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CONTENTS.

THE struggle over the Philadelphia Public Buildings develops, but does not decide itself. The dead-lock, however, seems to be loosening. Some time ago the Commissioners offered to pledge themselves that if the Councils would appropriate six hundred thousand dollars to continue work during 1878, instead of half a million as first provided, they, the Commissioners, would not trouble them with any mandamuses or other demands for money during the year; and accompanied this proposition with an agreement from the Messrs. Struthers not to demand in 1878 any sum beyond what the Commissioners should allow them out of this six hundred thousand. In the mean time the clause in the new constitution, which prohibited any municipal commission from incurring debts or making contracts on behalf of any city till appropriations had been voted therefor by its municipal government, had been relied on by the Councils as an effectual restraint upon the Commissioners from compelling any expenditure against the desire of the Councils beyond the contract already made with the Messrs. Struthers; and the decision of a lower court against a writ of mandamus upon the Councils, applied for by the Commission, sustained this reliance. But a decision of the Supreme Court (two judges out of seven dissenting) has lately reversed that of the lower court, and made the mandamus peremptory, ruling that the constitutional clause, though it takes away from the Commissioners the power to make contracts and incur debts in advance of appropriations, leaves them the authority, conferred by the act which appointed them, to demand and compel what appropriations they see fit. In truth, it can make little difference to the city government whether the Commissioners have power to bind it by contracts and then call for appropriations to satisfy them, or to compel the appropriations and then make contracts accordingly. On the strength of this decision the Councils have appropriated the six hundred thousand dollars proposed by the Commissioners for this year, and have with great unanimity passed an order appointing a joint committee to go to Harrisburg and urge the abolition of the Commissioners themselves.

THE law of ancient lights has been under discussion in the English building journals for a good while past. In a country where all vested rights are so jealously guarded, and where nature is chary of light during much of the year, it is natural that the possession of it should be maintained with zeal; and that the present activity in rebuilding large cities with buildings denser and higher than the old should lead to many quarrels between those who build and their neighbors. So rigidly, indeed, is the established access of light, even across streets and yards, guarded from interference, if we may judge from the English papers, that it would almost seem that the law of lights had been established for the express persecution of architects. It is carried so far, in fact, as to become an oppression which would here be considered intolerable; for a person may, as one writer instances, by going into an unoccupied region on the outskirts of a growing town, and covering a small lot with buildings, in a few years obtain by prescription a dominant right over the neighboring owners, which will make their land practically unavailing for building purposes, and so to all intents destroy its value. It would even seem that English jurisprudence is drawing the restraints of the law closer and closer in this respect, till the conflict of interests is likely to call for legislation. In the United States, on the other hand, the law of ancient lights is falling into desuetude, it is said, a natural consequence of its incompatibility with the conditions of modern society. Cases in the courts are few, and the judges grow more lenient in the application of the law; in fact, its severities are almost forgotten. In a country, too, where the atmosphere is usually clear, and the light strong and unclouded, the question of easement of light would probably never have acquired the importance that it has in England. A story is now going the rounds of the daily press, to the effect that a dealer has lately brought suit against a city for widening the street on which his property abutted, as by so doing the plaintiff's shop was made shallower by some twenty feet; the claim for damages resting in the fact that the changes made the plaintiff's shop so light that it damaged the sale of his goods, whose quality was such as to demand a dark place for their exhibition.

A SUIT was lately tried in England, and mentioned in the last *Architect*, where the defendant claimed that as the plaintiff's building was used as a coffee-house and cook-shop, sufficient light reached it for such an establishment. The Lord Chief Justice did not take this view, and the jury gave substantial damages for the plaintiff. The case was taken before the Court of Queen's Bench, where the judgment for the plaintiff was unanimously upheld. The law governing such cases as at present understood is well expressed in a recent decision of Mr. Justice Fry: "Access" — access being the word used in the Prescription Act, which governs such cases — "of light may be described as the freedom with which any light may pass through a certain space over the servient tenement. The aperture, in other words, is the measure of the access of light." Modern law therefore regards not merely a particular window, but the total amount of light enjoyed by the dominant tenement. In the case in question, as in similar cases, the defendant submitted the plea that the plaintiff was in part compensated for the loss of direct light, by the increase in the power of the reflected light, — a plea which fell flat because it has been decided that a tenement is entitled to have light of the same nature it has always had, and need not put up with reflected light as a substitute. As the rulings at present stand, they are wholly in favor of persons who possess the easement of light; and they may exact considerable damage for infringement on their right, or may even cause the obstructing buildings to be pulled down.

WE have more than once mentioned the Society of Decorative Art, instituted and supported by the ladies of New York. This has been at work for a year or more, and the results have been to a degree satisfactory. A society to be known as the Auxiliary of the New York Society of Decorative Art has been formed lately in Boston, which is to provide for the amateur artists in that neighborhood the advantages that are enjoyed by those who live near New York. The society differs in several points from its prototype, to which, by the way, although auxiliary it is not subordinate. The management of affairs is vested in committees, whose members belong to both sexes, a fact of itself which guarantees a more effective activity. As it is not at present proposed to establish any classes, the society will content itself with opening an establishment which will be part museum, part salesroom, and part intelligence-office, and such a place in a very central situation the society has acquired rent free; here the work of amateurs can be exhibited and sold, and here information as to materials and processes can be obtained. No work will be admitted that has not received the approval of the examining committee; and things that have been approved by either the Boston or New York society will be received at the rooms of the other without further inspection.

