana; cost, \$20,000.

F. Husehke, two-sty brick dwell, 21' x 46', 181 Orchard St.; cost, \$2,000.

Same, three-sty brick addition, 21' x 51', 381 Wells St.; cost, \$3,000.

C. C. Chandler, two-sty brick dwell, 22' x 50', 3349 Wabash Ave.; cost, \$2,800.

C. Zuber, three-sty brick store and dwell, 25' x 80', 717 Halsted St.; cost, \$6,500.

J. Swan, two-sty brick dwell, 25' x 80', 3184 Michigan Ave.; cost, \$10,000.

Wm. Herring, two-sty brick store and dwell, 22' x 66', 3252 Halsted St.; cost, \$3,800.

City, three-sty brick school-house, 84' x 84', Kedzie Ave. and Walnut St.; cost, \$35,000.

Cincinnati.

BUILDING PERMITS. — During the month of July and since our last report the following building permits have been issued: —

Rothert & Hischer, three-sty brick; cost, \$3,000.

J. N. Fernstein, three-sty brick; cost, \$3,200.

J. Blaize, brick stable; cost, \$2,000.

Rebiaco & Co., brick foundry; cost, \$2,400.

Louis Burkhardt, two-sty frame; cost, \$4,000.

John Hauck, two-sty stone-front; cost, \$5,000.

H. S. Malsack, three-sty brick; cost, \$4,000.

D. H. Lehnkering, two-sty brick; cost, \$3,000.

H. Linderman, two-sty brick; cost, \$3,000.

F. C. Miller, four-sty brick; cost, \$10,000.

Marmet & Co., elevator; cost, \$6,000.

W. Thein, three-sty brick; cost, \$5,000.

New depot for Pittsburg, Cincinnati & St. Louis R. R.; cost, \$61,900.

John A. Johnson, two-sty brick; cost, \$3,000.

John Rolfs, double two-sty frame; cost, \$5,000.

Gambirinus Stock Co., addition to brewery; cost, \$13,000.

Cincinnati Brass Works, four-sty brick; cost, \$15,000.

S. C. Foster, four-sty, stone-front; cost, \$3,500.

Dr. B. Agin, three-sty brick; cost, \$1,100.

Fred Albers, three-sty brick; cost, \$3,500.

German Methodist church; cost, \$13,000.

John Steinkamp, three-sty brick; cost, \$2,500.

Lewis Diener, three-sty brick; cost, \$5,100.

J. B. Bobe, 3 three-sty brick; cost, \$8,000.

J. B. B. be, 2 three-sty brick; cost, \$5,100.

A. E. Heighway, four-sty stone-front; cost, \$6,000.

J. H. Wehrman, two-sty brick; cost, \$3,000.

Wm. Asteaford, three-sty brick; cost, \$4,700.

Zuanein & Cunningham, four-sty brick; cost, \$5,000.

Henry Hamberg, two-sty brick; cost, \$3,000.

W. H. Parkham, 1 two-sty brick; cost, \$1,000.

Fred Schmidt, two-sty brick; cost, \$3,500.

George Steinkamp, three-sty brick; cost, \$5,000.

Permits for repairs, 41; total cost, \$33,200.

Total number of permits for the month, 76.

Total cost for the month, \$272,900.

Total permits to date, 437.

Total cost to date, \$1,119,280.

Milwaukee.

The following building permits have been issued by the Board of Public Works for the month of July: —

R. P. Riesen, brick store; cost, \$5,000.

Carl Busach, brick store; cost, \$7,000.

Paul Vogt, brick store; cost, \$5,000.

Aug. Tobbert, brick store; cost, \$12,000.

L. F. Denoyer, addition to brick store; cost, \$1,000.

Hausringhausen, addition to Best's Brewing Co.; cost, \$15,000.

L. Souner, brick church; cost, \$6,000.

Quinn & Trainer, Marquette College building; cost, \$23,000.

