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A MONUMENT is to be erected in Boston to the memory of Colonel Robert G. Shaw, the earliest commander of colored troops during the civil war, who was killed in his first engagement, the desperate assault upon Fort Wagner. The committee appointed to take charge of the matter have been wise enough to commission Mr. Auguste St. Gaudens to execute the memorial, which will be of a very unpretending though original design. As shown in Mr. St. Gaudens's sketches, the figure of Colonel Shaw, in high relief, is to occupy a panel inserted in a vertical tablet of stone which forms the back of a small exèdre. On either side will be accessory panels, representing scenes in the life of the hero; the whole of the sculpture to be executed in bronze. The site of the monument is not yet definitely fixed, but an application has been made to the Governor and Legislature of Massachusetts for permission to place it upon the State-House grounds, and this will probably be granted. We trust that the preliminaries will be as brief as possible, so that there may be no delay in adding to the artistic attractions of Boston an important work by a sculptor so brilliant and original as Mr. St. Gaudens. Nor can we refrain from hoping that Mr. Stanford White, who was associated with Mr. St. Gaudens in the design of the Farragut monument, may also have some hand in the Boston memorial. Open to criticism as the base of the Farragut statue undoubtedly is, it surpasses a hundred-fold in interest any ordinary structure of the kind with which we are acquainted, and we should be quite willing to endure another moderate shock to our ideas of classical propriety for the sake of the enjoyment to be derived from the contemplation of a work even half as successful in design as that which adorns Madison Square.

THE great competition for the national monument to King Victor Emmanuel of Italy has been decided by the award of the first prize, of fifty thousand francs, to M. Henri Ménot, a pensioner of the French Academy. The second prize, of thirty thousand francs, was given to Signori Ferrari and Tiacentini, and the third, of twenty thousand, to Professor Stefano Galletti. Whether either of the prize designs will be carried out is, however, doubtful. According to the correspondent of the *Builder*, out of the three hundred designs submitted those shown by drawings were, as a rule, superior to the ones represented by models, indicating, as he thinks, either that the best sculptors kept out of the contest, or that the resources of architecture are greater than those of sculpture in dealing with such a problem. A considerable proportion of the designs are for triumphal arches, more or less amplified with colonnades; several of them including in the scheme the remains of the ancient semi-circular wall of the theatre belonging to the Baths of Diocletian, which is cut through the middle by the new Via Nazionale, and is made to serve as the background for a curved colonnade, or portico, leading up from each side to the central arch, which spans the street. Some of the plans, as usually happens in such cases, are principally remarkable for their ingenious impracticability. One of these, shown by a large model, represents a huge column with cap and base, very similar in outline to that of Trajan, but with the important difference that the shaft consists of a thin shell of glass sashes, enclosing a spiral staircase which winds around a richly-sculptured newel in the centre; while another, presented by an artist of too towering a genius to submit to ordinary limitations of circumstances, proposes the diversion of the course of the Tiber through the territory now occupied by the Borgo and the Castle of Sant' Angelo, in order to furnish it with a suitable site on the river's bed. Among the sharp criticisms which many of the designs receive, it is pleasant to find indications that the project of our compatriot, Mr. Henry L. Gay, of Chicago, excited marked attention. The *Deutsche Bauzeitung*, which gives brief but effective notices of the more important designs, devotes a considerable space to this, illustrating it with a sketch plan and section, and characterizing it as an original and interesting design, though in a style which would seem very strange in Rome.

THE *Sanitary Engineer* contains a letter from a practical plumber, which is full of interest for those careless or uninstructed plumbers, architects, or amateurs who still continue to countenance the dangerous practice of using chimney-flues as conduits for the foul vapors of vaults or drains. According to this correspondent, a soil-pipe in a large Western hotel was carried into a flue of a chimney which was constantly warm. There could hardly be much question that an ascending current of greater or less force would be constantly maintained in such a flue, so long as the supply of air was kept up from the soil-pipe, but in spite of this the foul gases diffused themselves so rapidly through the brickwork into the rooms adjoining the chimney as to cause a deep stain in the plastering, and to render it "as soft as putty." In addition to this, as the letter says, "the stench created was terrible." What could have caused the softening of the plaster we do not quite understand, unless perhaps some oxidation of the ammonia from the pipe into nitric acid may have taken place in the pores of the mortar; but we can fully comprehend the discoloration and the stench, which were only the natural result of the arrangement. The writer adds that "the soil-pipe has since been run through the chimney and about six inches above it. There has been no trouble since." We hope that besides this all the plaster over the flue, if not the whole of the enclosing brickwork, has been removed and replaced with fresh material. If this has not been done, we can assure all whom the information may concern that the rooms through which the flue passes will for a long time be dangerous to their occupants. The organic filth with which the bricks and mortar are saturated will, notwithstanding the cutting off of further supplies, and the cessation of "trouble," continue for many months, or even years, in a state of what may be called malignant decomposition, pouring volumes of virulent though subtle poison into the air. Disinfection, as ordinarily practised, can do little toward purifying walls so corrupted: nothing short of complete extirpation of the materials exposed and the substitution of new can give any real security.

A SINGULAR but not unprecedented accident recently caused the death of four children in Glasgow, Scotland, by crushing them under the weight of a falling roof of a shed which sheltered one side of the school-yard where they were playing. This shed was built up against the high party-wall of a neighboring house, but was entirely open on the side toward the yard, the roof being sustained by cast-iron columns five inches in diameter and about nine feet high. There were five columns in the length of the building, — ninety feet, — making their distances from centre to centre fifteen feet, and the roof which they supported was of double-pitched form, thirteen and a half feet in span, and the same in height at the centre. To sustain the back of the roof, and at the same time to tie it to the building behind, iron beams extended from each column to the party-wall, into which they were inserted three or four inches, but apparently not anchored in any way. Without any special occasion, so far as can be ascertained, the whole shed fell forward, breaking off three of the pillars, and letting the roof down upon the ground. There seems to be no reason to doubt that the insufficiency of the anchorage to the wall behind was the true cause of the accident, and it cannot be too strongly impressed upon the minds of young architects that any supporting structure, whether a wall or a range of columns, is under very different conditions of

stability when extended through a considerable distance from those which exist when the length is only a few feet, and that thorough bracing, tying or buttressing will be needed at least as often as once in twenty-five feet for every wall, or substitute for a wall, to keep it long in place. A large proportion of our worst building accidents occur from want of precaution in this matter, and as the size of our structures increases they will grow more and more frequent unless the conditions to be provided for are well understood.

A suggestion is made in *Le Génie Civil*, which may prove of considerable value in this country, by M. J. Garnier, a metallurgist of distinction, who proposes to apply the processes now universally in use for the refining of iron and steel to the purification of copper, which is produced from certain ores with a considerable admixture of iron, arsenic, sulphur, and antimony, from which it must be freed by long and repeated meltings, to oxidize the foreign elements and permit their separation in the form of scoriæ. These processes usually take place in a furnace lined with firebrick, as was the case with iron until within a few years, but as the substitution of an alkaline lining of lime or calcined dolomite has revolutionized the iron manufacture by the means which it affords for attracting and removing the phosphorus which forms the most injurious impurity in that metal, Mr. Garnier considers it more than probable that a similar basic lining to the furnaces used for refining copper might serve to attract and remove the arsenic and antimony, which resemble phosphorus in many of their reactions, in the form of arseniates and antimoniates of iron and lime. Little or no change beyond the application of a fresh lining at each operation would need to be made in the furnaces for the application of this process, and the disengagement and passage through the liquid copper of bubbles of carbonic acid from the lining would assist much in stirring up the mass and hastening the refining process. Anything which may tend to reduce the cost and extend the use of copper is of much interest to architects, who are compelled to resort to that metal for all their work of certain kinds which is intended to be of extraordinary durability or artistic value. We can hardly imagine a discovery of greater importance to the art of building than one which would make it practicable to substitute this beautiful, ductile, and indestructible metal for the perishable painted or galvanized iron, tin-plate, and zinc, or the unmanageable lead, which it is now necessary to use for roofing and similar purposes.

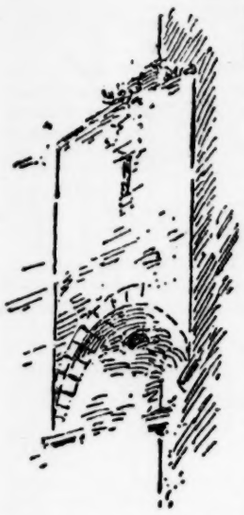
At a recent meeting of the Berlin Society of Architects some interesting remarks were made upon the causes of the black and green incrustations which time brings out upon bronze statues. It has often been observed that the atmosphere of modern cities is very unfavorable to bronze, giving it a dirty black color instead of the beautiful green patina which characterizes the ancient statues of the same metal. A committee of the Industrial Union recently undertook the investigation of the matter, and among other things noticed that a certain statue, that called the Alten Fritz, in Berlin, was entirely covered with a black coating, while a bronze cannon which stood in front of the arsenal near by was of a beautiful green color. As these two must have been subjected to the same atmospheric influence, it seemed very reasonable to suppose that the composition of the alloy might have been the essential condition in determining the black or green color of the patina, and an analysis was made, which showed that while the cannon was composed, like all of the so-called brass ordnance, of about nine parts copper to one of tin, the statue contained a considerable proportion of zinc. This is usually the case with modern bronze statuary, the substitution of zinc for tin in the alloy giving certain desirable qualities of fusibility, while the antique works have a composition very nearly similar to that of gun-metal; zinc, which was unknown in Europe until the seventeenth century, being of course absent from the mixture. These indications that the substitution of zinc for tin is the true cause of the inferior color of modern bronzes were supported by the results of an experiment, in which several bronze alloys were subjected to the action of a solution of copper. It was found that under this treatment a composition of copper and tin alone acquired a green coating, while those containing zinc were blackened to a greater or less degree, in proportion to the amount of zinc in the composition. To architects this investigation is of more interest than might appear at the first glance. Many of them, it is true, have occasion at times to direct works of sculpture in bronze, and it is certainly desirable to know the means of obtaining that rich green coloration of the antique statues, which so many attempts have been made in modern times to imitate; but a much larger number are likely to be able to control the manufacture of bronze hardware, the value of which would be greatly increased if it could be used in its natural state, without any of the artificial coloring which so much of it receives, and with the certainty that age and use would only increase its beauty.

An ingenious application of the microphone has, according to the *Scientific American*, been made by Count Hugo von Engenberg in the Tyrol, in tracing the course of underground springs. It is said that savages are able to hear the trickling of streams beneath the surface, and Count von Engenberg, following out this idea, buries a number of microphones in the ground in the locality where springs would be most likely to occur, connecting each with a separate telephone. At night, when other sounds are hushed, he listens at the telephones, and can easily detect the murmur of running water even at a considerable depth.

A rather harsh decision has recently been made in the English courts regarding the validity of an agreement with a corporate body not attested by the corporation seal. It appears that some four years ago the Corporation of the town of Leamington made a contract under seal with one Powis, an engineer and general contractor, to execute works for supplying the town with water, according to specifications and plans furnished, and under certain conditions. One of these conditions was the usual one that if the contractor failed to proceed with due diligence and expedition, the town surveyor might, after twenty-four hours' notice, take possession of the premises, including the tools and materials on the ground, and employ other men and materials sufficient to finish the work, deducting the cost from the amount to be paid to the contractor. After two years' progress the surveyor reported that matters were not going on to his satisfaction, and was instructed by the Corporation to take possession of the work as the contract provided. This was accordingly done, and the surveyor then invited bids for the completion of Powis's contract, and awarded the work to Young & Company, another firm of contracting engineers, executing a written agreement with them, as he was authorized by the Corporation to do. They completed the undertaking to the satisfaction of the engineer, and carried out also a considerable amount of additional work under his direction. For a time their money was regularly paid to them on the surveyor's certificate, but after the whole was done, their final account for the balance due was rejected. They brought suit for the amount, about seven thousand pounds, and were resisted by the Corporation on several pretexts, but chiefly on the ground that their employment was not under the corporate seal. The result of the first trial was in their favor, but the award was ordered to be made by an arbitrator, who came to the Court for instructions as to whether the absence of the seal would be fatal to the right of the plaintiffs to recover their claim. After two appeals the case came before the highest tribunal, which decided unanimously that to enforce a contract made without the seal of the Corporation would be in effect repealing the Act of Parliament which provides, for good reasons, that no agreement of a corporate body shall be valid without the common seal, and that, therefore, however great might be the apparent hardship to the plaintiffs, the want of the seal on their contract must prevent them from recovering their money. Several previous cases have resulted in the same way, and it would seem as if English contractors might have learned by hard experience the necessity of making sure that such formalities were complied with.

One of the questions most frequently asked in respect of professional practice is answered in *La Semaine* according to the French custom. Some individual, apparently a manufacturer, writes to inquire whether he has not a right to the original drawings and specifications of a building which he has just had constructed for him, and if the architect refuses to give them up, whether he is not entitled to keep back a part of his commission. To this *La Semaine* replies that "the architect is bound to deliver up to his client a copy of the plans and specifications; but that these documents are usually furnished at the beginning of the work, for the assistance of the client in discussing and fixing the details of arrangement and construction, and if these are mislaid or thrown aside, he is not required to furnish a second set."

PENDENTIVES.



A PENDENTIVE is a device for bridging over or filling up the internal angle formed by two walls, so that a square space may be covered, I., by an octagonal vault or spire; or II., by a dome.

I. The object here is to get from a point in the angle to a straight line, drawn horizontally from one wall to the other, perpendicular to the line that bisects the angle.

Figure 1 (See illustrations) shows the simplest possible method, which is to lay a slab of stone or several lintels across. It is limited by the practical size of the stone, and therefore does not occur on any large scale.

Figure 2 exhibits the method by corbelling out. It may be used on any scale, but if large is apt to look clumsy; it is common as the starting of the oblique sides of octagonal spires in English churches.

Figure 3 shows a bracket or series of corbels in the angle, carrying slabs or lintels. It is a form quite practicable, and an improvement both in appearance and available size on No. 1; but we have met with no example of it.

Figure 4. Here the angle is filled up with an inverted triangular pyramid. In construction it is really corbelling, as the bed-joints are horizontal. It is common in England as the support of the oblique side of a spire, the faces of both often being in the same plane. An early example occurs in Syria, at Latakiah. (See Vogué's "Syrie Centrale," Volume I, page 76.)

Figure 5. The surface in this form is cylindrical. The bed-joints are probably always horizontal. If they were in planes radiating from a common axis, thus making the pendentive a part of a barrel vault, the structure might be self-sustaining if the arc were not more than 30 degrees; but it would be ill-adapted for carrying a heavy load. The form is a graceful variation of No. 4, and may be described as one-quarter of an inverted, square-based, concave pyramidoid. Examples occur at Spoleto; San Ambrogio, Milan; St. Michele, Pavia; and St. Front, Perigueux. (See Hubsch, "Monuments de l'Architecture Chrétienne.")

Figure 6. This and the two following show the method by arching across. Such forms are known as "squinches." Figure 6 is from St. Nazaire, Milan.

Figure 7 is very common in English Gothic towers carrying spires.

Figure 8 is from a church at Bougival, France, of the XIIIth century. There is a window at the base of each oblique side of the spire. (See Baudot, "Eglises de Bourgs et Villages," Volume II.)

Figure 9. Here a conical vault is employed. A plan, elevation and section are given. Examples are very numerous in French Romanesque and Early Gothic, as at Château-Neuf, Cogniat, St. Menoux, Limay, etc. (See Baudot and Viollet-le-Duc's "Dictionnaire.) The form is commonly known as a "trumpet." (French, *trompillon.*)

Figure 10 is a practicable form, but we have noted no example of it. It consists of a bracket supporting two oblique trumpets.

Figure 11 is also conical. An example occurs at Freiburg.

Figure 12 is a form which at the spring is conical, but as it rises passes into a half-dome, the curve on a vertical section through the centre being an arc of 90 degrees. It is common in France, as at Montbron, Traey-le-ral, Feucherolles, Château-Neuf, etc. (See Baudot and Viollet-le-Duc, Volume III, art. "*Clocher,*" and IV, art. "*Coupole.*")

Figure 13. This is a fan-shaped pendentive, from Limburg Abbey. This form, starting usually from a point is quite common in France.