The use and value of such an organization depend on the standard of work it sets up, and this again depends mainly on its examining committee. If they insist on quality rather than quantity, and reject all work that has not real excellence, they may do good service, and improve the average of decorative work, as well as encourage the best. If they temper their judgment to the weakness of amateur skill, they may make their undertaking popular, and a commercial success; but this will be of very little public service, and the power of the organization to do better things will be thrown away. As a mere commercial undertaking, such an elaborate special machinery is superfluous. The ordinary course of trade will sufficiently provide for it. There is enough and to spare of decoration nowadays; and for the average of it, it were better to devise means of keeping it at home than of opening a market. We are led to say this because we understand that the New York Society has lessened its efficiency in just this way. Concession to a supposed expediency led to lowering the standard at first established, till the artists who once composed the examining committee lost heart and fell away, leaving the conduct of this part of the work to successors of more accommodating tastes. If a society of decorative art were a necessary thing, to be kept alive at a sacrifice, this might be reasonable. But such a society is not a necessity. Decorative art needs no encouragement: it needs direction, criticism, and the discrimination of the good from the mediocre. In this there is a field for such a society, and a chance to commend its existence by a useful influence. In this view, professional advisers have an advantage over others, in that their professional position gives them independence. A non-professional committee, apart from the question of fitness, is exposed to a great many influences, social and personal, which are a great embarrassment to the earnest and conscientious, and from which the professional censor is by his position more or less secluded; a consideration which we think was not sufficiently taken into account in the New York Society. We doubt if any thing more than a pecuniary success, and that temporary, can be secured for a society that takes the ground of compromise; but if the Boston one takes and holds a really high stand, it may do a valuable work. Artistically there is enough to do in discriminating what is good; and financially we suspect there will always be a reasonable demand for what is set aside as really the best that is to be had, though the supply may be small.

The labor troubles are far from having reached a settlement. Small strikes are going on in Burlington, New Haven and elsewhere, while those in Cincinnati may at any moment assume considerable importance. There the Socialistic Party, to the number of some three thousand, paraded the streets on the 10th inst., with banners bearing such devices as "Labor creates all, therefore labor should have all," and "Those things that man did not create should be man's in common." If these two very contradictory statements could be reconciled, we think it would be uncommonly pleasant to be a laboring-man. No disturbance occurred; but as the red flag was shown at various points, the police were kept in readiness to quell any outbreak. At the meeting after the parade, the speeches, which were of a decidedly red character, were more particularly directed against the eight-hour law, now before the State Legislature, concerning which it was said that as it made the working day eight hours long for employés on State work, while laborers under private contractors were left to make their own terms, it could be only an "electioneering dodge." The following resolutions, among others of a like nature, were passed: —

"*Resolved*, We demand that a law be passed that will make it a criminal offence for any private employer to permit a laborer to work longer than eight hours per day in said employer's service.

"*Resolved*, That the Senate Bill No. 8, which permits the employés of private contractors to contract to work longer than eight hours per day, justly damns the bill as a transparent piece of demagogism."

What was the cause or the upshot of the communistic meeting in St. Louis, on the 11th inst., we have not seen stated; but the red flag was openly paraded, and inflammatory speeches were made. In New York the French Communists held a meeting March 17 in aid of the widows and orphans of the Commune, and the Communists transported to New Caledonia. In this there is nothing to be noted, except that there is in New York an organized body of communists who give each other the title of "citizen." But perhaps the most significant event is the triumph of the working-men in California, who, in the three cities heard from, have elected all but three of their candidates. It is customary to assert that the country has nothing to fear from open and avowed communism; but with such a success of the working-men — whom the late riots, strikes, and disturbances prove to be willing to join hands with the real communists — following hard upon the disturbances and riotings of Kearney's followers in San Francisco, we find it hard to believe that it is well, simply because of sentiment, to let communism thrive in our midst.

There will be "nuts" for contractors if the House of Representatives passes the bill introduced by Mr. Schleicher of Texas. Mr. Schleicher, struck by the bad economy of the way which now prevails, of doling out appropriations for public buildings which are insufficient to carry the work on promptly, or of stopping work altogether for want of appropriations, and noticing that while the buildings linger the Government is paying a million dollars a year for rent in temporary quarters, has devised a remedy. He proposes that the Government shall borrow twenty millions at five per cent, and pay its million in the form of interest on this loan, using the principal to finish all its buildings in the course of a year, and establishing a sinking fund for the gradual payment of it. The bill is reputed, says the New York *Herald*, to be in favor with Congressmen, who desire to please their constituents; but we should incline to doubt both its efficacy and its economy. The difficulty of administering such an amount of work so pressed would, under the present system, be enormous; and to think of finishing it in any thing like a year would be preposterous. To set it actively in progress would give a great stimulus to the building-trades, certainly; and as far as cheapness goes, the present would be as good a time to build as the Government would be likely to find. But to fancy that this would be the end of it, would be very sanguine. The hunger of constituencies for public improvements is not so easily appeased. We imagine more mouths would be opened than would be closed by the bill, and the Government would find that the price of building would not keep its present level very long.

ARCHITECTURAL RESTORATION.

We have spoken before this of the debates concerning architectural restoration, which have been lately aroused in England, and have, in fact, grown into tolerably lively quarrels now and then. We have called attention to Mr. Stevenson's controversy with the restorers of his country's cathedrals, Sir Gilbert Scott at their head, and to Mr. Ruskin's witness of the uncleanness of the bread by which they live (*American Architect*, Nos. 80, 81); and last week we quoted part of a letter from Mr. Moore, describing a process which is specially characteristic of Italy and France, where smugness is apt to be considered an essential part of architectural effect.