W. P. Taylor, block of four brick dwells; cost, \$29,000.

Wm. Kasten, brick dwell; cost, \$2,000.

N. Ludwig, brick dwell; cost, \$3,500.

P. Straub, brick cased dwell; cost, \$2,500.

Mrs. Bachler, frame dwell; cost, \$2,500.

F. Struve, frame dwell; cost, \$2,500.

C. Kratz, 2 frame dwells; cost, \$6,000.

Duchow & Riepenhager, frame dwell; cost, \$5,000.

L. Vogel, frame dwell; cost, \$2,500.

J. J. Diehrich, frame dwell; cost, \$3,000.

Theo. Schanefeld, frame dwell; cost, \$2,500.

Aug. Tobbert, frame dwell; cost, \$2,400.

A. Bate, frame warehouse; cost, \$3,500.

The above list shows quite a movement in the building business in the past month. Through the month of June it looked very dull, but a slight decline in the price of materials seems to have given confidence to real estate owners that it will pay to build. All mechanics are well employed, and the prospect of their being so through the remainder of the building season is very promising.

New York.

BUILDING PERMITS. — *Fifth St.*, 1 three-sty brick stable, 25' x 96'; cost, \$7,000; owner, R. E. Dietz, 51 and 56 Fulton St.; architects, Thom & Wilson, 1238 Broadway; mason, B. Spaulding, 527 Lexington Ave.; carpenter, S. McMillan, 245 West Forty-Sixth St.

East Thirtieth St., rear No. 711 to 721, 1 two-sty brick workshop, 122' x 25'; cost, \$2,840; lessees, American Manufacturing Co., 711 to 721 East Thirtieth St.; architect, Wm. J. Fryer, Jr., 104 Goerck St.; builders, A. A. Andrus & Son, 415 West Twenty-Third St.

Fourteenth St., 1 three-sty brick fire-engine house, 25' x 103' 3"; cost, \$13,500; owner, City of New York; architect, N. Le Brun, 24 Park Pl.; contractor, John McGuire, 236 East Thirty-Seventh St.

One Hundred and Twenty-Third St., 4 four-sty brick tenements, 25' x 60'; owner, A. Yost, 234 Second Ave.

Fifty-Fifth St., 1 three-sty brick stable and riding ring, size of stable, 101' x 55'; ring, 101' x 125'; cost, \$30,000; owner, A. H. Barney, 82 Broadway; architects, Potter & Robertson, 52 William St.; mason, L. N. Crow, 2 West Fifty-Third St.

One Hundred and Sixty-Ninth St., 1 three-sty frame tenement, 30' x 50'; cost, \$5,000; owner, Jacob Stahl, Franklin Ave., near One Hundred and Sixty-Ninth St.; architect, Julius Kastner, 1532 Third Ave.

Second Ave., cor. One Hundred and Tenth St., 5 four-sty brick stores and tenements, 25' x 50'; cost, each, \$9,500; owner, E. M. Meehan, 131 East One Hundred and Ninth St.; builder, Hugh Meehan, 131 East One Hundred and Ninth St.

NOTE. — No permits granted up to 4 P. M., August 10th, by new department.

ALTERATIONS. — *East Twentieth St.*, No. 49, raised one sty; cost, \$1,500; owner, Daniel Huntington, on premises; builder, George Mulligan.

East Fifty-Fourth St., No. 59, three-sty brick extension, 15' x 23'; owner, L. V. Sone; architect, R. W. Buckley.

Twenty-Third St., one-sty brick extension, 30' 10" x 68'; cost, \$1,500; owner, architect and builder, Twenty-Third St. R. R. Co., 621 West Twenty-Third St.

East Thirty-Second St., No. 128, front and interior alterations; cost, \$1,500; owner, R. Hoe, Jr., 31 Gold St.; carpenter, B. Hockinn; mason, Geo. Vassar.