Figure 14 is a half-dome. St. Julia, Brescia.

Figure 15 is from the cathedral at Worms. The upper part of this is a half-dome. The awkward horizontal angles at the spring of No. 14 are here cut away, and the surface of the dome is connected with the arches by a spheroidal surface. It is a very elegant form, and in the case named serves as a niche for a statue which is supported by a corbel just above the spring of the arches. Both this form and the preceding one, however, are open to the objection that they cut away part of the walls.

II. The object in the second class of pendentives is to get from a point in the angle to an arc of a circle, usually of 90 degrees.

In some cases an octagon is first produced, and the lower ring of the dome is set directly on this. In the church of St. Nicodemus, at Athens, of the Xth century, a conical vault is used extended beyond the line of an octagon to the quarter-circumference of the circle.

Figure 16 illustrates a method common in the Hauran, according to de Vogüé, in the IIId century. Slabs are employed or several lintels to produce an octagon, which is reduced again by lintels across its angles, to a polygon of sixteen sides, and this again to one of thirty-two. The last is sufficiently near to a circle to receive the lower ring of the dome.

Figure 17 is a method used in a tomb at Old Delhi, India. An octagon is produced by squinches, corbels are set in the angles and the first ring of the dome is set on these and the walls, leaving portions of its bed to overhang.

Figure 18 represents the spherical or Byzantine pendentive. Its surface is a portion of that of a hemisphere whose diameter is the diagonal of the square to be covered. It is produced by intersecting such a hemisphere by semi-cylindrical barrel-vaults, whose diameter is that of the square, and then cutting off the top of the hemisphere by a horizontal plane at the level of the ridges of the vaults. The upper line of each pendentive is, on the horizontal projection, an arc of 90 degrees, and the four pendentives thus form a ring on which the final dome rests. In the Byzantine examples, the space to be covered being square, the dome that furnishes the pendentives is intersected by four equal barrel-vaults. In theory it may be intersected by any number, equal or unequal, so that a space of any form may be covered by a dome supported on spherical pendentives. At Planes, in France, there are three, the space being triangular; but, as the vaults are not as wide as the sides of the triangle, the space is first reduced by trumpets to an irregular hexagon, and the pendentives start from a straight line, not from a point. At St. Ferreol the space is rectangular, but oblong, and two of the vaults are narrower than the other two. In Renaissance examples the corners of the square are often cut off somewhat, and the vaults are of less diameter than the space, and the pendentives start from a line. Examples of the Byzantine pendentive are so numerous that special naming is superfluous.

Figure 19 illustrates a variety found in France, introduced there after the first Crusade, as for instance at St. Front, Perigueux, in which the supporting arches are pointed. In this case the pendentive if formed with geometrical accuracy, would have a surface composed of parts of two spherical surfaces intersecting at an angle quite obtuse, as indicated by the dotted line and the line of intersection would have a reflex curvature at the top; but in the cases that occur all traces of the angle are obliterated by "rule of thumb."

Figure 20 gives another variety peculiar to France. The faces of the supporting arches, instead of being in vertical planes as usual, are warped so as to form part of the pendentive surface. The edge of the intrados remains in the vertical plane, but the edge of the extrados is brought forward until it lies in the surface of the sphere or spheroid. The pendentive surface therefore begins at the edge of the intrados of the arch, instead of at the extrados, as in the ordinary Byzantine form. Examples occur at Montmoreau, Angoulème, Obazine, Roulet, Château-Poncat and Souillac. (See Baudot and Viollet-le-Duc's "Dictionnaire," Volume IV.)

It seems probable that all or most of the Byzantine pendentives of the Middle Ages were built with horizontal bed-joints, and that the practice of constructing them like a dome with radiating joints, did not prevail until the XVIth century.

SOME RESULTS OF MR. CUSHING'S VISIT.

THE visit of Mr. F. H. Cushing to the East with his Zuñi friends, and the accounts of his adventurous, but thoroughly scientific methods of investigation, have had the natural and highly beneficial effect of quickening both a popular and a scholarly interest in the development of anthropologic studies in America. The study of the native races of North America forms one of the richest fields on the globe for ethnological investigation. We may therefore expect soon to see numbers of our young students, equipped for the task by a thorough preliminary training, and fired by Mr. Cushing's example, turn their attention in a similar direction. The opportunities are practically unbounded: there is an urgent need for an army of sincere workers in the field; the best part of the work must be done by the present generation; and Mr. Cushing says that there is not a native tribe in North America that will not richly reward a study of its institutions according to the methods he has pursued with the Zuñis. In the way of sedentary native races there is a wider opportunity for study than may appear to the casual observer. The pueblo tribes of New Mexico and Arizona are not the only original sedentary races outside of Old Mexico. Just as the Zuñis appear to be the present representatives of the ancient Toltecs, according to Mr. Cushing's well-grounded belief — and not connected with the Aztecs, as has been supposed by many — there is reason to believe that the ancient mound-builders' stock of the Mississippi valley has its living representatives in the earth-lodge-building Mandans and kindred stocks of the Northwest, and also in the Natchez and Creeks of the South. It is not impossible that he who goes among some of these tribes and becomes one of them for purposes of study, may discover that they have an accurate knowledge of the history of many of the famous mounds and their dwellers, just as Mr. Cushing discovered that the history of many of the ancient ruined pueblos and cliff-dwellings was accurately preserved in the traditions of the Zuñis, whose ancestors built them. Another highly interesting and finely developed class of sedentary Indians are the Nai-das and other "joint-tenement-house" tribes of the Northwest coast.

A young ethnologist, however, can find for his maiden investigations good fields of work nearer home. I had the pleasure of accompanying Mr. Cushing to New York on his return to Washington from his Boston visit. At Norwich, Conn., the Zuñis were aston-

ished and gratified at meeting a genuine native New England Indian. He was a watchman at the railway station, and he passed through the train with lantern in hand, standing in silent amazement as he came face to face with his brethren of the South-west in their native costume. He was a fine specimen of his race: over six feet in height and of stalwart proportions; he told us that he was a Narragansett. We noticed that he spoke English imperfectly, and Mr. Cushing said it was evident that he spoke the native tongue of his people. The Zuñis were told that he was one of those whose ancestors lived here at the time the white people came to this country, whereupon one of them said: "So he is one of those who the Father of the Council told us welcomed the Americans to this land" (President Bishop of the Massachusetts Senate, in his graceful speech to the Zuñis, had eloquently spoken of the welcoming of the Pilgrims by the Indians at Plymouth), and they feelingly wished the child of King Philip's race a long and prosperous life as each one grasped him warmly by the hand.

This episode led me to ask Mr. Cushing if there was not anything about the remnants of our native Indian tribes scattered here and there in the East worthy of systematic ethnological study, and he said that undoubtedly there was. The reason why they were not made the subject of such study was the prevalent belief that the field had been thoroughly worked up. Such was not the case, and there was a deal of valuable material to be obtained in this way which might perhaps throw considerable light on certain features of colonial history and the nature of the people who occupied these shores when our forefathers came. Wherever there was a remnant of an aboriginal tribe, even though its habits of life might have become radically changed and the purity of its blood destroyed by commingling with other races, there was a promising field for ethnological work, provided its language be kept alive. If the language were lost, however, there would be little opportunity for profitable labor; but the following fact should be borne in mind: a few families of Indians might live surrounded by whites, and the latter never suspect that a separate language existed among them, for a leading characteristic of the race is secretiveness and a distrust of strangers concerning such things.

Some of our college students might find it a novel and profitable manner of spending a summer vacation by instituting an investigation of this sort. Valuable suggestions for the work might be obtained by consulting the authorities of the Bureau of Ethnology at Washington, or of the American Archæological Institute at Boston. Major Powell's "Introduction to the Study of Indian Languages," and other handbooks published by the Bureau would be invaluable aids. It should be remembered, however, that a peculiar temperament is required for successful work of the kind. Sympathy and adaptability to the ways of others are needed above all. One must place himself on a thorough equality with his subjects; must share and appear to enjoy their ways of living and thinking; and must avoid giving the slightest occasion for allowing them to suppose that in any way he regards himself as socially above their level. The language, in many instances, would be a difficult thing to get hold of, but patient application and the exercise of diplomacy could hardly fail to be rewarded at last. In the investigation of these tribal remnants the acquisition of folk-lore, traditions, legends, and superstitions, together with the observation of peculiar customs and details of daily life, would probably be the most valuable results. In obtaining these the reciprocal method, as practised by Mr. Cushing, is the most practical and useful; for instance, the narration or reading of tales of folk-lore or mythology would undoubtedly be repaid in kind.

Mr. Cushing's methods are heartily approved by his principal, Major J. W. Powell, the director of the Smithsonian Institution Bureau of Ethnology, who is now recognized as one of the foremost of living scientists. Major Powell says that the days of "travelling ethnologists" have gone by. In the first annual Report of his Bureau, recently published, he has an admirable paper, "On Limitations to the Use of Anthropologic Data," in which he shows the folly of metaphysical methods in anthropologic study, and cites examples from three eminent authors — Grant Allen, Peschel, and Herbert Spencer, — to illustrate the worthlessness of a vast body of anthropologic material to which even the best writers resort. "Anthropology," says Major Powell, "needs trained devotees with philosophical methods and keen observation to study every tribe and nation of the globe almost *de novo;* and from materials thus collected a science may be established.

Mr. Cushing's visit to Boston was marked by an ethnological discovery of great importance, being nothing less than the fact that in religion the ancient Incas of Peru were much the same as the Zuñis of to-day. In visiting the Peabody Museum at Cambridge Mr. Cushing examined for the first time the splendid collection of Inca articles, which included certain things which have been the puzzle of archæologists, and known as the "Peruvian mysteries." These he at once saw were the religious sacrificial paraphernalia of the Incas, and in essential characteristics substantially identical with those used by the Zuñis. They were also identified by the Zuñis as corresponding to their own. It is hoped that this important subject will be worked up by Mr. Cushing jointly with Professor Putnam, the latter treating it from the standpoint of Peruvian archæology, while Mr. Cushing tells of the present observances of the Zuñis.

Sylvester Baxter.

OILING THE WAVES.[1]

We learned in our school-room days how Pliny had remarked that "all seas are made calme and still with oyle, and therefore the dyvers do spurt it abroad with their mouths into the water, because it dulceth the unpleasant nature thereof, and carryeth a light with it;" and in later years it seemed a remarkable confirmation of his words to find that the divers of the Mediterranean actually do spurt oil in the manner he described, in order to clear the light under the surface of the water, by the stillness so caused. . . .

As regards a practical application of the lesson, the men of St. Kilda seem to have been the first of our own countrymen to discover one. There, as usual, necessity proved the mother of invention. This lonely little isle is girt by precipitous cliffs, and has but one landing-place, and no harbor. Every fishing expedition therefore involves the hazard of extreme danger in returning to shore, for, should a sudden tempest arise and lash the stormy waves to fury, no boat would dare to approach the isle under ordinary circumstances. But the islanders have one abundant harvest in the multitude of all manner of sea-fowl, which constitute the sole wealth of St. Kilda. Some of these are so full of oil that the people do not always take the trouble to extract it, but some slovenly householders simply pass a wick through the body of a dead bird, and, drawing it out by the beak, actually light the wick thus oiled, which goes on burning for a considerable time.

It seems to have occurred to some reflecting islander that this abundant oil-supply might be somehow specially adapted to the requirements of the beautiful white-winged creatures, to whom wind and wave are alike ministers of delight. So the thought of carrying sea-gull oil to sea took form, and the fishers made puddings of the fat of sea-fowls, and fastened them astern of their "cobles," to hinder the waves from breaking. . . .

The idea which the Shetland islanders and St. Kildians thus worked out for themselves had already presented itself to other men sailing on the great waters. About the middle of the last century the attention of the great Dr. Franklin was called to the subject by a letter from a gentleman who told how, during a stormy voyage on a Dutch ship, the captain, in order to prevent the waves from breaking over the vessel, poured a small quantity of olive oil into the sea — a little at a time, not more than four quarts altogether — and so effectual did this prove, that the writer suggested that surely the same simple means might be made greater use of, were it only generally known.

Dr. Franklin also observed that whenever whaling vessels were lying in New-Port Harbor (Massachuetts) the water was always smooth on account of the leakage of blubber. He accordingly tried sundry experiments to test the working of this phenomenon. On a stormy day he went to a large pond which was so much exposed to the wind as to form waves, and on these he sprinkled a small quantity of oil. At first he took up a position to leeward, but observed that though the oil instantly spread in all directions, it could not work effectually against the wind, as it was quickly driven back to the shore. So he went round the pond to windward, where he found that one teaspoonful produced an instant calm over a considerable space, and, spreading rapidly, soon made an oily film over an extent of at least half an acre, which became as smooth as a looking-glass. One drop of oil forms a film of about four feet in circumference.

It seems strange that, after this subject had been taken up by so learned a man as Dr. Franklin, so many years should have been suffered to elapse ere any definite effort was made to turn it to practical account.

He afterwards tried the experiment on a larger scale on the surf at Portsmouth (New Hampshire). Selecting a tempestuous day, he sailed out half a mile from the shore, and poured a moderate quantity of oil on the tossing waters. The effect was instantaneous, for although the swell continued, the surface was not wrinkled or broken, and, though the sea around was white with crested waves, there were none in the smooth track left by his boat; and he noticed that a barge rounding the headland under sail at once turned into that oily path as onto a turnpike.

I have sometimes noticed the same smooth track left by a steamer, as the result of the oily water which she is continually throwing out. I first observed this one evening in the Gulf of Pecheli. There was a little sea on, but nothing to speak of, and the sun was sinking in liquid gold. Its reflection was crossed by a horizontal line of perfectly smooth water, extending as far as we could see on either hand. There was no vessel in sight, but our captain maintained that it was the course of a steamer, and that the smooth waterway was caused by the oil from the machinery. He said this result was always produced in a greater or less degree, and that we only saw it thus plainly because of the sun being at so low an angle.

[1] Portions of a paper by C. F. Gordon Cumming in the *Nineteenth Century.*

In the present instance we actually followed the smooth line of oily water, till on the following day we caught up the steamer just as she anchored off the Taku Forts at the mouth of the Peiho.

This brought the subject of "smoothing the waters" back to my mind. Soon afterwards, while crossing the Yellow Sea, *en route* to Nagasaki, in a small brig, we came in for some rough weather, and, though we had no occasion actually to test the matter, I was greatly interested at hearing from our Danish captain of many cases in which he had known of oil being cast on the waters to prevent waves from breaking. He said he had himself carried a long wicker basket astern, containing oil-bags, so contrived that by their gentle dripping a constant supply should be kept up. The result was admirable. Not one wave broke over the poop; the only objection was the expenditure of oil, and that was a trifle not worth a moment's consideration compared with the damage which would certainly have been done had even one breaker been permitted to form, as any one must realize who has once experienced the awful crash when a huge curling wave strikes a shivering ship: the weight of falling water crushing boats and bulwarks, and sweeping the deck. . . .

Other men have tried the use of oil-bladders, just pricked with a needle, and hung over the sides of a vessel, so as to keep up a continual dripping. Several small bladders, containing perhaps a gallon apiece, are found to answer better than one large one, being more diffusive in their action. . . .

All on board have known that the preservation of the ships and of their own lives was due to the action of that precious oil, yet year after year thousands of vessels start to face the dangers of the deep and never think of shipping a few extra casks of oil, in case of need. Nor, when the moment of danger has arrived, do they ever think of pouring out even what they have on board for common use. And yet from time to time some one escapes from a wrecked vessel and tells how he attributes what seems his almost miraculous preservation to the fact of some one having had the rare good sense to station a man in the stern of the boat, to pour out oil at intervals, and so prevent the waves from breaking over her astern. The result seems always satisfactory, and the boat which but for this precaution would inevitably have been swamped, reaches the land without so much as shipping a bucketful of water.