On the general question of restoration, it is doubtful whether even thoughtful people can ever be brought to entirely agree. The debate which has been stirred up about it in England still continues. At a meeting of the Architectural Association last month, it was resumed with animation, and Mr. Stevenson bore witness against it with the same spirit as before. "I venture to affirm," he said, "that this generation has, mainly by its restoration, marred, altered, and destroyed more historical monuments than any previous three centuries put together. We have revised and rewritten in our new handwriting, copying as well as we could the old characters, every old record we could lay our hands on. I do not think posterity will thank us: rather, I expect their curses on us as self-conceited destroyers of the records of our country and history." There is no doubt that modern restoration has been in great part inconsiderately, irreverently, and even shamelessly done. But the question is not merely what has been done, but what shall be. Here the architect will perhaps always differ a little from the painter and the antiquarian. Mr. Ruskin may represent one extreme of

opinion; as the scourer of the Duomo at Florence, and the French restorers, who, not content with furbishing up the Cathedrals of Paris and Angoulême, have scored them within from end to end with clean black mortar joints against the white stone, represent the other. It is probably true, as Mr. Moore says in the letter from which we have quoted, that "few persons in Italy care any thing for the beauty of their old art." Mr. Ruskin somewhere speaks of having seen the restoration of a horse in one of Veronese's pictures undertaken with a pot of white paint and a large brush tied to the end of a long stick. But there is a difference among restorers; and men who have been indiscreet or mischievous in one place have in another stayed their hands with respect. M. Viollet-le-Duc and Sir Gilbert Scott have excesses to answer for; but to say that they have "extensively defaced, if not destroyed, nearly all the French cathedrals" and the English as well, is to make an accusation that it would be very difficult to sustain.

It is inevitable that in an age which is marked at once by great antiquarian interest and great enterprise in building, such controversies should occur, especially when the antiquaries and the builders are mostly different persons. It is the more natural in an age when, in spite of its architectural activity, there is no general current of style and feeling strong enough to absorb all interests, but instead a wide eclecticism, and discordant personal preferences; and still more in an age which is exceptionally characterized by the fondness for the picturesque and the romantic which accompanies its preference for landscape in painting, and for the charm of association. It is this last characteristic which more than the others distinguishes our age from all that have gone before it. There probably never was a time, till ours, when the adventitious, pictorial beauty which monuments owe to time and exposure, would have been put into competition with their worth as objects of architecture and of utility. It is this feeling which has imported a new element and infused acrimony into the discussions, leading them insensibly away from the question of purely architectural preservation. It is behind this feeling that the absolute opponents of all restoration really intrench themselves; and it has confused the discussions, because, so far as we see, no attempt has been made to discriminate it from a pure zeal for the conservation of architecture.

There are two very distinct sources of interest in any old monument. One is the human design and work of it; the other the marks which time, weather, and use have left upon it, with which we may include the associations of history which cling about it. As a building grows old, stains and marks of disintegration gather upon it, which add to it a delicate charm, and at first unite with its design in a harmonious effect of increased beauty. To these are to be added a good deal which is simply dirt, and the marks of abuse, but which the beneficent influences of sunlight and atmosphere translate into adornments that if not too curiously scrutinized have their own attractiveness and lend themselves to the general effect; but at length these additions and subtractions overlay the original design of the building and obscure it. It is no longer primarily an architectural object, but a pictorial or historical one. The point at which a building ceases to be a piece of architecture and becomes a picture or a relic, and the degree in which these things are combined in any given building, will not be easy to determine, nor are people likely to agree upon them. But it should be remembered that the effect of time and use is after a while distinctly destructive of architectural quality, and this consideration should not be put out of court in judging the question of restoration. An architect naturally thinks of it first, but the painter and the lover of the picturesque subordinate it or forget it. The sensitive architect is not obtuse to the beauty which age gives to material. He would build his structures of stones that wear it if he could find them shaped to his hand, and when he finds it in buildings that already exist he will save it if he can. But to him the human design in a building is the chief thing, and when he finds that this is getting effaced from it he is apt to think the restitution of it the first thing to be done in taking care of the structure. The restitution can usually be made with security in most respects if the degradation of the original work has not gone too far. Proportion, outline, grouping, the adjustment of detail, may be accurately preserved if the restorer's hand is not too long delayed. Wherever there is a piece of a moulding left it may be accurately restored. So long as any part of the work exists, such as its sculpture if it be good, which owes its life to the marks of the workman's hand, or any material which honorably holds its form and is serviceable, the reverent restorer will preserve it tenderly; nor will he be in haste to set his own new work against it, unless where it is necessary for what he will consider the greater gain of maintaining a perishing design. But while the architectural design is dominant and is valuable it deserves to be upheld against the encroachments of decrepitude and the loss of its essential elements. As a question of art, the idea of a building, when it can be unquestionably made out, is superior to its materials, and the whole to the details.

Here is a point, we think, where the opponents of restoration are very apt to sacrifice the greater to the less, to let the design perish for the sake of the material, and the whole for the sake of the details. We may reasonably protest against the kind of reverence for art that would let the high gables crumble away from an old façade or its lines of moulding weather into shapeless flatness, rather than have its time-stained face temporarily spotted with fresh stones or lay the profane hand of the modern stonecutter upon it. We are not arguing against the maintenance of old monuments out of archæological interest or historical reverence. These are considerations apart, to be separately determined in every case. We maintain only, that when the question is argued on the ground of art, one kind of considerations, and those the larger, should not be ignored for another, and it is doing no honor to a designer of old time to let the outline, disposition, and subordination of his design fade away for the sake of leaving in honored isolation details which, precious as they may be to us, existed in his mind only for the sake of the whole.

Where a monument is so far degraded that its original form cannot be clearly shown, there is an end of restoration; nothing but conservation or replacement is possible: only, let us realize that there is degradation. When the historical interest has become superior to the artistic, the case of restoration is closed also; but it is well to distinguish between what is the history of art, and what of temperature and moisture, and not to be too great a stickler for the undecipherable meteorological record when the artistic one has mouldered away. Again, there may even be a question between the accidental picturesqueness of age and the artistic beauty of design. But all these questions are aside from the quarrel of those who oppose restoration out of reverence for the old work that is restored. One may be disposed to condemn unsparingly those who willingly sacrifice old work that is good, or the vulgar indignity of scouring and hammering into freshness that which can be preserved, for the sake of making it look new; but it is difficult to share the feeling of the many who would cherish the letter at the cost of the spirit, and who would tenderly guard a decaying monument from the restorer's touch, till the imprint of the design that gave it life had mouldered into hopeless oblivion, as the Egyptians did their mummies, or as maidens do the corpses of bouquets.