East Thirtieth St., No. 527, raised one sty; cost, \$1,500; owner, J. Fagan, on premises; architect, Julius Boeckel; builder, Jno. Fish.

West Fifty-First St., No. 49, two-sty brick extension, 9' x 19', tin roof; cost, \$2,500; owner, J. H. Rhines, on premises; architects, Cauvet & Rosentstock; builder, Wm. Armstrong.

FULTON MARKET. — The Sinking Fund Commissioners held a meeting yesterday afternoon to take action upon the present condition of Fulton Market. It

was decided to refer the matter of repairs or a new structure to the Inspector of Buildings, with instructions to report before the next meeting.

BARNUM'S MUSEUM.—Proposals for removing the old building on Madison Square Garden, and excavating for the foundations of the new Museum, have been solicited by Barnum's Museum Company, but the competition for designs has not yet been invited. Some plans have, however, been voluntarily submitted.

HOTELS.—On Seventy-Third St., between Ninth and Tenth Aves., 4 brown-stone houses are to be built. Mr. H. J. Hardenbergh is the architect.

INFIRMARY.—For Trinity Church, on Varick St., a brick infirmary is to be built, from designs of Mr. Chas. C. Haigh.

WAREHOUSE.—The Hudson River Railroad is to have a warehouse, about 200 feet square, built on Twelfth Ave., between Fifty-Ninth and Sixtieth Sts.

St. Louis.

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

OWNERS NAME.	USE.	Stile.	Cost.
V. Hormann,	Dwell.	2 8	\$4,000.
Chas. Weber,	Dwell.	3 25	7,000.
M. Flesch,	Dwell.	3 8	4,000.
B. W. Lewis,	Dwell.	3 10	7,000.
Wm. S. Pope,	Dwell.	3 16	15,000.
Chas. Bosse,	Dwell.	3 10	5,000.
Mrs. C. Schwap,	Dwell.	2 8	4,000.
W. L. & J. Hughes,	Dwell.	3 10	5,700.
W. L. & J. Hughes,	Dwell.	3 10	5,700.
W. L. & J. Hughes,	Dwell.	3 10	5,700.
C. L. Stuever,	Dwell.	3 8	5,000.
G. Zimmerer,	Dwell.	2 6	3,000.
G. Zimmerer,	Dwell.	2 6	3,000.
G. Zimmerer,	Dwell.	2 6	3,000.
G. Zimmerer,	Dwell.	2 6	3,000.
Chas. Todd,	Stores.	2 8	9,000.
S. Gaty,	Stores.	2 2	6,300.
City of St. Louis,	Engine House.	2 2	4,600.

General Notes.

HOLYOKE, MASS.—Mayor Ruddy is about to build a block on Lyman St., of brick, with marble finish; to be stores on first floor, and tenements above.

Messrs. Moore & Ives are to build a large tenement block on High St., of brick, with Sutherland Falls marble finish; Cain & Kilburn, architects.

KANSAS CITY, MO.—The following building permits have been issued:

J. Boyd Henri, Madison Ave., brick building; cost, \$2,500.
 F. Howard, No. 1056 Union Ave., brick store; cost, \$2,500.
 J. Kellogg, 1058 Union Ave., brick store; cost, \$3,500.
 F. R. Holman, Harrison St., 14 wooden dwells.; total cost, \$2,500.
 Drennon, Werk & Brunback, West Fifth St., brick addition to hotel; cost, \$5,000.
 L. H. Waters, Independence Ave., brick dwelling; cost, \$3,100.

Publishers' Department.

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New Advertisements.

E. THIELE (New York), Portland Cement. Page ix.
 T. M. CLARK (Glens Falls, N. Y.), Brick. Page 83.
 JAMES R. OSGOOD & CO. (Boston), Bound Volumes of the American Architect. Page iv.
 A. C. ELLITHORPE (New York), Air-Cushion. Page i.
 J. G. WILSON (New York), Venetian Blinds. xii.
 BERRY BROS. (Detroit, Mich.), Hard Oil Finish. Page ix.