A notable instance of this has been recorded by Mr. Ritchie as having been observed by him during a hurricane on the island of Porto Santo. He had just seen a vessel torn from her anchor and engulfed by the terrific breakers, when he espied a boat in the middle of the bay, coming toward the shore. Her fate seemed inevitable, but, to his amazement, the huge waves on which she floated never broke, but rolled right up on the strand, and there deposited the boat, so high that the men had only to jump out and scramble up the beach. The mystery which so amazed him, and which appeared to him little short of a miracle, was simply due to the fact that as the boat neared the breakers, the captain had stove in the head of a keg of oil, and offered the soothing contents to the raging spirits of the deep.

Repeated efforts have been made by Messrs. W. and R. Chambers to bring such facts as these to the notice of all who "go down to the sea in ships," but their statements have unfortunately been generally received with indifference or disbelief. Yet they have from time to time published the evidence given by the masters of vessels in such minute detail as to place their accuracy beyond all possibility of doubt. . . .

Very noteworthy is the evidence of Captain Betts of the *King Cenric*, running from Liverpool to Bombay with coals. He ran into a heavy gale which raged furiously for five days. Happily the chief officer had seen oil-bags profitably used during storms in the Atlantic, and bethought him of applying the lesson, so he got two canvas clothes-bags, and poured two gallons of common pine-oil into each. Having slightly punctured the bags, he hung one over each side of the vessel, towing them along. The effect produced was magical. The waves, which had previously been breaking over the vessel, causing her tremendous shocks, now broke at a distance of many yards, while all around the ship and in her wake lay a wide belt of perfectly smooth water. The crew were thus enabled to repair damages, and were relieved from this most imminent danger.

The oil in the bags lasted for two days, by which time the worst fury of the storm was over, and there was no occasion to renew the supply. So the expenditure of about thirty shillings' worth of oil was the means of probably saving a valuable ship with its cargo, and many precious lives. . . .

Quite recently Mr. Chambers has received further details of cases in which the crews of wrecked vessels have undoubtedly owed their lives to thus casting oil on the storm-vexed waves. One case was that of the screw-steamer *Diamond* of Dundee, recently wrecked off the island of Anholt. Her chief mate says he had often heard of the effect of oil in preventing the sea from breaking, and especially recalled its use in the case of a whaler in the South Seas, whose crew had given up all hope of saving her, when some oil-casks were accidentally crushed, with the extraordinary result that not another wave broke over her.

Bearing this in mind, and seeing no sign of a life-boat coming to the rescue of the *Diamond*, he determined to try the experiment himself, though the ship's boat had apparently little chance of braving such a sea. He provided each boat with a five-gallon can of oil, and told off one of the company to pour it gradually over the stern. Immediately the sea in the wake of the boats became perfectly smooth, and they passed right through the boiling surf and reached the land in safety without shipping a sea. None of the men in the boats believed, when they left the ship, that all would reach the shore alive, and the people on land watched their approach in wonder, deeming it impossible for even the life-boat to live in such awful breakers.

The writer who quotes these cases draws from them the very practical suggestion that every life-boat should be fitted with a proper oil-tank, to be kept always full, and so planned that the crew should have no trouble beyond that of turning on the tap at the moment of need, when the oil should drip of its own accord. He commends the suggestion to the builders of life-boats, and especially to the consideration of the National Life-boat Institution. And he further urges that the Board of Trade should insist on a sufficient supply of oil, for this special purpose, being put on board every ship as a necessary part of her outfit. Also, that some philanthropic society should issue a pamphlet containing a collection of all the most remarkable instances on record of the action of oil on breakers, for gratuitous distribution among all seafaring men. . . .

Another simple and most practical method of applying this invaluable safeguard has been suggested, namely, that every life-buoy should have a small bag of oil attached to it, which could be punctured with a knife at the moment of throwing it to a drowning man. Any one who has seen a poor fellow fall overboard, even when quickly followed by a well-directed life-buoy, knows how uncertain are the chances of ever recovering either. How every eye is strained to descry such puny objects on the great waste of heaving, foam-flecked waters! If a vessel is running before a sharp breeze, the life-buoy and the swimmer will be left far behind ere she can be stayed and a boat lowered, and it is hard indeed to mark the exact spot on that wearily monotonous expanse of ever-moving ridges, where the search must begin.

Far different would be the case were the life-buoy accompanied by a dripping oil-bag. Every one on the vessel would see the smooth surface formed all around it, and not only would the boat go direct to the spot without the unnecessary loss of a moment, but the poor swimmer would have a far better chance of reaching the life-preserver, and would moreover be protected from the breaking waves.

Yet another means has been suggested by which this precious quality of oil might be made available, namely, its use in shells so constructed as to burst on striking the water, and which might be fired from mortars placed on the beach so as either to fall outside the breakers, or by subduing them to facilitate the launch of the life-boat or to fall to windward of a wrecked vessel, and so enable the life-boat to approach her in comparative safety. Surely the ingenuity which devises such intricate mechanism for destructive shells and infernal machines might contrive some method by which the oil-shell might be safely despatched on its errand of mercy.

Though the casting of oil on troubled waters has been so persistently regarded merely as a poetical figure of speech, notes of its actual use have occasionally appeared in books of travel. For instance, it has long been known that when the fishermen of Lisbon find the surf on the bar of the Tagus unusually rough, they empty a bottle or two of oil into the sea, and thereby smooth the waves so effectually that they can pass the breakers in safety. But no one ever took that hint as the embryo of some grand scheme for overcoming the horrors of landing in the surf at Madras, or at many another port where traffic is endangered by the fierceness of the breakers.

No one even tried to apply it to the dangerous bars at the mouths of several of our own large rivers, of Aberdeen for instance, where we have had to mourn such pitiful wrecks of fine vessels, literally dashed to pieces by the mad surf breaking on the bar. Amongst the good ships that have perished at the mouth of the Dee are numbered two in which I had sailed so often that they seemed to me like old friends, and as I bewailed their fate and that of the kind, brave men drowned within sight of their homes, I thought of the fishers on the Tagus, and marvelled if British ingenuity would never find means to turn their simple precaution to account.

It has been reserved for the nineteenth century to find the practical application of the observations made by Pliny eighteen hundred years ago.

The subject has at last been taken up in good earnest, and it is to a citizen of Perth, Mr. John Shields, that is due the honor of taking the initiative in a movement which, if fully carried out, must prove of incalculable benefit to our seafaring population. . . .

The plan he hit upon was that of laying iron and lead pipes from the beach, right out across the harbor to the open sea, terminating in the deep water, two hundred feet beyond the bar, and then, by means of a force-pump on the shore, to pump oil into the tubes and eject it at the bottom of the sea, outside the harbor, so that, as it rose to the surface, it might be driven inward and prevent the formation of breakers on the bar. The pipes are fitted with three conical valves fixed seventy-five feet apart at the sea end of the pipe. These are forced open by the stream of oil as it flows out, and instantly close when the pressure is removed.

Mr. Shields fixed upon Peterhead, in Aberdeenshire (the easternmost headland of Scotland, and consequently a spot exposed to the full force of every gale that sweeps the east coast), as the most suitable spot for his test experiments. Here, then, he proceeded to sub-

merge 1,200 feet of lead and iron piping. A large barrel containing about a hundred gallons of oil was placed in a shed on the beach, in connection with the force-pump. . . .

On the 1st of March we may say that the apparatus was fully and practically tested for the first time, and with such success as to leave no doubt that it must shortly be a recognized necessity in all harbors dangerous of access. On the day in question a gale was blowing from the south-east, accompanied by a heavy sea. Huge green billows, from ten to twenty feet in height, curled in white crests as they neared the harbor mouth, and broke in mad surf above the bar. No boat could have dared to face those breakers, and any luckless vessel wrecked on that rock-bound, inhospitable coast must have been abandoned to her fate.

No better day could have been selected to test the soothing power of oil. If any perceptible difference could be produced on those raging, tumultuous waters, it was evident that the gaining of a complete mastery over them became merely a question of how much oil was to be expended. In the present instance the big hundred-gallon cask was filled. The forcing-pump was set in action and a large quantity of oil was driven through the pipes, whence it was ejected at the bottom of the sea, at some distance beyond the impassable barrier of mighty breakers. The oil immediately rose to the surface, and formed a thin film on the water, extending right across the harbor mouth. Straightway the dangerous white crests disappeared, and, though the strong tide still swept inward in huge swelling billows, they were shorn of their terror, and became perfectly smooth rollers, on which any vessel or boat might safely have ridden into dock.

Owing to the strength of the tide and the severity of the gale, the oil was swept shoreward so rapidly as to render continuous pumping necessary; but as long as the oil supply was kept up, the surf was kept down, and there remained no reasonable doubt in the minds of the spectators that henceforth the raging of the waters could be subdued at will, and that ships might be enabled to make the port in safety, no matter how wild the tempest. . . .

Since the first report of Mr. Shields's invention appeared, letters have been received from all quarters adding individual testimony to the value of oil in saving boats from capsizing or from being swamped, either at the moment of launching or when attempting to rescue fishing-nets on the approach of foul weather. . . .

The captain of a steamer writes that, some months ago, he encountered a heavy gale in the Bay of Biscay. Several steamers were lost, and his own vessel was in danger, waves breaking over her with great violence. He had two canvas bags made, each to contain a quart of common lamp-oil. The bags were punctured and hung over each bow, with sufficient line to let them tow freely. The result was most satisfactory. Scarcely a sea came on board, each wave as it reached the oil ceasing to curl, and undulating past the ship without a break. The oil in each bag lasted eight hours. On the following voyage he was compelled to put the matter to a still more practical test, and the result surpassed his most sanguine expectations. He says: —

"I was compelled to abandon my vessel at midnight. There was a heavy sea, and though the boats were provisioned and in readiness for lowering, the sea which was running along-side and breaking over the ship made me doubt the possibility of the boats ever living in it, even if the difficulty of launching them was overcome.

"I caused two tins of common lamp-oil, each containing about two gallons, to be emptied, one over each side, and, after giving it time to diffuse itself over the water, the boats wore lowered and sheered clear of the sinking ship, without shipping so much as a bucketful of water. The waves were still towering thirty or forty feet above us, but without a breaker or a white-topped one among them, while ahead and astern they were breaking heavily. I believe that, under Providence, we owe our lives to the use of oil, and trust that it may ere long be recognized as an efficient aid in saving life at sea."

Major-General Hendry, writing to the *Globe* with reference to the experiments at Peterhead, gives a remarkable instance which occurred in 1846, in which the use of oil was the means of saving the lives of the crew of a schooner which was caught in a heavy gale off Sable Island. Persons standing on the low sandy shore, where furious billows, swept by the whole force of the storm, were dashing with appalling violence, were amazed to see a schooner tearing her way through a sea of white foam, while two men in the after-part of the vessel were apparently throwing something at intervals high up into the air.

"The schooner was the *Arno*, Captain Higgins, with twelve men, from the Quero Bank, where they had been fishing. They left the bank at the commencement of the gale. The captain let go his anchor in twenty fathoms of water, paid out three hundred fathoms of hemp cable, and brought the vessel's head to wind. In a tremendous sea he held on until noon, when, seeing no prospect of the gale abating, he cut his cable and put his vessel before the wind, preferring to run her on shore before night to riding there and foundering at her anchor. He lashed himself to the helm, sent all his men below but two, and nailed up the cabin doors. He had two large casks placed near the foreshrouds and lashed there. He then directed his two best men to station themselves there and lash themselves firmly to the casks, which were partly filled with blubber and oil from the fish. They had each a wooden ladle about two feet long, and with these ladles they dipped up the blubber and oil and threw it up in the air as high as they could. The great violence of the wind carried it far to leeward, and, spreading over the water, made its surface smooth before and left a shining path behind; and although the sea would rise very high, yet the top of it was smooth, and never broke where the oil was. It was raging, pitching, and breaking close to her on each side, but not a barrel of water fell upon her deck the whole distance. The vessel was so old and tender that she went to pieces in a very short time after the crew, with their clothing and provisions, were saved."

THE ILLUSTRATIONS.

RAMBLING SKETCHES, NO. IV. BY MR. T. RAFFLES DAVISON. — LUDLOW, ENGLAND.

[From the *British Architect.*]

The most prominent object in the town (not excepting the Castle), is the Church of St. Lawrence, with its lofty central tower, which indicates the position of the town for miles away. The Church is noteworthy in many ways. The decorated tracery of the windows (indicated on the plate — the details of various parts — the splendid choir lighted by a series of very fine Perpendicular windows — the east window, containing some three hundred figures in compartments representing the history of St. Lawrence, who, poor fellow, was stoned, scourged, whipped, clubbed, trampled on, torn with hooks, burnt with irons, and finally broiled to death — the magnificent lantern light in the tower over the crossing of nave and transepts — the finely toned organ, more than a century old — and lastly, the hexagonal porch at the southwest, are some of the more striking points of excellence. I was in the church at the evening service, and have seldom seen in church or cathedral a more impressive interior effect, largely helped by the great arches supporting the tower, flanked by the semi-arches from the aisle-walls. A singularly graceful and unaffected little cherub, most excellently sculptured, is placed over a tomb in the choir, which it greatly adorns.

The "Bull Ring" was the scene of bull-baiting in old times; I have sketched it to show as much as possible, but not from the most picturesque point. The town is well off for hotels. The "Feathers Hotel" is said to have been erected for princely officers connected with the castle; the coffee-room is a charming old apartment with fine panelled walls, decorated plaster ceiling, and elaborately carved mantelpiece; there are windows at each end, so that the room is always cheerful and pleasant. The exterior of the hotel is very elaborate and picturesque, but the detail is poor. The house itself is excellently managed and replete with comforts and luxuries in the shape of a varied stock of horses and carriages. The "Angel" is also an excellent house, once patronized by the Prince of Wales, and the exterior is surely a model of Queen Anne feeling, for the windows are "curvy" and have no visible means of support.

"Broad Gate," the only old gate left, is sketched, for it is a prominent object from the head of Broad Street, and one of the features of the town; it puts one in imagination in a foreign place.

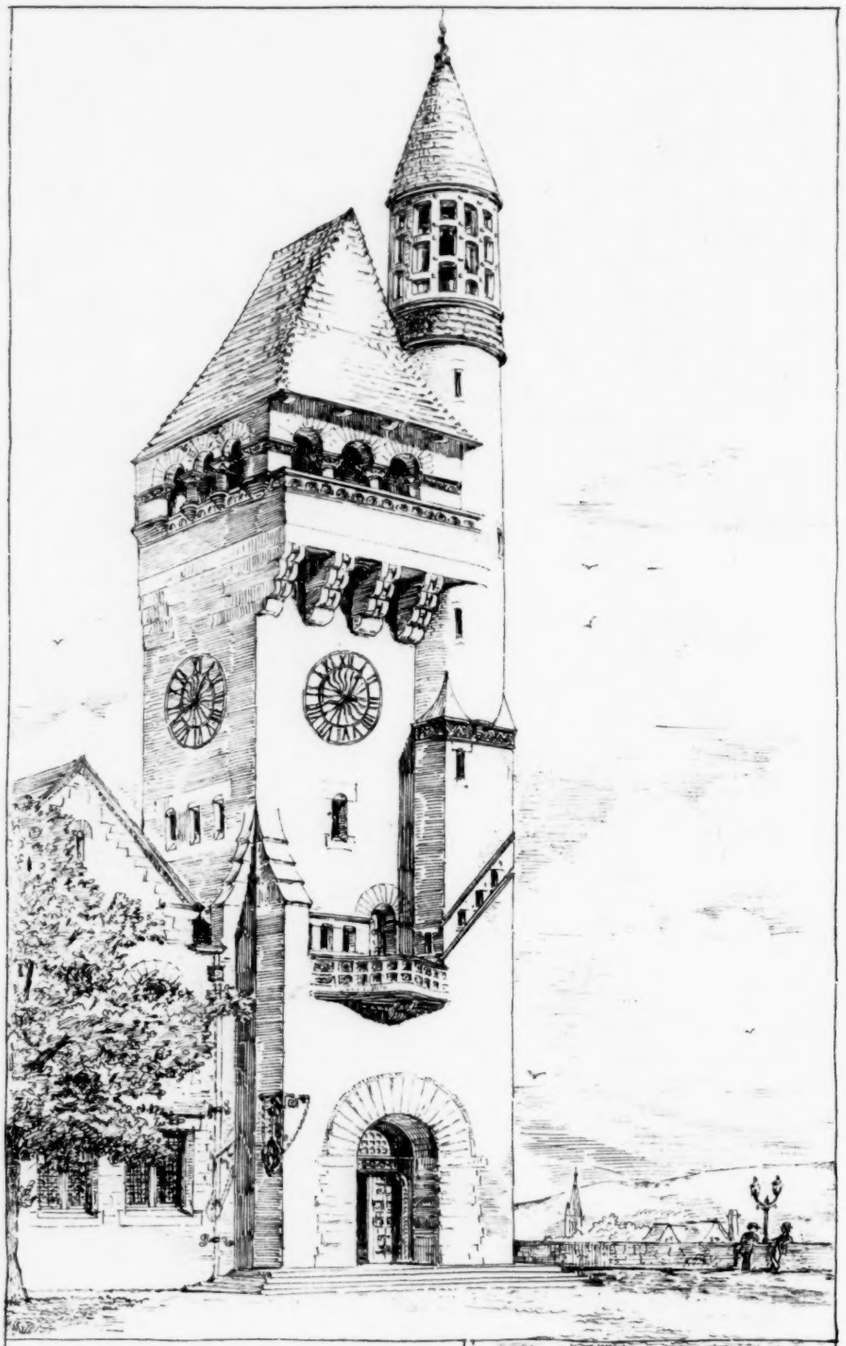
When Leland crossed over Ludford Bridge in the earlier half of the sixteenth century, he wrote: "There be three fayre arches in this bridge over Teme, and a pretty chapel on it of St. Catherine. It is about one hundred years since this bridge was built."