PAPERS ON PERSPECTIVE.

VI. — THE POSITION OF THE PICTURE. — THE OBJECT AT 45°. — THE MEASUREMENT OF INCLINED LINES.

IN the last paper we saw how, when the real length and direction of the lines by which an object is defined are known, the real length and direction of their perspectives may be exactly ascertained. But our investigations covered only the cases of lines parallel to the plane of the picture, whether horizontal, vertical, or inclined, and of horizontal lines inclined to the picture. It remains to find out how to apply a scale to lines inclined to the picture, that are not horizontal, such as the lines of the gables, and of the hips and valleys of roofs.

102. Plate V. shows how this is done, and at the same time illustrates some other points of interest. In this plate, as in the previous plate, we have at the side a plan, on a small scale, illustrating the relative position of the spectator at the station-point S; of the object, at A; of the plane of measures, at *m m*; and of the plane of the picture, at *p p*. In the present plate the position of the object at A, and of the spectator at S, is the same as in Fig. 11; but the position of the plane of the picture and of the plane of measures is changed, their previous position being indicated by dotted lines. Their position is now taken so that the centre at C, and the vanishing point of 45° at V^x, coincide. That is to say: the

principal lines of the building, R and L, at right angles with each other, are now at 45° with the plane of the picture, and consequently with the plane of measures; and the line X that divides the angle, making 45° with each, is accordingly at right angles with the picture and plane of measures, and coincides with the Axis. V^X then, of course, comes in the same place that C does.

103. Now in the first place this illustrates the point, that, the position of the spectator and of the object being given, it is purely a matter of convenience how we take the plane of the picture, and in what direction its axis is drawn. In Plate IV., Fig. 11, the axis was directed towards the end of the house, C coming near the corner, and the left-hand side of the house was less inclined to the plane of the picture than the right-hand side. In Plate V., Fig. 14 and Fig. 15, the axis is directed further to the left, C coinciding in position with V^X, and the plane of the picture and plane of measures are equally inclined to both sides of the house, making 45° with each. But of course this would not change the appearance of the object A, as seen from S; and if the drawings were both made so as exactly to cover and coincide with it, the two representations would look exactly alike when viewed each from its own station-point, so far as concerns their main outlines. These are not affected by the alterations and repairs the house has undergone since we last saw it. But its position as seen in Fig. 12 is not exactly the same as that shown in Fig. 11, as it was intended to be and as the text implies (101). It is about ten feet farther to the right. For the two figures entirely to correspond, the point V^X in Fig. 12 should be near the window, as in Fig. 15, which is consistent not only with Fig. 14, but with Fig. 11 also.

104. In the second place, the plate illustrates the point that it is a much simpler thing to make a drawing in perspective when the plane of the picture, as in Fig. 15, is at an angle of 45° with both sides of the object than when it lies accidentally, as in Fig. 13.

For this attitude of the object sets the station-point at its maximum distance from the picture, which is obviously an advantage. This distance, S C, is in this case just half the length of the Horizon between V^R and V^L. Moreover, since S is equidistant from these points, and C, which is also V^X, is half way between them, it follows that D^X coincides with V^R, and also that there is another D^X coinciding with D^L; that D^L and D^R are also equidistant from C; and, in short, that the whole series of vanishing points and points of distance is symmetrical about T P P′ in one direction, as it is about the Horizon in the other.

105. From this symmetry, which is clearly exhibited on a small scale in Fig. 14, it follows that V^M and V^N are equally distant from the Horizon, that T L M is parallel to T R N′, and T R N to T L M′, and hence that V^Q and $V^{Q'}$, which lie at the intersection of these traces, are at an infinite distance. Hence Q is parallel to T R N and T L M′, Q′ is parallel to T L M and T R N′, and the projections of these lines in the perspective plan are parallel to the Horizon.

106. The great convenience of this is shown in Fig. 15, where the hips of the roof of the schoolhouse on the left, that form its outline against the sky, are drawn parallel to the traces of the planes in which they lie, instead of being directed, as in Fig. 13, to their inaccessible point of intersection.

107. It will be observed that the relation of the principal distance points D^R and D^L to their corresponding vanishing points, V^R and V^L, is the same as that of the corners of an octagon to the corners of the square from which it is cut, the distance of each from the remoter corner being half the diagonal of the square. Compare Fig. 16 with the small plan in Fig. 14. The distance apart of the vanishing points then being as 200, the distance of the station-point from the picture at C will be as 100, and each point of distance will be at a distance of 141 from its own vanishing point, and 59 from the other. Or, in other words, the distance apart of the vanishing points being as 10, that of the points of distance from the centre, C, will be as 2, their distance from the nearest vanishing points will be as 3, their distance from each other will be as 4, and the distance of the spectator from the picture as 5, very nearly.

108. Fig. 17 shows the amount of the error involved in this assumption. It is so slight, that for practical purposes the distance apart of the points of distance may generally be taken as two-fifths of that of the vanishing points, when the picture is at angles of 45° with the sides of the object.

109. Fig. 15 also illustrates another point of capital importance, showing how dimensions are laid off by scale upon lines lying on the *hither* side of the plane of measures; these lines are necessarily drawn to a larger scale than that used for lines in that plane, just as lines beyond it are drawn to a smaller scale. The principle of the isosceles triangle, explained in the last paper, and again illustrated in Fig. 14, still holds good. The fence, for instance, that is built out from the front corner of the house, toward the right, has the position of its posts laid off upon the line of horizontal measures, or ground line, *g l*, to the right, by scale, and then transferred to the line of the fence in the perspective plane, by parallel lines drawn to D^L, the fence being in a line with the left-hand side of the house. These lines diverge as they come forward, and the scale of the fence is obviously increased. The building on the left is entirely in front of the plane of measures.