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PROPOSALS.

ASYLUM.

[On Blackwell's Island, N. Y.]
 DEPARTMENT OF PUBLIC CHARITIES AND CORRECTION, No. 66 THIRD AVE.

NEW YORK, August 7, 1880.

Sealed bids or estimates for alterations and additions to the retreat building at the Lunatic Asylum, Blackwell's Island, will be received at the office of the Department of Public Charities and Correction, in the city of New York, until 9 o'clock, A. M., of Friday, the 20th day of August, at which place and time the bids or estimates received will be publicly opened by the head of said Department and read, and the awards of the contracts will be made as soon thereafter as practicable.

The form of the agreement, including specifications, and showing the manner of payment for the work, will be furnished at the office of the Department.

For further information see City Record.

TOWNSEND COX,
 THOMAS S. BRENNAN,
 JACOB HESS,

Commissioners of the Department of Public Charities and Correction.

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JAIL-YARD WALL, ETC.

[At Brooklyn, N. Y.]
 Sealed proposals are solicited and will be received by the undersigned committee at the office of the Clerk of the Board of Supervisors, Room 10, County Court-House, until 3 o'clock, P. M., of Tuesday, the 17th day of August, 1880, for furnishing the materials and labor necessary for the erection of wall around County Jail property, and for removal of Morgue from present location to northeast corner of said property, and for grading, etc., in accordance with plans and specifications for the same, which plans, etc., can be seen at the office of Wm. H. Muntell, architect, Phoenix Building, Court St., or at the office of the said clerk.

Blank forms of proposals can be procured at the office of the said clerk. No other form of proposal will be received. Each proposal must be accompanied with a certified check, payable to the order of E. B. Cadley, clerk, etc., (or cash) for an amount equal to ten per cent. of the bid price, as a guarantee of the good faith of the bidder, the county reserving the right to reject any or all bids. By order of the Board of Supervisors of Kings County.

JOHN H. DOSCHER,
 PETER L. WILLIAMSON,
 C. C. BENNETT,
 ALEXANDER WALKER,
 EDWARD EGOLF,

Committee on Jail.