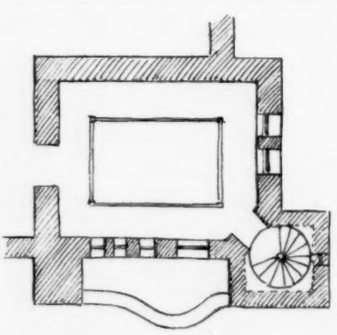
Lane's Asylum was built by an old servant of Ludford House in 1674. Ludford Almshouses are prettily situated, and have a picturesque repetition of chimneys and dormers. The charm of the town is that there is still so much left of old time about it to attract.

THE ALBERT HALL MANSIONS, SOUTH KENSINGTON, LONDON, ENGLAND. MR. R. NORMAN SHAW, ARCHITECT.

[From the *Building News.*]

This building, which has lately been erected in Kensington Gore, is situated close to the Royal Albert Hall. Its scheme, being somewhat complicated, and therefore difficult to explain without diagrams, we publish herewith plans of two floors and a section, which will make clear the arrangements. On referring to the section, it will be observed that the front or north side is divided into seven stories, whilst the back portion has nine floors in about the same height. The object of this is to place the whole of the principal or reception-rooms so as to overlook Hyde Park, and by the lesser number of stories to obtain greater height, whilst the back of the building being occupied by bed and dressing rooms, kitchens, etc., a less height, such as 10′ 6″ or 11′ is for all practical purposes as good; and by this arrangement a considerable amount of accommodation is gained. The variety of levels which thus arise make the plans, unassisted by a section, difficult to understand. The portion already built, and shown in the perspective view, consists of three entirely separate blocks. In each block are eight large separate suites, and in the upper part eight smaller suites, which may easily be altered into four larger suites, if desired. Each of the larger suites is complete in itself, with front door openings from the principal stair, and back door from the service stair. Two lifts are provided: one for passengers, and one for coals, provisions, etc., situated close to the tradesmen's entrance. It will suffice to describe two floors, as all the others are very similar. The ground floor consists of outer and inner entrance-halls, dining-room, drawing-room, each 19′ x 17′; three bedrooms and water-closet on same floor. A private stair leads up to three bedrooms, bath, and linen room, water-closet,

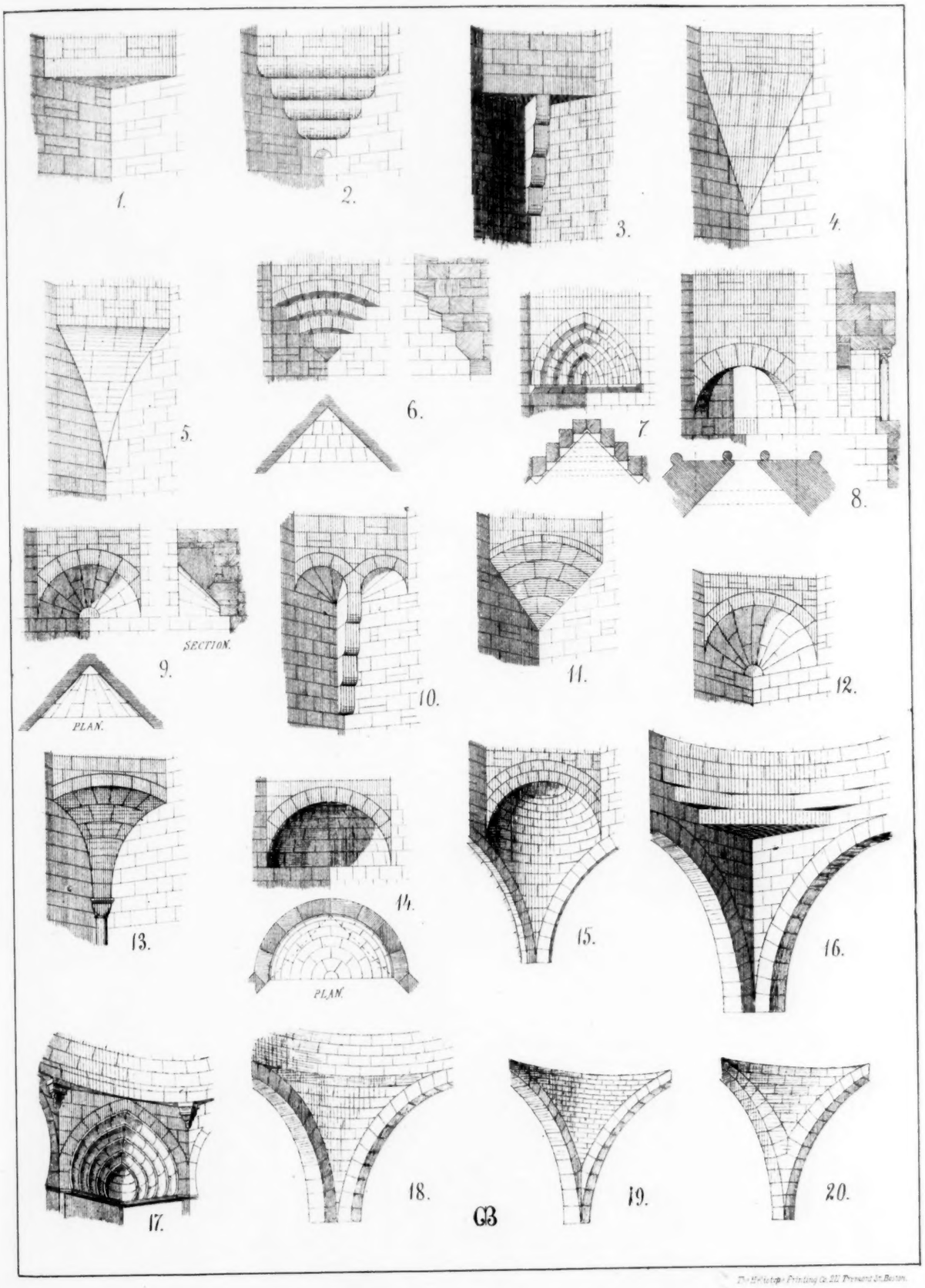




Tower:
for a
Town Hall:.

MATERIALS:
Common Brick
Quarry-face Stone.

The Heliotype Printing Co. 181 Tremont St. Boston.



The Heliotype Printing Co. 211 Devonshire St. Boston.

PENDENTIVES

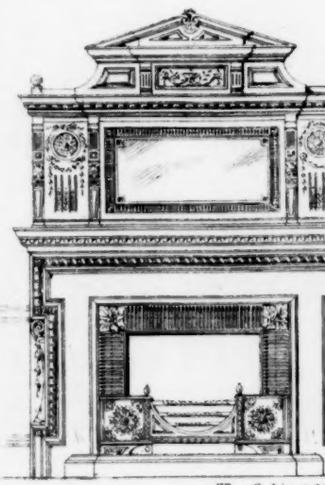
Our Foreign Exchanges — IV.

CONSTRUCTIONS RECENTES A LONDRES.

MANUFACTURES DOULTON. — [illegible]

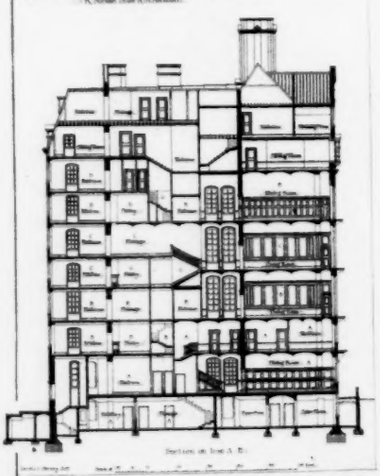
Das Reichsche Haus (zum Richhorn) in Schwabach.

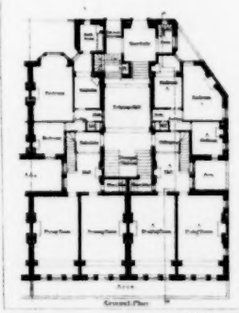
Deutsche Bauzeitung



The Cabinet M

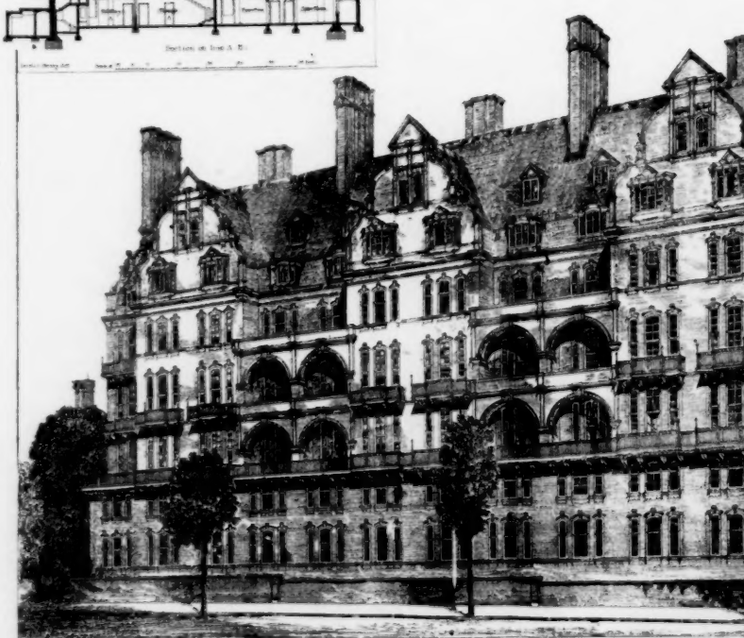
Albert Hall Mansions, South Kensington.





Albert

MANUFACTURES DOULTON. — [illegible]

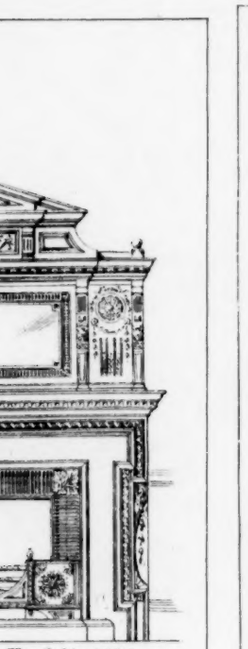


W. H. Lethaby, del.

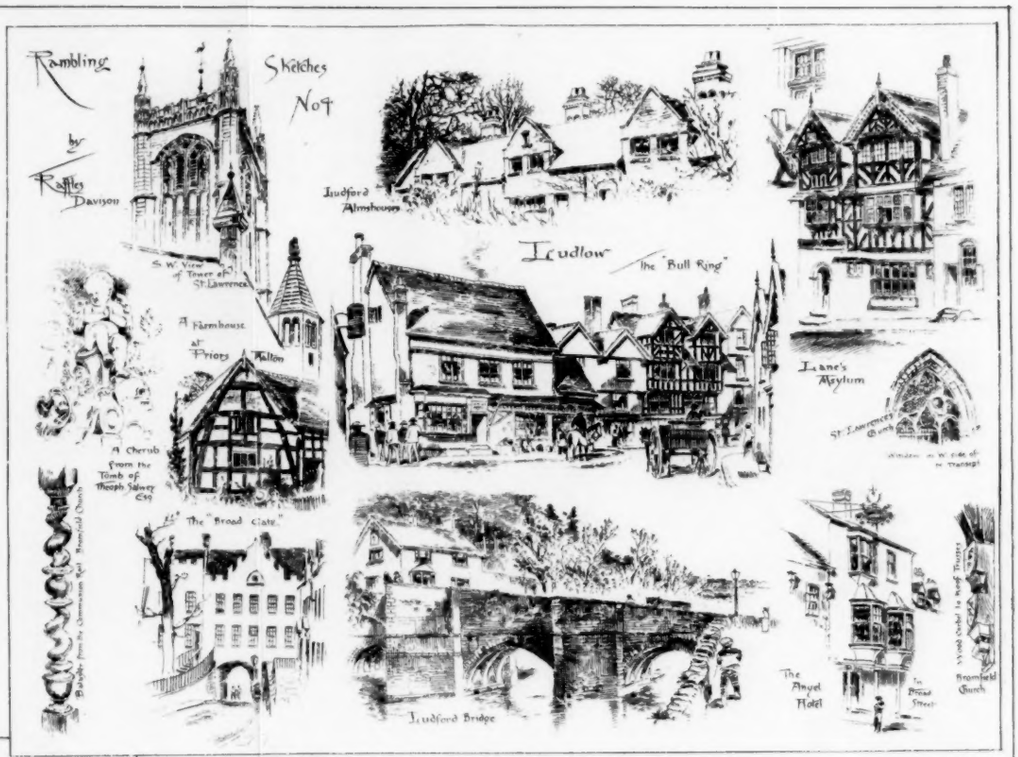
LA SEMAINE DES CONSTRUCTEURS.

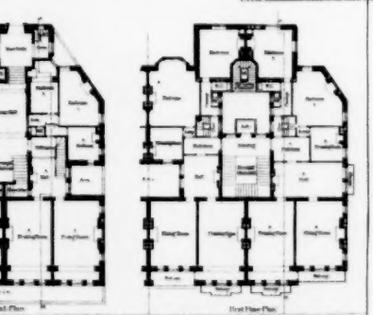
The Heliotype Printing Co. 211 Tremont St. Boston.

OD & CO

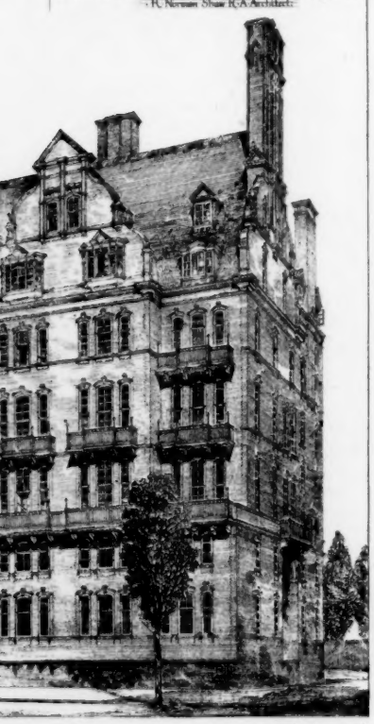


The Cabinet Maker.