110. To avoid confusion the points on the ground line intended for use beyond the plane of measures are indicated above it, and those which give the dimensions of objects this side of it, as is the case with this fence, are indicated below it. A better way in some cases is to have separate ground lines, for figures in front of the plane of measures.

111. Let us now take up the question left unanswered in the previous paper, and see how dimensions can be laid off by scale upon inclined lines; upon lines, that is to say, which like the gables and the hips and valleys of roofs lie in inclined planes, and are inclined not only to the plane of the picture but also to the horizontal plane.

In the first place it is clear that just as every horizontal plane has a line of horizontal measures, or ground line, where it intersects the plane of measures; and as every vertical plane has a line of vertical measures, which is its line of intersection with the plane of measures: so every such inclined plane, as for example a roof, in like manner has its own line of measures, lying in it and also in the plane of measures, upon which dimensions can be laid off by scale. It is the line in which that plane intersects the plane of measures, and it passes through the point at which any line in that plane pierces the plane of measures. This line and its perspective are always parallel to the trace of the given plane. For, as we have seen (78) this trace is the intersection of the plane of the picture with a plane parallel to the given plane, and passing through the eye, while the line of measures is the intersection of the given plane with a plane parallel to the picture. The intersections of these two sets of parallel planes must be parallel.

112. To find a line of real measures in any plane, then, it suffices to find the point at which any line in it pierces the plane of measures, and to draw through this point, when found, a line parallel to the trace of the plane.

113. In Fig. 15, for example, we have several such lines: *g l* parallel to the Horizon; *l m* parallel to T L M; *n r* parallel to T N R, etc. In the case of the ground line, the horizontal lines to be measured off are prolonged until they reach the plane of measures, and the line *g l* is drawn parallel to the horizon through the point thus obtained. In the case of the inclined lines of the gables, that on the end of the building at the right is brought forward till it touches the plane of measures, and the corresponding line on the porch roof of the porch of the little schoolhouse on the left is carried back until it reaches the plane of measures. These points are ascertained from the perspective plan, the point where the horizontal projection of these inclined lines pierces the plane of measures being the projection of the point where the lines themselves do so. The lines of measures *l m* are then drawn through the points thus ascertained parallel to the trace of the plane L M. As these gable lines lie also in the vertical planes R Z, vertical lines of measures, 'Z, parallel to T R Z, may also be drawn through the same points.

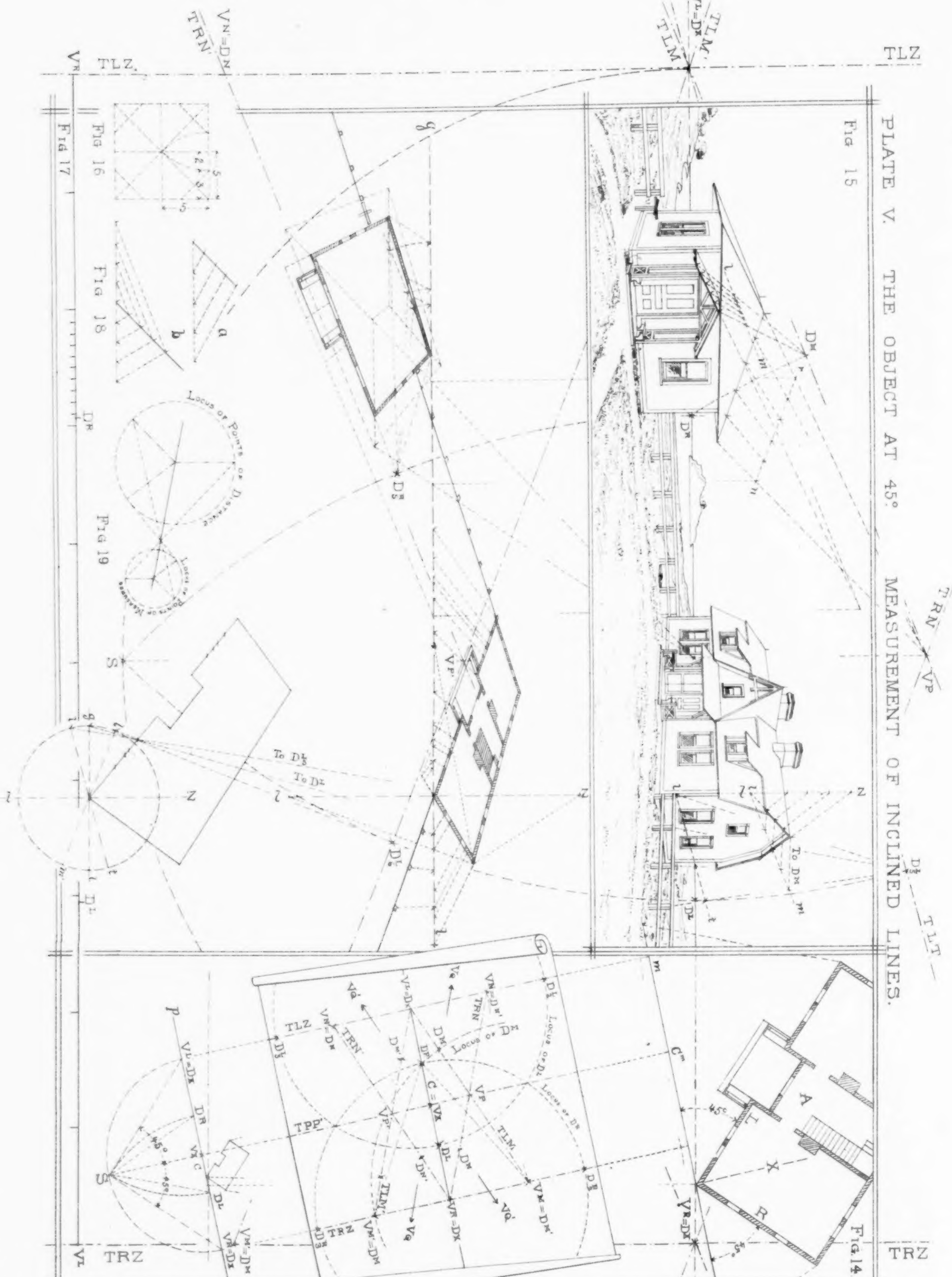
114. In the case of the hip line Q, of the little schoolhouse, which is parallel to the plane of measures and to the trace T R N (105), it is necessary to proceed as in the case of vertical lines, or any others that are parallel to the picture, and carry across it a line lying also in the plane R N, but inclined to the picture, by means of which the line where the plane intersects the plane of measures can be found. In the figure the line of the other hip, P, is used for this purpose, its horizontal projection being found in the perspective plan. It would have done just as well to prolong the line of the eaves until it met the plane of measures, and to draw the line *r n* through the point thus found.