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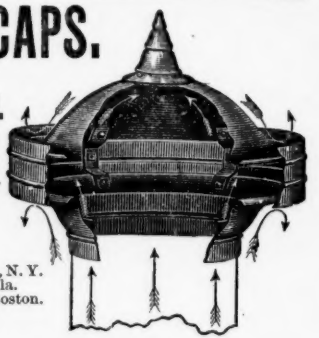
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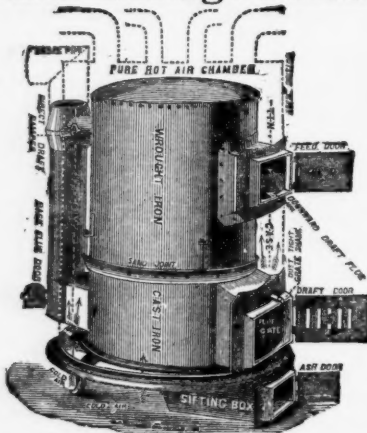
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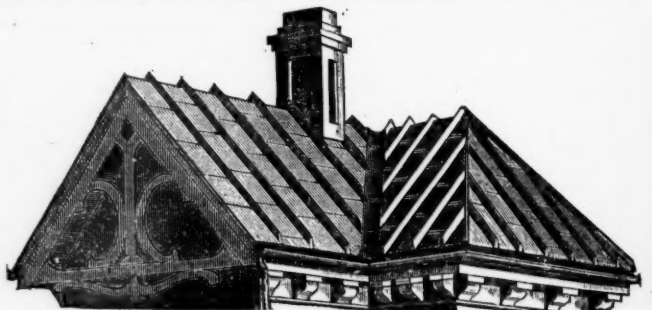
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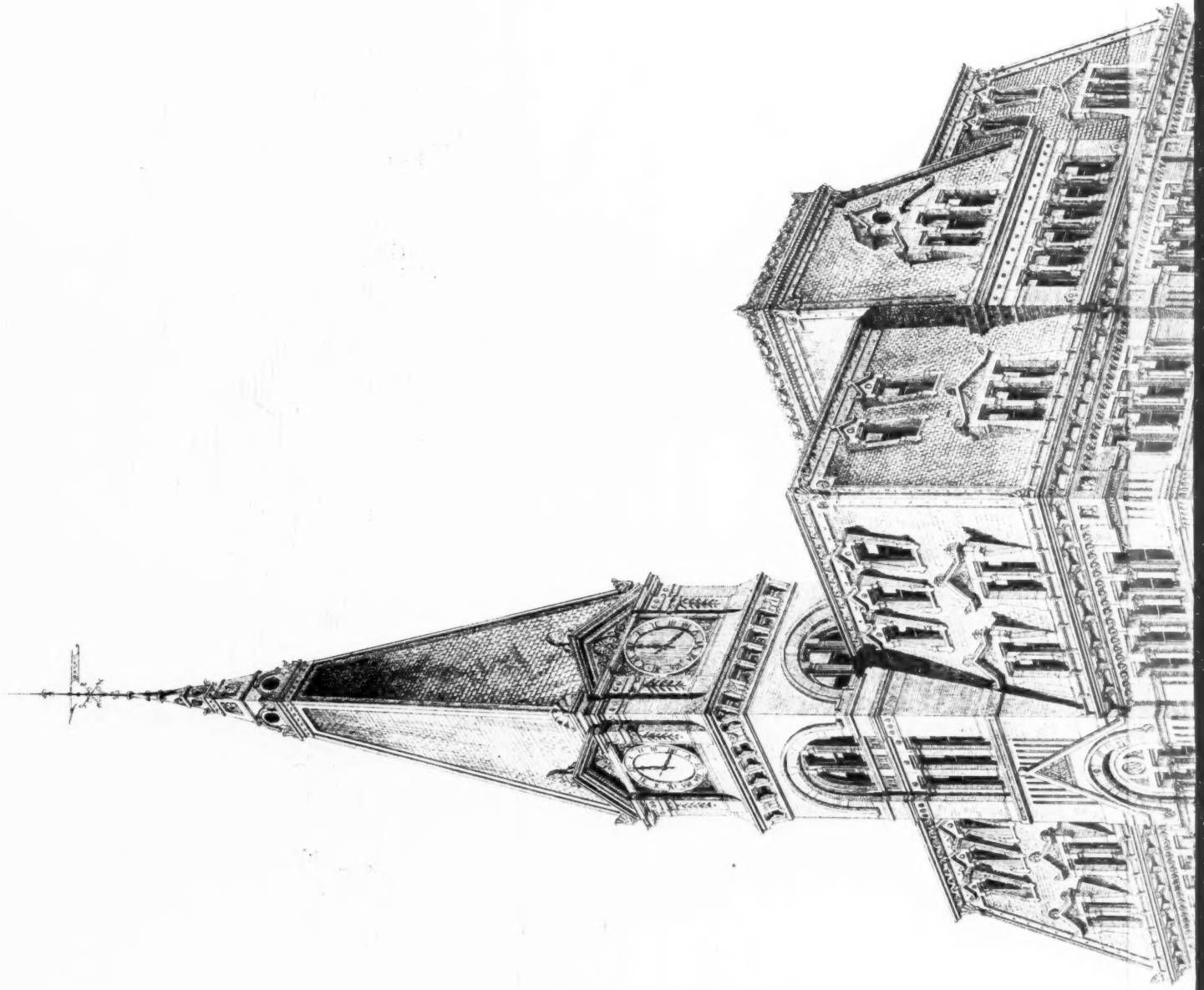
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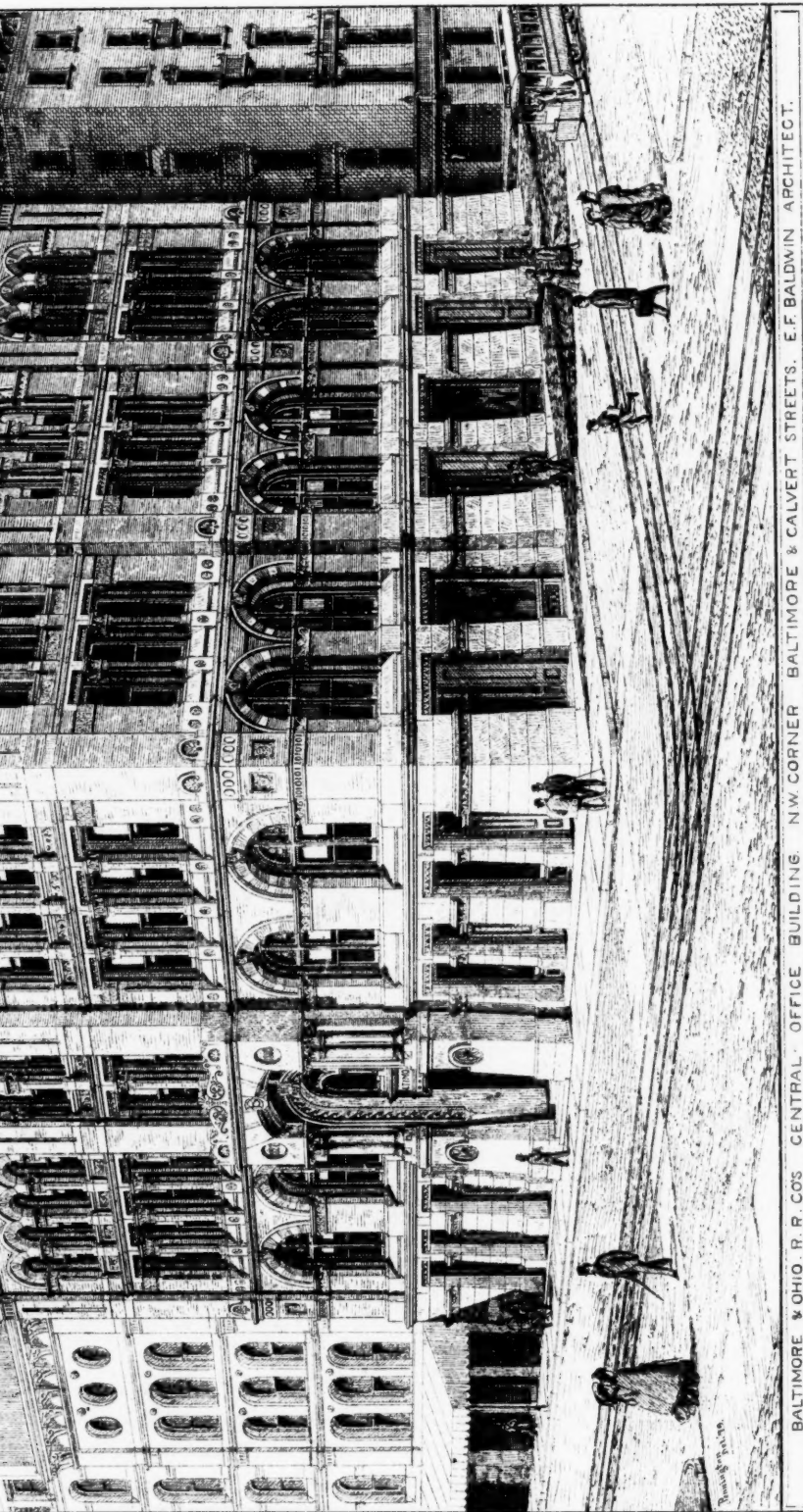