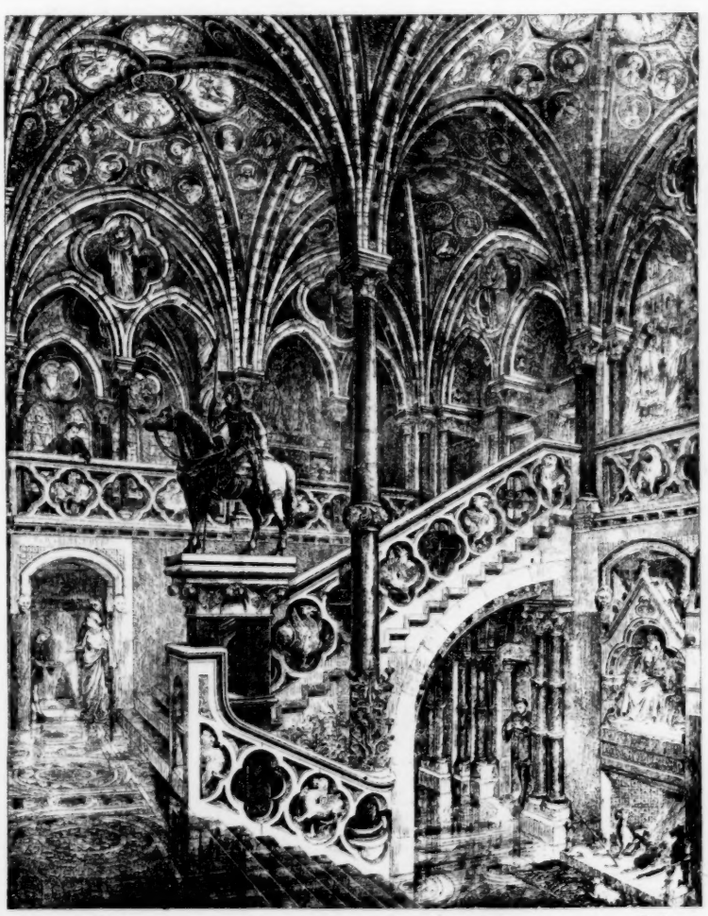




Albert Hall Mansions South Kensington
R. Norman Shaw R.A. Architect



THE BUILDING NEWS



THE GREAT STAIRCASE, CARDIFF CASTLE.

etc., on entresol. In the basement, also reached by a private stair, is a kitchen and scullery, pantry, two bedrooms, larder, and coal-cellars. The rooms belonging to the ground-floor suites are marked in the plans and section by the letter A. The suites on the first floor have each outer and inner entrance-halls, a drawing-room, 17′ x 29′ and a dining-room, 17′ x 24′ two bedrooms, and a dressing-room on the same floor, and a private stair leading down to a kitchen, pantry, bed and dressing room. The rooms of this suite are marked B on plans and section. On the section the letter C shows the rooms of third floor, and D those of the fourth. Ample cellarage and spare rooms are provided for all the suites in the basement.

THE GREAT STAIRCASE, CARDIFF CASTLE. THE LATE MR. WILLIAM BURGES, ARCHITECT.

[From the *Architect*.]

The great staircase is an addition to the castle, and the design had to be arranged to suit doors, windows, and passages of the old building. It consists of two flights, and leads from the entrance-hall (on which level the library is situated) to the great hall. On plan the staircase is a square 23′ 6″ across. In the centre is a marble column, from which springs the groining of the four vaults of the ceiling, the height from floor to groining being 31′. There is a gallery on two sides on level of landing formed by a second plane of tracery which goes all round the inside. The columns are of marble, the steps of rose-colored granite, and the lower portion of the walls are of marble. Color and gold have been largely used in the decoration.

DESIGN FOR A MANTELPIECE, BY THE LATE BRUCE J. TALBERT.

[From the *Cabinet Maker and Art Furnisher*.]

This mantelpiece, one of the latest designs of the author, rendered in Italian walnut and pear, has been on exhibition at the late Building Exhibition at London.

BRICK AND TERRA-COTTA BUILDINGS, LONDON, ENGLAND. MESSRS. WARING & NICHOLSON, AND MR. STARK WILKINSON, ARCHITECTS.

[From *La Semaine des Constructeurs*.]

These buildings, lately finished, on the Albert Embankment, are built of red brick and relieved with the colored terra-cotta manufactured by the Messrs. Doulton.

DAS ROTH'SCHE HAUS "ZUM EINHORN" IN SCHWEINFURT.

[From the *Deutsche Bauzeitung*.]

DESIGN FOR A TOWN-HALL TOWER.

PENDENTIVES. BY PROFESSOR CHARLES BABCOCK.

LEGAL NOTES AND CASES.

Fixtures. — Portion of Mill Machinery. — Purchaser without Notice.

THE owners of a smutter in a grist-mill lent it to the owners of the mill, and it was to be returned and its use paid for; but whilst it was in use a judgment was recovered against the millers, and the mill, its fixtures, etc., were sold under an execution issued on the judgment. The owners of the smutter demanded its return from the purchaser at the execution sale, and on his refusal sued him in replevin, *Stillman vs. Flenniken*, in Iowa, but were defeated and they appealed. The Supreme Court of Iowa affirmed the judgment. Day, J., in the opinion, said: That as between the plaintiffs and the millers, the smutter in question did not become a part of the realty, but was subject to removal, must be admitted. The question involved in this case is as to what character is to be impressed upon the smutter against a purchaser at sheriff's sale, without any notice of the arrangement existing between its owners and the millers.

In *Quimby vs. Manhattan Cloth and Paper Co.*, 9 C. E. Green, 260 (264), it is said: "The true criterion as to fixtures — to determine whether they are to be regarded as part of the realty or not — is not whether they may be detached and removed from the premises without injury to the freehold, although that, as is well understood, is oftentimes an important element in deciding the question. It is well established that whether property which is ordinarily treated as personal becomes annexed to and goes with the realty, as fixture or otherwise, must depend upon the particular circumstances of the case. It appears from the facts, as found by the court, that the smutter was placed in the mill in the usual manner, and that without it the mill, without change in its arrangements, could not grind buckwheat and rye. It was then, to all appearances, an essential and necessary part of the mill." In *Gray vs. Holdship*, 17 S. & R. 413, the court say: "From the adjudged cases on this subject I think we are warranted in saying that everything put into and forming part of a building or machinery for manufacturing purposes, and essential to the manufactory, is part of the freehold: the wheels of the mill, the stones, and even the bolting-cloth are parts of the mill and of the freehold, and cannot be levied upon as personal property." In *Farr vs. Stackpole*, 6 Greenl. 154, it was held that things personal in their nature, but fitted and prepared to be used with real estate and essential to its beneficial enjoyment, being on the land at the time of its conveyance by deed, pass with the realty, and that, by the conveyance of a saw-mill with the appurtenances, the mill, chain, dogs, and bars being in their appropriate places at the time of the conveyance, passed to the grantee. In *Fairis vs. Walker*, 1 Bailey (S. C.) 540, it was held that a cotton-gin attached to the gears in the gin-house, on a cotton plantation, passed by a conveyance of the land. See, also, *Union Bank vs. Emerson*, 15 Mass. 152; *Fryatt vs. The Sullivan Co.*, 5 Hill, 116; *Bringhoff vs. Munzenmaier*, 20 Iowa, 513; *Ottumwa Woollen Mill Co. vs. Hawley*, 44 Ib. 57; *Milter vs. Plumb*, 6 Cow. 665; *Wadleigh vs. Janvrin*, 41 N. H. 503; *Powell vs. Monson* and *Brimfield Manufacturing Co.*, 3 Mason, 459; *Corliss vs. McLagin*, 29 Me. 115; *Trull vs. Fuller*, 28 Ib. 545. The rule is the same whether the sale is by the owner or a public officer, under the law. *Price vs. Brayton*, 19 Iowa, 309; *Farrar vs. Chauffetete*, 5 Den. 527. Without entering upon the hopeless task of citing and reconciling all the decisions upon this very vexed question of fixtures, we are clearly of opinion that the matter must, as to a purchaser without notice, be regarded as constituting a part of the realty. H. E.

Fire Insurance. — Vacant Premises. — Temporary Absence.

Under the condition in a fire policy that it should become void "if the dwelling-house should become vacant or unoccupied and so remain," a temporary absence of about a fortnight will not avoid the contract. *Laselle vs. Hoboken Fire Ins. Co.*, Supreme Court of New Jersey, November term, 1881. H. E.

Mechanic's Lien. — Waiver. — Manner of Payment.

A mechanic who furnished material for the construction of a mill may by fixing the manner of payment, and by his acts in relation to the claims of other creditors, be precluded from asserting a mechanic's lien, as against such creditors, although he has made no express promise that he will not assert his lien. *West vs. Klotz*, Supreme Court of Ohio, December 1881. H. E.

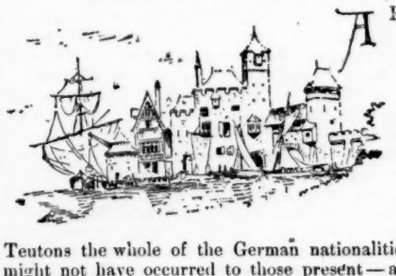
Patents — Copyrights. — Application in Payment of Debts.

A patent or a copyright, which vests the sole and exclusive right of making, using, and vending the invention, or of publishing and selling the book, in the person to whom it has been granted by the government, as against all persons not deriving title through him, is property, capable of being assigned by him at his pleasure, although his assignment, unless recorded in the proper office, is void against subsequent purchasers or mortgagees for a valuable consideration without notice. Rev. Stats., §§ 4,884, 4,898, 4,952, 4,955. And the provisions of the patent and copyright acts, securing a sole and exclusive right to the patentee, do not exonerate the right and property thereby acquired by him, of which he receives the profits, and has the absolute title and power of disposal, from liability to be subjected by suitable judicial proceedings to the payment of his debts. In England it has long been held that a patent right would pass by an assignment in bankruptcy, even without express words to that effect in the Bankrupt Act. *Ager vs. Murray*, Supreme Court of the United States, March 1882. H. E.

Forcible Entry and Retainer. — Removal of Improvements. — Injunction.

Where A has forcibly dispossessed B under a supposed title, and has made permanent improvements upon the property, he cannot be restrained by injunction by B from removing these improvements after judgment has been rendered in B's favor, and A has appealed therefrom and given a bond with sufficient security that he will not commit or suffer waste to be committed on the premises, and to pay double the value of the use of the property and all damages and costs, if judgment should be rendered against him on the appeal. *Campbell vs. Coonradt*, Supreme Court of Kansas, July Term, 1881. H. E.

THE AIR WITHIN OUR HOUSES.[1] — I.



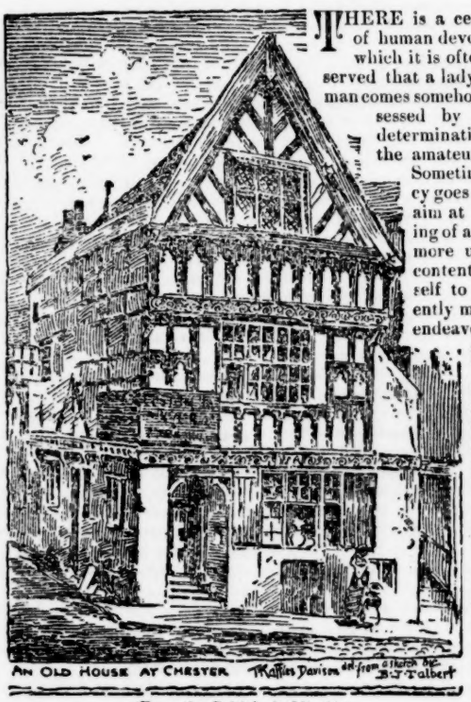
AFTER a few introductory remarks Professor Kerr said that in Europe, at the present time, there were two principal races which occupied the soil, namely, the Teutons and the Latins — the Latins being the Spanish, Italians, and French, and the Teutons the whole of the German nationalities and ourselves. It might not have occurred to those present — and they might fancy, perhaps, that he was indulging, for a moment, in a little exaggeration, when he told them what he was going to say — but it was a remarkable fact that up to the present moment the fundamental idea of domestic arrangement, that is of the designs and appliances of our houses, was amongst the Latins traceable to the form of dwelling in the ancient East, whilst amongst the Teutons it was traceable to the primitive arrangements of the people of the North. The ancient Oriental dwelling, and also that of the present day, was based upon the idea of an inclosure, and then a court inclosed by a protecting wall. That was the simple form of Oriental residences. Buildings there might be, but they were what might be called sheets around

[1] Part of a paper read before the Civil and Mechanical Engineer's Society, March 2, by Professor Kerr, and published in the *Builder*.