115. All these lines of measures lie in the plane of measures, and are consequently drawn to the same scale. On all of them one-sixteenth of an inch is the true perspective representation of one foot, and any dimensions laid off on this scale can be transferred to any other lines in the inclined plane, such as the lines of the gables, by means of points of distance lying in the trace or horizon of the inclined plane, just as dimensions can be transferred from the ground line to lines lying in the horizontal plane by means of points of distance taken on the Horizon.

116. The points of distance upon these inclined traces, or horizons, are easily obtained from those upon the horizontal Horizon, if we may use such an expression. It is obvious indeed that the problem is a simple one, if we remember that the point of distance corresponding to any vanishing point is found by setting off upon the horizon passing through that point the true distance of that point from the station-point. If this is done, the triangle S V D formed by the three points will, of course, always be isosceles, by construction. Now, the distance of every vanishing point from the eye is known, and can readily be laid off on all the traces, or horizons, that pass through it.

117. The distance of V^R from S, for example, is known to equal $V^R D^R$, and this distance laid off on T R N, T R N′, T R Z, and the traces of any other planes that contain R, give the corresponding points of distance on those traces, D^R_1, D^R_2, D^R_3, D^R_4, etc., all, in fact, lying at equal distances about V^R on the circumference of a circle whose radius equals V^R S, the distance of the vanishing point in question from the eye. This is shown both in Fig. 14 and in Fig. 15. In like manner a circle may be drawn about V^L, containing the

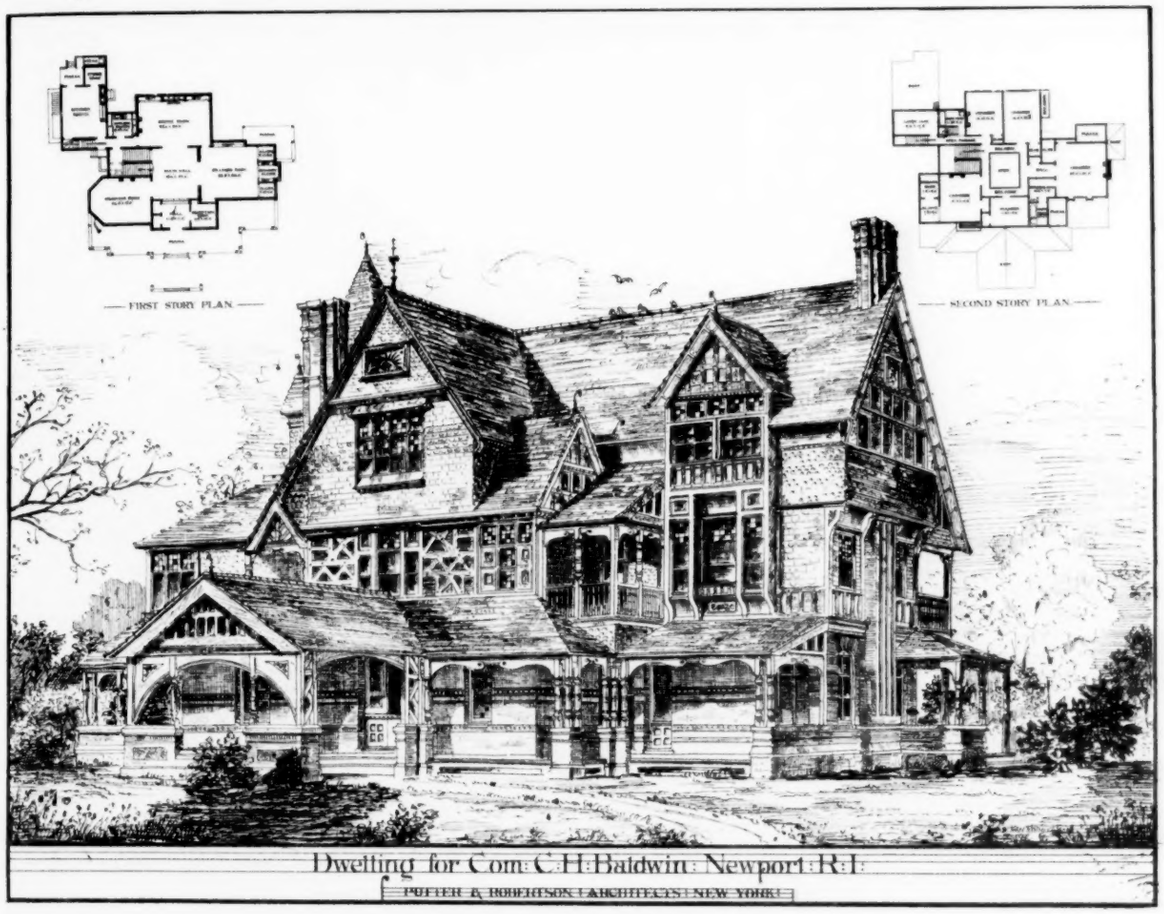
PLATE V. THE OBJECT AT 45°. MEASUREMENT OF INCLINED LINES.