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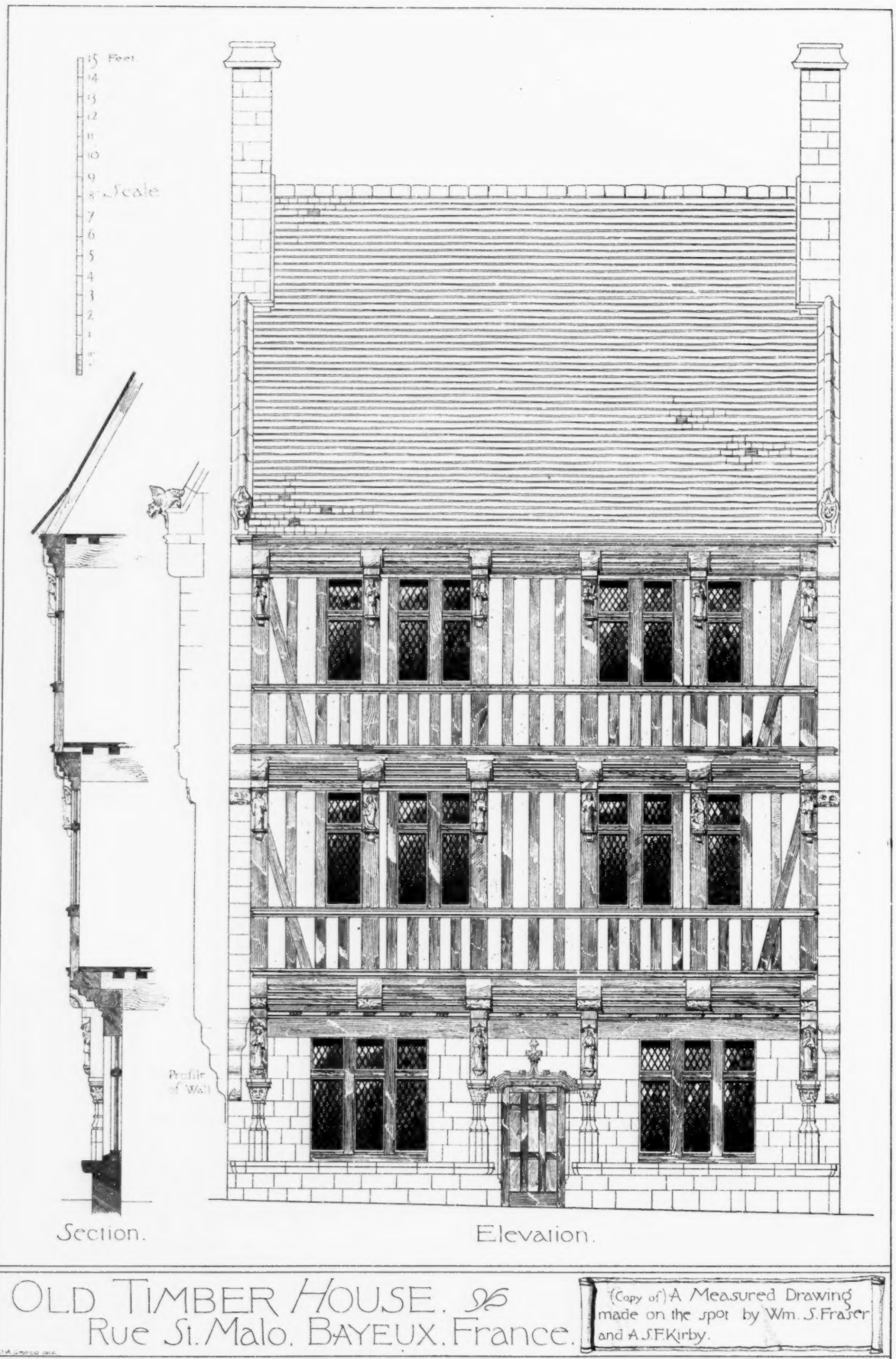