the walls. The typical original primitive dwelling of the Gothic races was a hall, and that form was still retained. The hall of the Northern races was simply a great barn, essentially a roofed building, for the purpose of providing not merely privacy, and not protection at all, for generally the inmates could protect themselves, but privacy and protection from the inclemency of the weather. They might think that he was exaggerating, but it was not so, as they would see when he told them that in the plans of French, Spanish, and Italian houses we could still find, somewhat intimately, the connection with the primitive court, the court being the primary idea, and the house being the secondary idea; whereas, in the plans of German and English houses, and the houses of other Northern races, could be traced, quite as distinctly, the presence of the original element of inclosed shelter, the court being, if it ever existed at all, a mere matter of convenience for the disposition of the building. Let them look at the ordinary state of things in Paris and in London at present. The ordinary Paris house, as they knew very well, had a court in the centre if it possibly could be managed, but no Englishman thought of putting an open court in the centre of his house, except it were a house upon a very large scale. Then, again, let them look at the difference between the habits of the Frenchman and the Englishman: The Englishman about town spent his time in his club. He sat there with the window shut in fine weather; he was snug and comfortable in his easy chair, and was under the roof which, in the present day, represents the original idea of the hall of the Northern men; and when he took his meals, he took those meals, of course, in the house. How did the Frenchman about town spend his life? Why on the boulevards; not merely sauntering up and down, but he took his meals upon the pavement. This might seem a picturesque description, but it was true. So in respect of the habits of the inmates of the houses, the distinction would be found still to remain. We, as he had said, being of the Teuton race, live in inclosed houses, which are built upon the primary idea of shelter; but, as they all knew, we were a great deal too fond of shutting ourselves up in boxes similar to the room in which they were then assembled, with the air carefully excluded, and passing our time in such discomfort or such comparative comfort as might happen. In such a state of things it was extremely necessary to consider the condition of the air within such boxes, when they shut themselves up temporarily within them. That was the question which they had to consider to-night. The air within the chamber (which he had described as a box) was well described when he used the phrase "air-bath." If they were, so to speak, fishes, and occupied such a chamber filled with water they would be in a water-bath; but, being air-breathing animals, they occupied a chamber just as much filled with air as a tank was with water; and, inasmuch as those animals which lived in a water-bath were very seriously affected by impurities in the water, was it not obviously the case that we who lived in an air-bath were liable to be equally affected by impurities in the air? Those whom he was addressing, being scientific men, did not want this fact enlarged upon in order to impress it upon their minds that a much more serious question, if science were worth anything, a much more important question than it was generally considered was, "What is the condition of the air-bath in which we are living, and is it the case that the air is artificially polluted?" Well, they knew it was. Was it possible to correct the pollution? He would tell them it seemed not. He would remind them what were the means by which the air-bath in which they lived was polluted. There was constantly going on, even involuntarily going on, the process of breathing. As the fish drew the water to its lungs, and expelled the water in an impure condition, so we drew the air into our lungs, and cast it out charged with organic matter which was held suspended in the chamber, and rapidly polluted the air if it was not frequently changed. Another operation which was constantly going on was this, and it was of great importance, namely, a constant evaporation from the skin of all the various impurities which had to be got rid of. With some people this was not a great consideration, but with some other people it was a very great consideration. It was so many pounds of matter daily, containing a large proportion of organic substance, which was the volume of the discharge from the human body by this simple, and, as was generally supposed, harmless means. All this, repeated constantly, made impure the air-bath. Then again, especially in England, the cooking of food was a process which was carried on within the walls of the house, and frequently carried on in the quarter of the house from which vapors were most likely to pass into other quarters of the house by passing upwards, and thus charging the air with that which we should regard as not a mere smell, but as a decided physical impurity, namely, organic matter suspended in the air. But this was not all: there were fires to be maintained in the house, and here there was a most lamentable instance of the backwardness of invention with respect to the most simple question of domestic arrangement. We burnt raw coal in our chambers, and the smoke was constantly passing into the air in some degree, very often in a very large degree, although it did not create general discomfort, as we were accustomed to it. He need not go into details, but he was accumulating, one by one, the little grievances which primarily affected the condition of the air-bath. There was another thing which had to be mentioned, which was this—that in our most comfortable houses we had an extremely large and unnecessary amount of upholstery. We had too large an amount of carpets and hangings in our bedrooms, our dining-rooms, and our drawing-rooms, on the stairs, and in every apartment. And what effect had this upholstery? It was composed of various tissues which had a capacity for absorbing the solid matter suspended in the air, and this solid matter was being continually sent out into the air again by the restlessness of the atmosphere: so the more upholstery the more impure the air, and the less upholstery in a room, the more cleanly it was to be found. There was one other consideration which was not generally taken into account. In a great many of our houses, and especially in old houses, the walls were covered with old plaster, and the ceilings were old and covered with old plaster, and the floor covered with old boards, and these boards rested upon old timbers, and those timbers had, very likely, in the spaces between them a considerable quantity of matter in the wrong place, otherwise dirt. What was the effect of this? They knew as well as he could tell them that the air was doing its best to play through the walls, ceilings, and floors, and it succeeded in blowing through to a much greater extent than the public were aware of. What was the consequence of the air blowing through those different substances? It must necessarily blow into the chamber, and thus into the air-bath, whatever atoms it could succeed in disengaging from the substances; that was to say, not only were the impurities, the artificial impurities, absorbed from the walls, ceilings, and floors, blown backwards and forwards into the room, but the very substances of the rotten, decayed walls, ceilings, and floors were being continually carried into the air. With all those processes fully at work he left them, as scientific men, to consider what was the invisible and intangible, but still appreciable, condition of impurity in which the air-bath existed? Well, he need not tell them that this was only the beginning of the grievances. We had an abominable contrivance called drainage. Now, there was nothing more discreditable to the ingenuity of Englishmen than the condition of our drainage. He stated frankly that he had no other plan: it was the business of the engineer and not of the architect. The architect had been deliberately superseded by the engineer in this particular matter: the engineers had taken the matter in hand, and had denounced the architects up hill and down dale, and had declared every one of them to be more or less of an ignoramus, and that nobody but an engineer understood the question; and therefore he was justified in saying that the engineer should solve his own problem. But what was this drainage? The popular idea of drainage was very simple. You emptied the slops into the sink, and they went—the devil knows where. That was the popular idea of drainage; but they, as professional men, knew where the slops went. They knew also, that they were occasionally arrested in their progress in those most inefficient and ill-contrived underground channels. They knew that the soil which was taken off, as we say, euphemistically, by water-carriage, was often arrested, and allowed to remain and decompose, and pass into the form of gas. They knew gas was generated by the decomposition of this decaying matter, when deposited, in however slight a degree, upon any interior surface. What followed? They knew this gas had two qualities which were extremely obnoxious: one quality was that it ascended to the highest level by reason of deficient specific gravity; and the second quality was that when it reached the highest level it exercised a pressure, being an extremely elastic gas. He need scarcely point out the effect of these two considerations. When the sewer-gas (a most excellent name, without going into particulars as to whether it should be called gas or vapor; the name sewer-gas carried an idea of offensiveness which was extremely convenient)—when the sewer-gas had reached the highest level, it exercised a powerful elastic pressure to force its way out, and succeeded in forcing its way. He need not say where it forced its way. It got into the house; and if there were no other grievance there was this to complain of—that this pestiferous and poisonous gas, forcing its way from the sewers into our houses, reached the air-bath, and of course, reached the vital organs of those who occupied it. So much for the sewer-gas. That was not all: there was next the question which he had hammered at for several years in his quiet way, namely, the ground or basement-air. They knew as well as he could tell them, and perhaps better, what this ground-air was. They knew that in the air-bath of which he was speaking—that was, the interior of any chamber—when in cold weather the air without was cold and the air within warm, and when in the night-time of warm weather the air without was cold and within warm, a barometric pressure was set up, and the air passed from the outside under the foundation, and through the floor into the house from beneath. That was the question of ground-air; it was no use to blink the matter. It was plain and simple to those who understood the simple question of science involved when once it was pointed out to them. The public did not understand it. The public would say:—"Do not talk about air coming from the foundation; it is of no use talking about air playing through a brick wall; we know better, that is over-refined science." But those whom he was now addressing, who professed to know something of the arcana of these matters, knew that it was a serious practical consideration in both cases, and in this particular case it was very serious, more particularly when they considered the form it took. Inasmuch as a very considerable area of the fashionable quarter of London was built upon market-gardens, and inasmuch as the soil, which had not been removed, was composed of old, decaying, pestilential matter which was called manure, the ground-air carried with it as much of this as it conveniently could into the houses of the people of South Kensington and elsewhere, and this had become a very serious grievance; and he was told that there were wise doctors who told their patients the truth, and advised them to leave and go and live in Russel Square. But he knew if they went to live in Blooms-

bury they would find the state of things very much the same there, but from different causes. Bloomsbury was not built on a market-garden, but the drains of the Bloomsbury houses, laid at the time the houses were built, were square, brick drains, which were the worst contrivances possible; and he would leave them to judge what was the condition of those drains, not only in Bloomsbury alone, but in the older districts of London. The liquid soil, carrying as much as it could of solid matter, passed through the joints of these extremely imperfect bricks, and the consequence was that the soil under a great many of these fine houses was absolutely saturated, and where there was ground-air passing into these houses he need not tell them what it carried with it. He heard mentioned the other day, by a careful man, this point (which he had not heard before); he said: — "When you have got a house on a gravel soil, do not be too sure that you are free from this pestiferous ground-air, for if a drain in the adjacent houses happens to leak, and the soil under the adjacent houses is saturated with sewage, the ground-air there may pass through the house and carry the impurities of your neighbor." Therefore, unless artificial contrivances were adopted to prevent the ground-air entering at all, we could not be free from the risk of poison by these means.

AMATEUR ARCHITECTURE.



(From the *British Architect.*)

THERE is a certain stage of human development at which it is often to be observed that a lady or gentleman comes somehow to be possessed by a singular determination to play the amateur architect. Sometimes the fancy goes so far as to aim at the designing of a church, but more usually it is content to limit itself to the apparently more humble endeavor to plan a house. That is to say, there appears to be a certain definite intellectual age at which many people attain strong convictions that they only require a fit opportunity in order to display a genius for architectural work — at least of an ordinary kind — which shall astonish every beholder. We may add that to a few the opportunity actually does offer itself — when they have to enter upon the undertaking of building on their own account; and the use that is occasionally made of this opportunity is the question before us.

Those who happen to have participated in the act of genius which is called planning one's own house will fully appreciate what we mean when we observe that the first great stumbling-block to such amateur adventure is unfortunately the staircase. Not that the impossibility of accomplishing the staircase is the fault of the designer; it is of course the fault of the staircase; but the way in which the amateur is invariably stumped by this homely feature is both amusing and suggestive. The remedy, however, is easy: it is determined that the staircase shall be postponed for the present, and, generally speaking, a "stroke" is placed in possession of a space about 18″ wide to satisfy the claims of destiny. Secondly, there is an element, not wholly unimportant or irrelevant, called construction, which enters more or less into every act of architectural design. We may frankly acknowledge that this does not trouble the amateur so much as might be expected. The amateur "leaves all that to the builder." The object of the amateur is merely to devise the best, "prettiest," and most comfortable, most convenient, most appropriate, and altogether "nicest" house that ever was thought of, and all this of course can be done with lines — or, as they are always preferably called, "strokes" — such as shall indicate to the imagination of the designer the admirable relations of the apartments to each other when they are duly constructed by those people whose business it is. Another question of occasional difficulty is the lighting; but this again the amateur is not to be fairly expected to go thoroughly into. The builder will "easily manage" that; there must be windows, and of course windows will be made. Fireplaces, again, are not always so well understood as they might be by the amateur, and it may be agreed on all hands that the design of smoke-flues is out of the question; but all that is the bricklayer's business and not the amateur's; the utmost that the amateur needs to determine is that there shall be no smoky chimneys, and that a certain particularly nice invention in the way of stoves shall be made use of, and that a certain clever firm shall be employed to put in the cooking apparatus, and so on. Then again, although there is a general idea manifested in the amateur's plan that the doors shall be "somewhere here," yet once more it is obviously as inexpedient as it is unnecessary to condescend too much upon details. To work to scale is another thing that may be mentioned as an undeserved inconvenience and embarrassment to the amateur. The amateur generally does not work to scale: the amateur imagination can get on much better without such a formality; but again this is only matter of detail. Lastly, something might be said about drains and certain conveniences to which they may be said to belong; but it would be too contemptible to ask the amateur to dabble in drains. The decorations are much more to the point; and here the amateur is generally quite at home. The precise shade of every color is fixed, and the design of one's own house is now completed so readily that the essentially feminine character of the whole process is made perfectly clear.

When the clergyman designs his own church the case is very much the same. The masculine considerations of construction are still left a good deal in the dark, not to say altogether unconsidered, unknown, and unkowable. The roof is to be like such a one's roof, the chancel like such another one's chancel, and the tower and spire like the tower and spire of so-and-so with certain improvements; but of all things the font is to be exactly like somebody's font which is absolutely faultless, and the subjects for the painted windows are left in the completest order.

Now there are several circumstances which may certainly be said to be of more importance than the amateur, whether in designing a church or in planning a house, seems to think. In the first place, the plan of a building of any considerable intricacy is one of the absolutely most recondite works of human skill; so much so that a thoroughly perfect plan, like a perfectly sound horse, is seldom to be met with. Secondly, the construction of the building is a thing that can never on any account be lost sight of for a moment. Thirdly, the language of drawing is a thing that is not "understanded of the people," and especially the language of plan-drawing. In order to appreciate the real difficulty of planning a house, let an average specimen of a young architect be taken, who has passed so many years in continual practice in an office, a year or so besides, perhaps, as a clerk of works, and several years in miscellaneous practice, and let him be set down to devise a good modern country mansion, not having made the subject a special study. The result, we may be permitted to say, would be so far from satisfactory, that we will simply ask leave to inquire how very much less satisfactory the plan of an amateur must be, who has passed no time in learning the business of plan, no time in learning construction, no time in practising the architect's various exercises of skill, no time in even acquiring the language of drawing. It is not too much to affirm that, as matter of fact, there is not one man, and not half a woman, in ten thousand, who can in the slightest adequate way read even the simplest plan of an architect, saving of course a certain proportion of builders and their subordinates and of those who belong to some of the kindred professions. The amateur, in short, who professes to "draw the plan of a house" is obviously ignorant of the very alphabet of at least three languages that are in question.

Believing that amateur architecture in every shape is to be wholly discouraged and discountenanced — just as much so as amateur surgery or amateur warfare — we may observe that the way in which it is more generally done, or pretended to be done, is nothing more than this — some expert, or half-expert, is got to perform the real work of device, and the merit of it, or rather demerit, is of course exactly what might be expected. There are some persons who have a happy faculty of appropriating the work of others; and it is not to be wondered at if they take especial pleasure in the sense of personal distinction which is by such almost painful means acquired. But beyond this self-deception amateur architecture can never really go. Of the composition of the artistic part we have said nothing. Even of the case of an archæological clergyman, or even Sir Edmund Beckett or Mr. Beresford Hope, interfering in the design of a church, we have said very little. We are content to take the much more nearly possible task assumed by some cultivated gentleman — or lady — who ventures to think that no one can plan an ordinary dwelling-house so well as the occupant, who of course *must* know better than all the world besides exactly what is wanted. The whole enterprise from beginning to end is an effeminate failure, and cannot be otherwise. Architects are becoming more and more skilful in this country every day, and the necessity is therefore becoming greater for explaining plainly the obvious fact that the more they know of their business, the less does anybody else know of it. — *The Architect.*

AMERICAN SOCIETY OF CIVIL ENGINEERS.

The society met Wednesday evening, April 19, Maj. George W. Dresser in the chair. Mr. John Bogart, Secretary.

The deaths of two members were announced: Prof. C. G. Forshey, of New Orleans, and Capt. C. W. Howell, Corps of Engineers, U. S. A.

Mr. Ricardo Orozco, C. E., of Mexico, exhibited and explained the plans and profiles of the proposed Works of Drainage of the Valley and City of Mexico. The explanations were translated by Mr. Theophilus Masac, C. E. The city of Mexico is situated in a basin without natural outlet. The lake Texcoco, within a very short distance of the city, in times of flood overflows and affects deleteriously the city to such extent that its sanitary condition has become very bad. A short distance farther from the city are the lakes Chalco and Xochimilco, which also overflow towards the city. Three other lakes at more considerable distances are in the same basin. There are no natural outlets, only evaporation lowering the areas of the waters. The extreme desirability of securing drainage from this basin has been long felt. In the seventeenth century Senor Enrico Martinez, an engineer under the Spanish authorities constructed a tunnel partially through the mountain Nochistongo, which however never was entirely completed. Many years afterward the Jesuit fathers made an open cut down to the tunnel. This work cost a very large amount of money and many lives. Proper slopes were not maintained, and the earth caved in frequently. The drainage has never been properly kept up. Senor Orozco's plan is to construct an open canal upon such grade as will entirely drain the lakes Xochimilco, Chalco, and Xaltocan, and also maintain at regulated surfaces the lakes Texcoco and Zumpango. Through the city of Mexico are to be constructed sewers flushed by the waters from the lakes, which are carried to a common conduit, where the sewage is purified by deposition, the solid matter to be used for fertilization, and the water carried away in the canal. The whole length of the canal would be about fifty miles. Expense about $7,000,000.

Maps, profiles, and plans, executed in a remarkably fine manner, were exhibited.

THE PROPOSED CONGRESSIONAL LIBRARY BUILDING.

April 16, 1882.

To the Editors of the American Architect: —

Dear Sirs, — Will you kindly permit me to make a suggestion? One of the most important and characteristic buildings of modern times is about to be built in this country. It has assumed definite form on paper, has received sanction of the authorities, and seems likely to be carried into execution. I refer to the proposed National Library Building at Washington. The nation should not be committed to such a building without the best expert criticism from librarians and architects. The proposed structure has not had the advantage of either. Indeed, it cannot have such criticism unless the design of it is duly published. The *American Architect* can best subserve the professional interests, which it is its business to promote, and can best advance its own interests by devoting itself seriously to the publication of these very important plans and elevations. It seems to me the paper cannot maintain its due position — much less advance to those higher planes which it can readily reach, unless it takes hold of such large national questions as this, and makes itself known throughout the country as high authority on such matters.

Pardon me for saying that it would be a reproach to the paper not to make every possible effort to publish these plans, as it would certainly be a reproach to the architect to deny them for such use. An exhaustive review and analysis of such national undertakings is the proper work of such a journal. Indeed, in my judgment, no national building should be erected without publication. The *American Architect* should establish such relations with the architect of the Treasury Department that his designs should constantly appear in the journal, and certainly Mr. Smithmeyer's project, with such explanations as he may wish to present, should enjoy the advantage of proper publicity. No other journal can give it. I write these things as your ardent friend and supporter. Truly yours, H.

[No one would be better pleased than ourselves if this journal should come to be recognized as the proper medium for making all important designs known to the public, and we are always grateful to those who help us in our efforts to make it so. In regard to the designs for the new Congressional Library we have so far assumed only an attitude of interested expectancy, knowing that the elevations recently published in various journals were, so to speak, only rough draughts, and feeling confident, from previous knowledge of Mr. Smithmeyer's courtesy and regard for professional opinion, that as soon as his designs had received the study requisite to bring them into full consonance with his idea, we should be enabled to reproduce them for the benefit of our readers, most of whom understand the great amount of labor which study involves, and will be quite willing to wait patiently for the completed result. — Eds. American Architect.]