THE HELIOTYPE PRINTING CO. 340 DEVONSHIRE ST. BOSTON

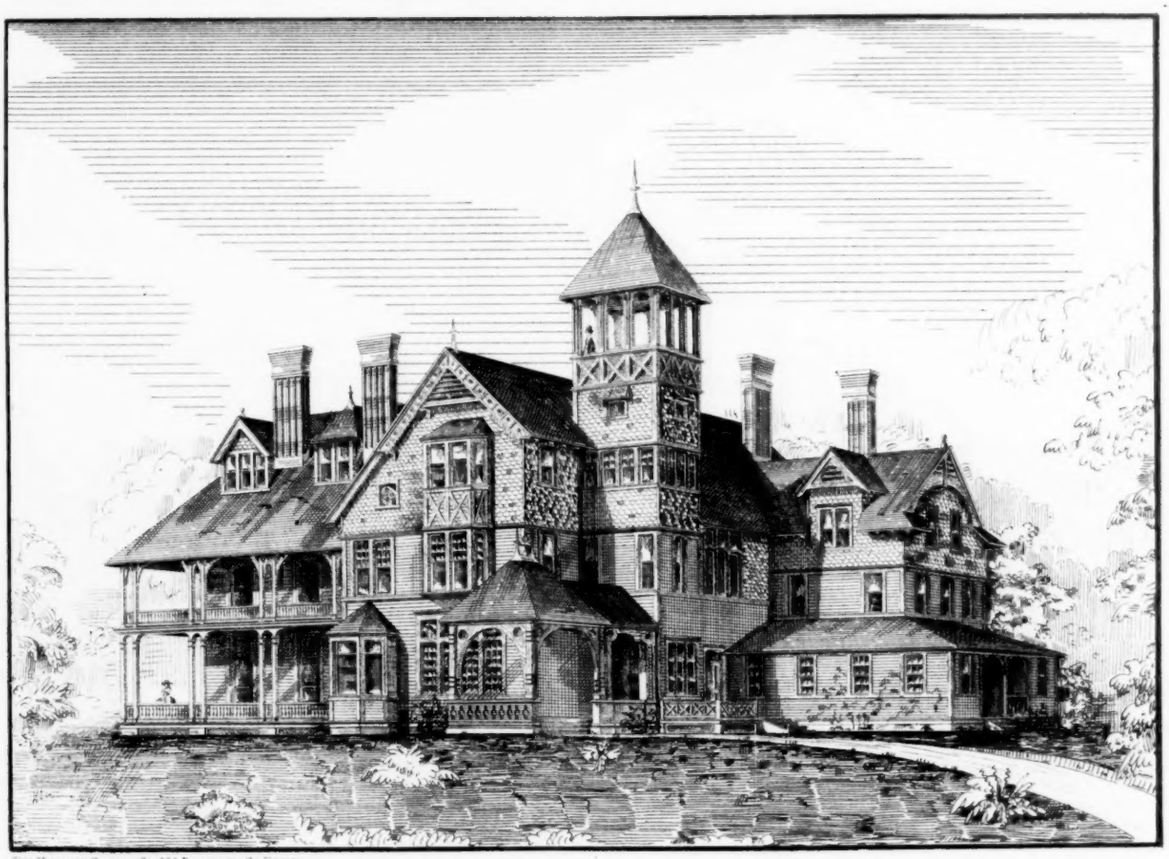
STORE ON FRANKLIN ST. BOSTON

MESSRS CUMMINGS & SEARS ARCHTS



Dwelling for Com. C. H. Baldwin, Newport, R. I.

PUTTER & ROBERTSON, ARCHITECTS, NEW YORK.



THE HELIOTYPE PRINTING Co. 330 DEVONSHIRE ST. BOSTON.

DESIGN FOR A COUNTRY HOUSE.
G. E. HARNEY, ARCHT.

THE HELIOTYPE PRINTING CO. 337 DEVONSHIRE ST. BOSTON.

distance points that belong to that vanishing point. Its radius will be $V^L D^L$, the distance of V^L from the eye.

Such a circle is the *locus* of the points of distance.

118. The distance of V^M from the eye is $V^M D^R$, as is obvious if we suppose the triangle $V^M D^R V^R$ revolved back around its side T R Z until D^R is at S, again. A circle drawn around V^M, with $V^M D^R = V^M S$ as a radius, will accordingly give points of distance, by which any inclined line M, vanishing at V^M, may be measured off by lines of measures lying in any of the planes that contain it, and whose traces accordingly pass through V^M.

As we have taken the lines M and M′ at an angle of 30° with the Horizon, the angle M D^R M′ is 60°, the triangle M D^R M′ is equilateral, and D^M falls upon $V^{M'}$, and $D^{M'}$ upon V^M.

In every case, of course, the line of real measures, like the lines of proportional measures discussed in a previous paper, is drawn parallel to the trace of the plane containing it (76).

119. It will be noticed that there are two points of distance on T L Z, at equal distances above and below V^R, just as we found that both V^R and V^L would serve as points of distance to V^X. Either of these can be used instead of D^R to set off given lengths on the right-hand horizontal lines. In the upper perspective plan, for example, the length of the right-hand side of the house is set off not only on the ground-line and transferred by means of D^R, but also on the vertical line of measures, both above and below the ground, and transferred by means of D^R_2 and D^R_3, giving in every case the same points.

Indeed, it is practicable to have a second point of distance on all the traces, beyond V^R. They would be the vanishing points of the bases of *obtuse-angled* isosceles triangles. Such a triangle is shown in Fig. 19, *b*. Its employment is shown in the upper perspective plan, where the length of the right-hand side of the house is laid off by scale on *g l*, to the *left* of the corner, and transferred to the perspective line by means of the point D^R_3, which is off the picture.