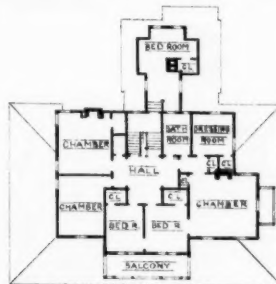
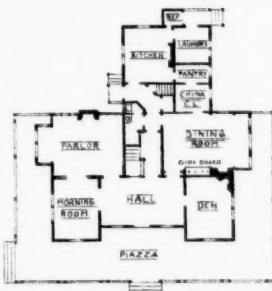
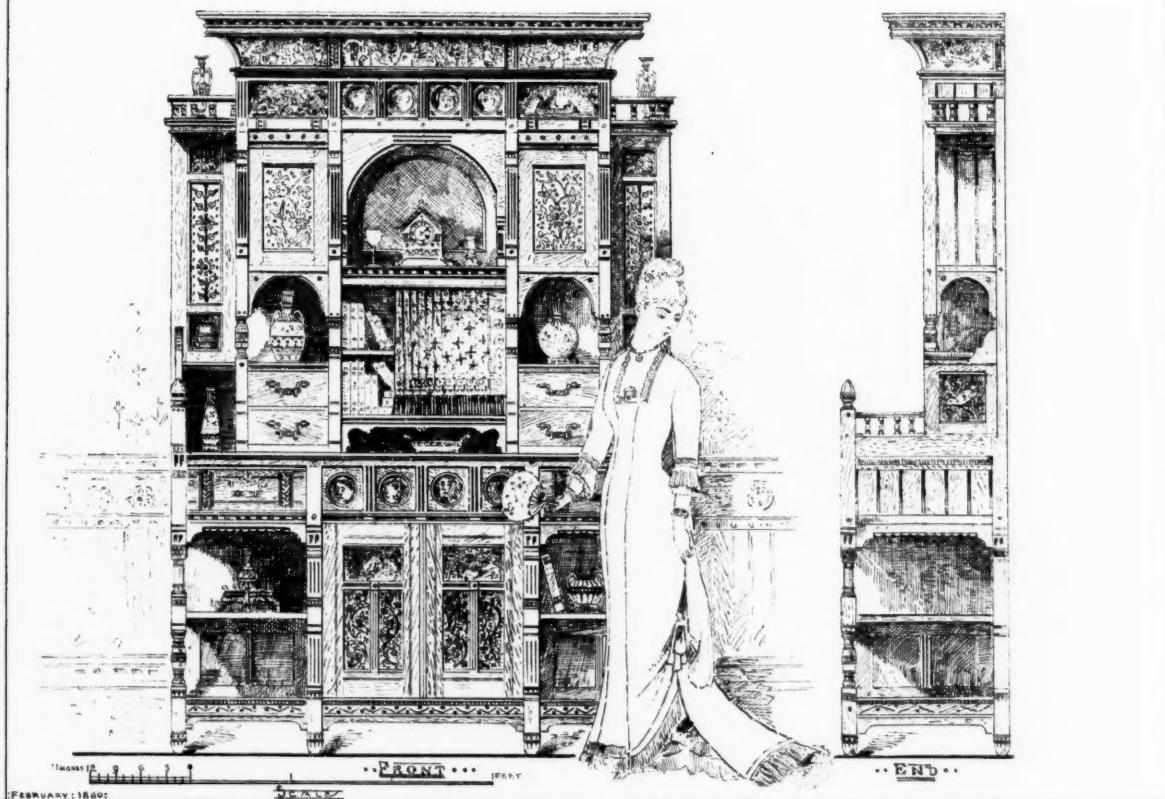
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