THE CANALIZATION OF THE MISSISSIPPI VALLEY.

New Orleans, April 13, 1882.

To the Editors of the American Architect: —

Dear Sirs, — But for the statement in your article of April 8, in reference to the Mississippi River, in which appears the statement that the Bonnet Carré Crevasse caused a fall in that river of 8 feet at Vicksburg, I would leave the discussion of the question with those giving it more specially their time and having more precise statistics at hand.

In point of fact Bonnet Carré, 40 miles above this place and 140 from the sea at South Pass, is about 5 miles from Lake Ponchartrain, which rises and falls more under the influence of the winds than of the tide, which barely, if at all, affects it. About 30 miles more through the Rigolets will reach Lake Borgne where real tide-water is found.

In the 24 hours following the crevasse, in 1874, a fall of about 1 to 2 feet was noticed in the neighborhood, reduced to about 1 inch at New Orleans, but quickly followed by a continuation of the previous rise, counteracting the sudden slight depression. The levees above or below have never been relieved in a measurable degree, although it is probable that the water might have been higher without the crevasse.

The flood this year found outlets not previously thought of. The waters leaving the Mississippi, in Arkansas, practically did not return to it, but followed the bayous, rivers and lowlands even to 100 miles or more from the main stream, and finally reached the sea, partly through the Teche River (or Bayou), over-running even the high banks of the stream into Vermillion Bayou, never before thought possible, and causing the erection of levees at Franklin, a thing never before done in the history of the country. Notwithstanding all this and all the other crevasses above this city, there were still numerous crevasses below here: thus testifying to the inefficiency of outlets in substantially relieving the Father of Waters in his gigantic rampages.

The canalization, if such be feasible within the means of the Nation, would give more *rapid* discharge. Its practical effect, however, would be to establish a more or less uniform new grade from the distant sources of supply to the point of discharge; sometimes lower, *sometimes higher* than the present grade. None of the "cut-offs" have materially lowered the level of the water above or below. The canalization would then require leveeing of practically the same average height as now, and would lead a more rapid stream through new and untried lands, with all their underground quicksands, which would soon crook the stream again unless protected not only against erosion but also against their own tendency to "flow" out. I have been a witness to a "cave" on the dead water side of a point, at a time of low-water, where land one acre wide at the bank, extending some three acres inland, suddenly went down so as to leave some 80 feet of water where the surrounding country was nearly 30 feet above water.

The erosion being practically uniform in all parts of the "canal" its whole length would have to be guarded.

It must seem more practical to centre expenditure at the comparatively limited sections now being worn away, say about one quarter of the whole, at most; while much less is actually dangerous. It is just as easy to revet against the direct action in a bend as against a more or less parallel, more rapid current, especially when in the first case the weak points are indicated by the stream itself. Again General Grant can testify that the river cannot be diverted by grand but pigmy operations. A stream one mile or more wide and reaching to 190 feet in depth cannot be straightened by a few millions of dollars. It is a power in itself, and being the drainage of nearly the whole country, requires the efforts of the whole country to keep it in bounds at high water, just as being the inland navigation for the whole country it is in the interest of the whole country to prevent its diversion and consequent shallowing in low water.

I must add that the dredging found necessary by Captain Eads at the Jetties, when erosion of the loose upper sand had exposed the clay bed, gives a measure of the work of cutting a new bed for the Mississippi. Yours, etc., Jas. Freret.

THE LATE ELEVATOR ACCIDENT AT WASHINGTON.

New York, April 24, 1882.

To the Editors of the American Architect: —

Gentlemen, —We note in your issue of April 15, 1882, an editorial referring to the elevator in the new building occupied by the War and Navy Departments, at Washington, which you state "fell last week from the third floor to the basement, carrying with it six persons, who were badly bruised but not permanently injured." As you were doubtless laboring under an erroneous idea of the facts, we beg you will publish this letter in your next issue.

On April 10, 1882, Hon. Wm. H. Hunt, Secretary of the Navy, appointed a Board to carefully inquire into and report the nature of the accident which occurred to the elevator on the 8th inst., and the cause of the same. On April 14th the Board submitted their report, in which they say, "*The occupants were unhurt and the car not at all injured. The Board are of the opinion that the elevator machinery as fitted to this building is equal to any steam-elevating machinery built, both in design and workmanship.*"

The only thing which occurred was the slipping of the engine belt, allowing the car to descend, under control of the "retarder." The elevator had been in use three years, and after personally examining the engineers in charge, the Board regret "to state that in their opinion there has not been that care of the machinery and careful adjustment of its working parts by these persons as is an absolute necessity for the safety and reliability of this important work."

With reference to the foregoing report we would state that one of the safety devices connected with this elevator, and the one called

into action in this instance, is a fluid brake, which is intended to prevent the car running down — from any cause — at an unsafe speed, and this brake performed precisely the duty for which it was constructed, and in an entirely satisfactory manner, saving from all harm the car and its seven occupants. This brake is not intended to entirely stop the descent of the car, but to regulate its speed to a safe limit. In this case, while no damage was done, the occupants were startled by the fact that the operator was unable to control the car in its descent.

After an experience of twenty-five years in building hoisting-machinery, having constructed the greater part of the first-class passenger-elevators throughout the United States, and some in foreign countries, we desire to say that "*no person has ever been injured upon one of our passenger-elevators!*" When we further state that it is estimated that upwards of fifty millions of people are annually carried on our elevators in New York city alone, the extent to which they have been introduced can be better understood, and the fidelity with which they have performed their duty appreciated.

Very respectfully, Otis Brothers & Co.

SUN-DIALS.

Crown Point, Ind., April 13, 1882.

To the Editors of the American Architect: —

Gentlemen, — Will you please inform me through the columns of your journal, if there is any book which I could procure upon sun-dialling, if not, perhaps you can kindly inform me of the mode of laying out a dial. Respectfully, A Reader.

[The simplest way to construct a dial is to secure the plate in a position exactly level, fix the "style" which may be of stout wire, or a thin plate of metal, by trial, so that its shadow at noon shall exactly coincide with the intersection of the vertical plane of the style with the dial-plate; then compare the movement of the shadow with that of a good watch, and draw lines to coincide with the position of the shadow at each hour. The angle which the style makes with the dial-plate must be equal to the latitude of the place, or in other words, the style will point to the north star, and the angles which the hour lines make with the meridian line will vary with the latitude. — Eds. American Architect.]

TILED STOVES.

New York, April 18, 1882.

To the Editors of the American Architect: —

Gentlemen, — In your notes relative to the Building Exhibition now being held in London you refer to Cliff's Tiled Stove. You will find two of them at Messrs. Fiske & Coleman's, 62 Congress St., Boston, and I have no doubt it will be worth your while to send some one to look at them. As these were sent here as samples out of the first lot manufactured, they will hardly do justice to what are being turned out now, as many improvements have been made.

Yours truly, S. A. Rimington,
Cliff's Sole Agent.

NOTES AND CLIPPINGS.

Moving a House by Railroad. — It is reported in the daily papers that Joseph Cummin, master carpenter of the Long Island Railroad, removed a lathed and plastered dwelling, 18 by 24 feet in size, from Bethpage to Bellport, a distance of fifty-three miles, on two platform cars, and placed it on its foundations in thirty-six hours. The house was landed without the breakage of a window-pane or a crack in the walls. The cost was about $1.50 a mile.

Rice-Flumes in the Mississippi Levees. — The *Times-Democrat*, of New Orleans, draws from the Mississippi floods the lesson that rice-flumes in the levees must be abolished, and that the Legislature must take this work in hand. "In our opinion," says that journal, "the danger and injury connected with rice-flumes have been sufficiently demonstrated. These flumes have caused innumerable crevasses; they are an element of weakness where everything should be sacrificed to strength. They offer no sort of consideration for the damage they threaten or inflict, and there is not the faintest justification for their existence. They should be prohibited by the supreme law-making authority of the State, and local governments should be held responsible for their suppression. Those who are engaged in rice planting can easily provide means of irrigating their fields. A steam pump of sufficient capacity can be purchased for $200 or $300, and, in cases where there are farmers not able to incur this expense, a group of neighbors could club together for the purpose. One thing is very certain, — the riparian parishes, and communities in the rear subject to overflow, cannot longer afford to have the levees upon which they depend for protection honeycombed by rice-flumes."

Erecting Wrought-Iron Chimneys. — A novel plan for erecting the casings of fire-brick hot-air stoves and wrought-iron chimneys is being pursued at the Pennsylvania Steel Works, Harrisburg. Two new blast-furnaces, with six Whitwell stoves, 60 feet high and 18 feet diameter, are in course of erection there. Instead of putting the bottom plates of the stove together on the ground, and building the rings up from the bottom to top, at the works mentioned a commencement is made with the top plates and top ring of the stove. They are first erected on the ground, and riveted and caulked complete; then with three very large screw-jacks, having a lift of about six feet, and placed at equal distances around the site of the stove, worked by men with winch-handles, this first ring is carefully and evenly lifted high enough to enable the workmen to put on the next ring of the plates, five feet deep. This ring is also riveted and caulked complete; then another ring is added and lifted, and so on till the whole stove is completed. The wrought-iron chimney, 175 feet high, for working these stoves, was erected in the same way. — *Iron.*

Tourists who Infest Egypt. — The *Builder*, quoting a correspondent of the *Debats*, censures the conduct of certain tourists who infest Egypt. They "increase in numbers every year; reports of revolution, insubordination in the army, and cholera, are powerless to hinder them: and those easy means of communication, the steamers that now run frequently up and down the Nile, bring in larger numbers than ever the strangers to see the ruins. Their presence, however, is, we are sorry to hear, deeply regretted by the genuine archæologist. In the thirty years that Egypt has been thus visited, more harm has been done to its old buildings than in the centuries of so much abused neglect which have passed over the country. The destruction caused by the tourists is really serious; piece by piece the inscriptions and the wall-paintings have been chipped away to supply 'mementoes.' M. Charmes describes how, on visiting a few days previously the Valley of the Kings, he found most barbarously mutilated the famous tomb of Seti I, which was discovered by Belzoni; the alabaster sarcophagus is, it will be remembered, at present in Sir John Soane's museum. When Belzoni and Champollion entered the tomb it was intact; not a word of the inscribed text was wanting; the wall-paintings were as fresh in color as if painted the day before; now the tomb is nearly a ruin, and in a few years the destruction will be complete." We may add to the remonstrances of our contemporary the questions, How is it possible to censure this wanton and petty mischief when the removal of noble obelisks to London and New York is thought worthy of public applause and national honors? What is the difference in stupidity between knocking off the nose of a statue, defacing a tomb, or carrying away one or more of the few obelisks left? — *The Athenæum.*

Folklore of Architecture. — The tradition at Duffield is as follows: — At this village was anciently a castle belonging to the Ferrars, Earls of Derby. The site of this castle is still known by the name of Castle Orchards, and at a very short distance from the hill on which the castle stood, is another eminence (only one field's breadth off) on which are some ancient cottages. There is a tradition current in the neighborhood that the church was originally intended to be built on this eminence, but after the work had been commenced and proceeded to some extent, the devil, for some unexplained reason, removed the whole of the work in one night to the site it now occupies, in a field by the side of the river Derwent, at quite the opposite side of the village. The workmen were naturally surprised in the morning at finding that their work had all disappeared, and after solemn prayer again began laying the foundations, but to be carried away again by the devil on the succeeding night. Day after day the same thing was enacted, the whole of the material brought in the day being removed and set up in its right place on the site the arch-fiend had chosen for it; and at last he so completely triumphed over the patience of the workmen, that they went down to the place where he had carried the material, and completed the church where it now stands. The eminence, it appears, on which the church was originally intended to be built, was a place of rendezvous for evil spirits, for at the present day the villagers firmly believe a "brown man," or bogie, is to be seen every night near the cottages. — *Llewellynn Jewitt in the British Architect.*

A Novel Grain Chute. — Chutes over dams for log and lumber driving, and slides down mountains and hillsides for same purpose, are common, but such appliances for running grain from mountain-tops are a novelty that Washington Territory has introduced among the utilities of industry. They are employed on Snake river. The hills on either side are so rugged and precipitous that a wagon road is an impossibility, but the great wheat country demanded that the grain should be brought to the river banks as expeditiously and economically as possible, therefore, pipes were laid up the face of the mountain, and grain is now sent down in bulk to the warehouse, where it is again sacked; the price paid is $2.50 per ton for merely bringing it from the top of the hill to the boats; the pipes are of wood and are fully half a mile in length. — *Northwestern Lumberman.*

Purification of Water. — The process devised by Mr. Peter Spence, of the Manchester Alum Works, for purifying inferior, discolored water, has been lately tried on a large scale at the Water-Works of the Bolton Corporation, and the result is reported in the local papers as thoroughly satisfactory. The Bolton water is said to contain a proportion of micaceous clay in such a state of suspension that neither filtration nor long settlement in reservoirs will remove its dirty opaque tint. The trial has been made at the Heaton reservoir, one of the two service reservoirs supplying Bolton and district; the other, the Sweetlove's reservoir, having been left untouched. The result of the trial is reported to be that, whereas the latter contains a mass of water which, upon being looked at through the two-foot tube, over white paper, would be pronounced unfit for drinking purposes, the Heaton reservoir now contains some sixty million gallons, which is transparent and colorless. It may be added that this result has been achieved without in the least degree hardening the water or introducing any new constituent into it, or without in any way affecting the fish in the reservoir; and the cost of treatment so far is stated not to exceed one half-penny per head per annum of the population. Mr. Spence claims the additional merits for his process that it can be controlled with the greatest ease and certainty, by a test which any laborer can be readily taught; that the unskilled labor of one man for a few minutes per day is all the work it requires; and that the total cost of treatment per million gallons is insignificant in comparison with the gain resulting from transforming dirty into clear, colorless water. Dr. Angus Smith, H. M. Chief Chemical Inspector under the Alkali Act and the Rivers Pollution Prevention Act, and one of our leading authorities on the impurities of air and water, has, it appears, tested the clarifying and decolorizing influence of the process upon the Manchester water, with the following results: Distilled water, 33; Manchester water, treated, 32; and Manchester water, untreated, 14. Dr. Smith also considers that a notable proportion of the pernicious, though invisible, albuminoid matters would be removed, along with the colored and mechanical impurities. — *Journal of the Society of Arts.*

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.]

256,432. Wood and Coal Elevator. — Geo. B. Allis, Little Rock, Ark.

256,456. Plastered Wall. — August H. Becker, St. Louis, Mo.

256,457. Earth-Auger. — William Brunner, North Lewisburg, Ohio.

256,462. — Ellipsograph. — Ezra E. Clark, Worcester, Mass.

256,478. Column, Shaft, Girder, Etc. — Henry J. Harrison, Liverpool, County of Lancaster, England.

256,480-481. Faucet. — John Howes, Worcester, Mass.

256,493. Saw-Handle Clamp. — William McNiece, Philadelphia, Pa.

256,509. Water-Closet. — Robert Reach, Washington, D. C.

256,510. Water-Faucet.—John Stephenson, Haverhill, Mass.

256,517. Elevator. -Stephen H. Thornton, Baltimore, Md.

256,541. Water-Closet. — August F. Biesch, Columbus, Ohio.

256,546. Wood-Screw Machine. — Asa S. Cook, Hartford, Conn.

256,549. Water-Closet and Garbage-Sink. — William H. Daniell, Pottsville, Pa.

256,557. Curtain-Fixture. — Hugh Farley, Philadelphia, Pa.

256,559. Adjustable Spring-Bolt. — Peter Forg, Somerville, Mass.

256,567-568. Mode of Incasing Knots or other Defects in Wood. — Britain Holmes, Buffalo, N. Y.

256,629. Combined Pencil-Point Protector and Twine-Cutter. — Claes W. Boman, New York, N. Y.

256,637. Sash-Holder. — James Campbell and Gibson Simonson, Harrison, O.

256,644. Window-Sash. — John F. Cox, Brooklyn, N. Y.

256,654. Combined Window-Cleaning Chair and Fire-Escape. — Anna Dormitzer, New York, N. Y.

256,665. Door-Lock and Latch. — Ole Flagstad, Hamar, Norway.

256,666. Cutter-Holder for Lathes. — Frederick N. Gardner, Hartford, Conn.

256,669. — Die and Die-Stock. — Jno. Gassman, Jackson, Mo.

256,702. Hydraulic and Pneumatic Elevator. — Geo. Johnson, Cincinnati, O., and Walter M. Bailey, New York, N. Y.

256,705. Water-Proof Paper-Hanging. — Chas. T. Kemmer, Cleveland, O.

256,731. Wash-Boiler Fountain. — Elie Pittet, East New York, N. Y.

256,736. Curtain-Fixture. — Wendell P. Putnam, Watertown, Mass.

SUMMARY OF THE WEEK.

Baltimore.

Building Permits. — Since our last report twenty-eight permits have been granted, of which the more important are as follows: —

George L. Krebs, 4 three-st'y brick buildings, Fayette St., between Caroline and Dallas Sts.

Henry Bogue, four-st'y brick warehouse, No. 65 Eutaw St., between Camden and Pratt Sts.

Walker Horse-Shoe Company, one-st'y brick building, 60′ x 180′, s w cor. Clagett and Allen Sts.

J. S. Bowen, three-st'y brick building, Pratt St., between Washington and Castle Sts.

Isaac Weinberg, 2 three-st'y brick buildings, Exeter St., between Hillen and Front Sts.

Woelk & Pierson, 4 two-st'y brick buildings, Hanover St., commencing 62′ s of Fort Ave.

Sarah De Wolf, four-st'y brick warehouse, Gay St., cor. of Harrison St.

L. H. Robinson, 9 three-st'y brick buildings, Mount St., s of Lanvale St.

L. H. Robinson, 11 two-st'y brick buildings, Bruce Alley, s of Lanvale St.

John Shuffler, two-st'y brick building, rear of n e cor. Charles and Randall Sts.

Chas. C. Green & Gandy, two-st'y brick blacksmith shop, n e cor. Boston and Concord Sts.

A. Gottschalk, four-st'y brick warehouse, s w cor. Light and Balderston Sts.

Thos. E. Masson, 2 two-st'y brick buildings, Lombard St., e of Lloyd St.

Martin Mamell, 2 three st'y brick buildings, Eastern Ave., e of Patterson Park Ave.

Geo. C. Hershman, 4 two-st'y brick buildings, Madeira Alley, n of Bank St.

Dr. E. D. Loughery, 2 two-st'y brick buildings, Gay St., n of the "Bridge."

Boston.

Quarterly Report.—The following table shows a comparison of the building permits granted for the three months ending April 1, for 1881 and 1-82.

	1881.	1882.
Brick	49	49
Wood	88	164
Alterations, repairs etc.	503	398
Boilers, engines, etc.	125	110
Heating apparatus	42	101
Special (wood)	5	5
Total	757	803

Alteration. — The Lowell estate, on Park St., is to be altered into a store and office-building for Geo. A. Smith & Co.; cost, $12,000; Geo. H. Young, of Boston, architect.

Building Permits. — *Brick. — Allen St.*, Hospital Grounds, Ward 9, for Trustees Mass. Gen. Hospital Corporation, pavilion for nurses, 25′ 6″ x 155′ and 32′ 6″, three-st'y; James Smith, builder.

Lafayette St., near Orient Ave. Ward 1, for Eliza Dunn, dwell., 16′ x 25′; Wm. Dunn, builder.

Pearl St., cor. High and Wesley St., Ward 4, for Thomas Doane, family hotel and stores, 52′ and 68′ 6″ x 72′ 2½″ and 79′, one-st'y and mansard; Weston & Shepard, builders.

Wellington St., Ward 18, for Thomas M. Stevens, family hotel, 38′ and 43′ x 63′, four-st'y; Thos. M. Stevens, builder.

Bedford St., 29 *and* 31, *Harrison Ave., Exeter Pl. and Chauncy St.*, 77 *and* 79, Ward 10, for Frederick L. Ames, Mercantile building, five-st'y; T. J. Whidden & Co., builders.

Wood.—O St., Ward 11, for F. O. Clark and Wm. H. Lee, 4 dwells., 20′ x 36′, two-st'y; F. O. Clark and Wm. H. Lee, builders.

152-143 , Ward 2, for Osborn Engine and Manufacturing Co., mechanical, 50′ x 70′; ells, 16′ x 50′ and 25′ x 30′, two-st'y mansard.

Oriole St., rear, near Wren St., Ward 23, for Charles M. Seaver, stable, 20′ x 30′; T. Albert Orrall, builder.

Pleasant St., rear of, near Mayfield St., Ward 24, for Ezra H. Baker, green-house, 15′ x 75′; McNeil Bros., builders.

Dale St., near Walnut Ave., Ward 21, for Wm. Donaldson, dwell., 21′ x 30′, two-st'y; Wm. Donaldson, builder.

Ocean St., near Roslin St., Ward 24, for D. Frank Hartford, dwell., 26′ x 38′, two-st'y, Noyes & Bros., builders.

Taylor Ave., near Taylor St., Ward 20, for Henry L. Batchelder, dwell., 18′ x 21′; ell, 13′ x 24′, two-st'y; Frederick W. Webster, builder.

Train St., near Boutwell Ave., Ward 24, for Frank O. Nash, dwell., 37′ and 39′ x 43′, two-st'y; Wm. G. Blazo, builder.

Bearse Ave., cor. Butler St., Ward 24, for Nicholas B. Soule, dwell., 21′ x 28′, two-st'y; Nicholas B. Soule, builder.

Lamartine St., rear of, near Spring Lane, Ward 23, for Martha Nelson, 2 dwells., 25′ x 35′, two-st'y; D. G. Drew, builder.

Boston St., near Dorset St., Ward 15, for Edward B. Clapp, dwell., 22′ and 32′ x 34′, two-st'y; John Horsfield, builder.

Creighton St., rear of 5, Ward 22, for Michael Henler, dwell., 21′ x 30′, two-st'y; Andrew Cassidy, builder.

Brooklyn.

Building Permits.—*Leonard St.*, e s, 25′ n Nassau Ave., one — frame tenement; cost, $4,000; owner, Mary Preston, extrx., Leonard St.; architect, Fred. Weber; builders, Pat. Newman and John Fallon.

Leonard St., e s, 50′ n Nassau Ave., 3 two-st'y and basement frame dwells.; cost, $8,900; owner, Mary Preston, extrx., Leonard St.; architect, Fred. Weber; builders, Pat. Newman and John Fallon.

Madison St., s s, 100′ e Bedford Ave., 2 three-st'y brownstone dwells.; cost, $4,500 each; owner and carpenter, John Hayes, 135 Stockton St.

Delavan St., s w cor. Richards St., three-st'y brick manufactory; cost, $9,000; owner, Chesbrough Manufacturing Co., 110 Front St., New York; architect, Augustus Hatfield; builders, P. Carlin & Son.

Cooper St., n w cor. Central Ave., two-st'y frame store and dwell.; cost, $3,200; owner, A. Krebs, Montrose Ave.; architect, George Hillenbrand; builders, W. Bayer and P. Schen.

Wyckoff Ave., n s, 25′ w Palmetto St., two-st'y frame store and dwell.; cost, $4,500; owner, Frederic Cromwell, 188 Columbia Heights; architect, R. B. Eastman; builders, James Ashfield & Son and Long & Barnes.

Park Pl., n s, 125′ w Franklin Ave., 2 three-st'y frame tenements; cost, $3,500 each; owner, Samuel Northbridge, Hoyt St.; architect and builder, Rulef Van Brunt.

Dean St., s s, 290′ e Brooklyn Ave., three-st'y brick dwell.; cost, $7,500; owner, Francis Peck, Eighth St., near Broadway; architect and builder, James Lock.

Clinton Ave., n e cor. Willoughby Ave., five-st'y and basement Newark stone convent and chapel; cost, $25,000; owners, Sisters of the Visitation, on premises; architect, P. C. Keely; builders, McGivney & McLaughlin; also, foundation only for convent; cost, $7,500.

Hudson Ave., e s, 84′ from De Kalb Ave., five-st'y brick stable and storehouse; cost, $7,000; owners, Johnstone Bros., Fulton St., near Bond St.; architect, W. J. Conway; builder, I. Brown.

Warren St., n s, 375′ e Third Ave., 5 four-st'y brick flats; cost, $8,000 each; owner, J. W. Dearing, 434 Henry St.; architects, Parfitt Bros.; builder, G. B. Dearing.

Bushwick Ave., n e cor. McKibbin St., two-st'y brick rope factory; cost, $3,300; owners, W. Wall's Sons, Wall St.; architect and carpenter, S. M. Weeks; mason, Jas. Rodwell.

Waverley Ave., w s, 133′ n Fulton St., 4 three-st'y and basement brownstone dwells.; cost, $8,000 each; owner, Isabella G rdon, 2 Willow St.; architect, R. Dixon; builder, John Gordon.

Humboldt St., w s, 25′ s Cook St., three-st'y frame tenement; cost, $4,500; owner, Jos. Vath, Humboldt St.; builders, J. G. Hoepfer and George Heerlein.

Lafayette Ave., n s, 15′ w Sumner Ave., 4 two-st'y frame dwells.; cost, total, $13,400; owners, Chas. and Isaac DeBevoise, 104 Debevoise Ave.; builders, S. J. Burrows and Marinus & Gill.

Devoe St., No. 276, s s, 175′ w Olive St., three-st'y frame tenement; cost, $2,900; owner, Frank Morhardt, on premises; architect, Geo. Hillenbrand; builder, M. Metzen.

Bushwick Ave., w s, 25′ from Grand St., 2 three-st'y frame stores and tenements; owner, Henry Heinking, cor. Grand St. and Bushwick Ave.; architect, A. Herbert; mason, Jacob Rauth.

Alterations. — *Remsen St., No.* 132, one-st'y base brick extension; cost, $4,000; owner, Miss A. B. Cary; architect, H. R. Searls; builders, J. H. Stevenson and Morris & Selover.

John St., cor. Bridge St., two-st'y brick extension; cost, $3,000; owner, P. Cassidy, 1119 Madison Ave., New York; architect, M. J. Morrill; builders, Hart & Daly and J. Williamson.

Fulton St., Nos. 2, 4 *and* 6, one-st'y brick extension; cost, $2,500; owners, Jewell Mill Co., on premises; architect, H. S. Jewell; builder, Jas. Rodwell.

Herkimer St., No. 776, one-st'y frame extension; cost, $2,500; owners, German Reformed Church, near premises; architect, H. Yaeger, Jr.; builders, C. Baur and H. Yaeger.

Chicago.

Chamber of Commerce. — The Building Committee of the Board of Trade have at last made a selection from the designs submitted for the new Chamber of Commerce. The plan submitted by Mr. W. W. Boyington is the one adopted. We understand that quite a number of changes are to be made. The estimated cost will be $850,000.

Apartment-Houses. — Mr. Samuel Wheeler will build on the corner of Rush and Ohio Sts. a five-st'y building, 80′ x 142′, four flats in each story, twenty in all. The front will be of Philadelphia brick and Bedford stone finish; cost, $125,000.

Houses. — On Walton Pl., between State St. and Dearborn Ave., are to be erected 5 houses for Messrs. C. N. Fullerton, H. A. Huntington, W. S. North, A. F. Hatch, and O. F. Aldis, 127′ front, of red pressed brick, iron and terra-cotta, harmonious in design but not identical; cost, $85,000; Messrs. Burnham & Root, architects.

Building Permits. — C. J. Hull, 4 two-st'y dwells., 48′ x 50′, 211-213 Taylor St.; cost, $3,000.

Potter Palmer, two-st'y cottages, 30′ x 44′, 2625-2715 State St.; cost, $3,000.

John Fischer, 2 three-st'y stores and dwells., 50′ x 74′, 3000 and 3002 Wentworth Ave.; cost, $12,000.

W. Earnest, basement, 20′ x 34′, 31 Thomas St.; cost, $5,000.

Hartman & Kabell, 3 three-st'y stores and dwells., 64′ x 72′, 958-962 North Clark St.; cost, $21,000.

W. J. & J. Rankin, two-st'y dwell., 23′ x 54′, 313 West Jackson St.; cost, $5,500.

Mrs. R. Schlotthaus, three-st'y dwell., 56′ x 92′, 93 to 101 Lincoln Ave.; cost, $20,000.

Samuel S. Jewett, six-st'y store and warehouse, 97′ x 264′, N. W. Market and Monroe Sts.; cost, $160,000.

J. L. & F. W. Campbell, 8 two-st'y dwells., 21′ x 36′, De Kalb St.; cost, $20,000.

Geo. A. Seaverns, three st'y flats, 80′ x 89′, Twenty-second and State Sts.; cost, $34,000.

C. J. Hull, 4 two-st'y dwells., 48′ x 50′, 1019-1021 Fulton St.; cost, $3,000.

B. Mandel, three-st'y flats, 25′ x 65′, 457 La Salle St.; cost, $7,000.

M. Hoffman, three-st'y flats, 25′ x 65′, 455 La Salle St.; cost, $7,000.

C. S. Epps, two-st'y addition to dwell., 20′ x 36′, 167 Cross St.; cost, $3,000.

J. West, two-st'y dwell., 24′ x 64′, Hoyne and Madison Sts.; cost, $6,000.

Phillip Straw, two-st'y dwell., 20′ x 60′, 673 Twenty-second St.; cost, $4,200.

Geist Bros., two-st'y addition to store, 20′ x 65′, 181 State St.; cost, $3,000.

Cincinnati.

Strikes. — The plasterers are still out on a strike and it appears at present as though the differences between the parties interested are not likely soon to be accommodated. The bosses are determined "to fight it out if it takes all summer."

Although the carpenters' strike has not yet commenced (the 1st of May being the time set for the same), yet there is apprehended even more trouble than from that of the plasterers, as the bosses seem determined to settle once for all as to who is actually the "boss" of the carpenter business, and so lively times may be anticipated, and what between strikes and rumors of strikes and high prices, what might have been a very busy season will more than likely terminate in a very poor one, as we hear of a great deal of work being delayed, postponed, or altogether withdrawn; the owners awaiting seemingly a more convenient season.

Wages at present are: brick-masons, $4.50; limestone masons, $3.00; carpenters, $2.50 to $2.75; plasterers, $2.50; plumbers, $3.00 to $3.50.

Prices. — The price of brick has lowered; common work can now be laid in the wall for $12 to $13 per M. Ordinary limestone work is about $4 per perch laid. Lumber yard sizes, $20 per M. Finer grades of white pine are held as high as $50.

Although prices are very little if any higher than they were last year, yet they are fully forty per cent higher than two years ago.

Houses. — Mr. Jas. W. McLaughlin, architect, is preparing plans for a large stone dwell., for Matthew Addy, Esq., to be erected on East Walnut Hills; cost, about $40,000.

Mr. Jacob Burnet is building a stone house on Oak St., Walnut Hills, from plans prepared by W. W. Franklin, architect; W. H. Stewart's Sons, builders; cost, $18,000.

Mr. Geo. W. Rapp, architect, has let contracts for a brick dwell., for Edwin Alden, Esq., cor. of Chestnut St. and Gilbert Ave., Walnut Hills; cost, $9,500.

Dwell. for Mr. E. Kugeman, Ohio Ave., near Parker St.; cost, $10,000. He has also prepared plans for dwell., for Mr. Wm. Bodemer, on Findlay St., near Bay Miller St.; cost, $11,000.

Factory. — The Cincinnati Stamping Co. have let contracts for a new factory, five-st'y, 71′ x 90′, location s e cor. Pearl and Lawrence Sts.; cost, $25,000.

Opera-House. — Mr. David Sinton has purchased the Grand Opera-House, and it is rumored will remodel the interior and will endeavor to make it one of the best buildings of its kind in the country. The price paid was $200,000.

Kansas City, Mo.

Building Permits. — J. S. Chick, at No. 1314 East Eighth, St., two-st'y brick dwell., 20′ x 35′; cost, $3,500.

W. P. Moores, at Nos. 1116 to 1120, 2 two st'y brick dwells., 17′ x 42′ each; cost, $2,600.