120. If, then, through the point at which any perspective line pierces the plane of measures, a line of measures be drawn parallel to the trace of any plane that contains the line (that is to say, parallel to any trace passing through the vanishing point of the line), any distance laid off by scale on the line of measures may be transferred to the perspective line by means of a point of distance in that trace; and this point of distance will be the point where that trace is cut by the circle, which is the *locus* of the points of distance, a circle whose radius equals the distance of the vanishing point of the perspective line from the eye, and whose centre is at the vanishing point.

This is illustrated in the lower perspective plan, in which a certain distance, being that from the corner of the house to the further edge of the window, is laid off on several lines of measures, *g l*, *l z*, and *l m′*, parallel to the several traces that meet at V^L. Lines drawn to the points D^L on those traces all give the same point upon the line L.

121. As the points taken upon the line of measures are all equidistant from the corner of the plan, they lie in the circumference of a small circle, which is the *locus* of the points of measures, just as the corresponding points of distance lie in the circumference of a large circle, and we have the curious phenomenon of lines drawn from certain points on the small circle to corresponding points on the large one, all intersecting at the same point, upon a line joining the two centres. But Fig. 19, which presents these geometrical relations in a diagram, shows that there is nothing surprising in this.

122. Now just as any line drawn in any direction, at random, through one end of a perspective line, may be used as a line of proportional measures (81), so any such line that lies in the plane of measures may be taken as a line of real measures; and any dimensions taken upon it by scale may be transferred to any perspective line that touches it, by means of a trace drawn through the vanishing point of the perspective line, parallel to the random line; the point of distance being taken upon that trace at the same distance from that vanishing point as its other points of distance.

This also is illustrated in the lower perspective plan, where in addition to the lines of measures drawn parallel to the traces already obtained, a line of measures *l t* is drawn at random at an angle of 15°. A new trace T L T is drawn through V^L parallel to it, and a new point of distance D^L_5 obtained upon it, where it intersects the *locus* of D^L.

The same thing is done again in the picture Fig. 15, where the divisions of the fence, on the right of the house, are taken by scale on an arbitrary line of measures just above. As this also is taken at 15°, the same point of distance, D^L_5, serves to transfer the dimensions to the line L, the top line of the fence.

123. Finally, just as of any two perspective lines having the same vanishing point, one may be regarded as the trace of a plane passing through the other (83), so a point of distance taken upon the first at the proper distance from that vanishing point may be used to lay off given dimensions upon the second by using a scale upon a line of real measures drawn parallel to the first, from the point where the second pierces the plane of measures.

This is illustrated in the plan of the little schoolhouse shown in the plate. The front line of the plan is regarded as the trace of a plane, and upon this trace the point of distance D^R_3, upon the *locus* of D^R, is easily determined. A line of measures is drawn parallel to it through the further corner of the plan, where the line R on the back of the building touches the plane of measures. The true width of the building being laid off on this line of measures by scale, and transferred to the perspective by means of a line drawn to the point of distance, we obtain the left-hand corner of the building, and the position of the rear window, as we ought to.

124. Here, as before (84), we must be careful not to suppose that this line of measures is drawn on the floor of the schoolhouse. It lies, in fact, in the vertical plane of measures, being an inclined line parallel to the plane of the picture. So also the point of distance is not on the ground, but is in the infinitely distant horizon which the front line of the building covers and apparently coincides with.

125. It is to be observed that the method of laying off real dimensions by points of distance, although analogous to that of laying off proportional measures by points of measures, differs from it in three particulars. In the first place it requires that the triangle shall be isosceles, or, which comes to the same thing, that its base shall be at right angles to the line dividing the angle. The direction of the base is the important thing. The second difference is this, that the lines of real measures all lie in the same vertical plane, while the lines of proportional measures may be taken anywhere; it being necessary only that they should be parallel to the picture. Every line of real measures may be used as a line of proportional measures, but not every line of proportional measures is also a line of real measures. The third difference is that in laying off proportional parts the length of the given line is fixed, and that of the auxiliary is indefinite; in laying off real dimensions these fix the length of the auxiliary, and it is upon the indefinite length of the given line that they are to be set off.

This difference is illustrated in Fig. 19, Plate IV.

The next paper will discuss the phenomena of parallel perspective, and the perspective of interiors.

Erratum. — In the first plate the vanishing points V_4 and V_5 should obviously be upon the trace T R N.

THE ILLUSTRATIONS.

STORE ON FRANKLIN STREET, BOSTON, MASS. MESSRS. CUMMINGS AND SEARS, ARCHITECTS.

THE material of which this store is built is Quincy granite.

HOUSE OF COM. C. H. BALDWIN, NEWPORT, R.I. MESSRS. POTTER AND ROBERTSON, ARCHITECTS.

SEASHORE RESIDENCE. MR. GEORGE E. HARNEY, ARCHITECT.

It is proposed to build this house at Bayshore, on Long Island.

INTERIOR VIEW OF THE NEW CATHOLIC CATHEDRAL AT QUEENSTOWN, IRELAND. MESSRS. PUGIN AND ASHLEN, ARCHITECTS.

We reproduce this design, which was published in the *Building News* not long ago, mainly because of the masterly way in which Mr. Gribble has handled one of the most difficult problems that a draughtsman is called on to solve, — the rendering of an interior perspective.

PERSPECTIVE STUDY. — PLATE V.

See the "Paper on Perspective" in this number.

MODERN PLUMBING. — I.

IN the accounts of the various sanitary contrivances and systems which appear from time to time in the professional journals, valuable and interesting as they are, there is much that belongs decidedly to the experimental and theoretical, not to say impracticable, region of the science, and the enthusiast who should attempt to carry out even half of the devices so attractively described would soon find himself in trouble. For the ordinary practitioner, who is constantly called upon to judge of the merits of different apparatus, and is held responsible if he either ignores a real improvement or recommends a new appliance which turns out unsatisfactory, it is of great importance to keep clearly in mind the distinction between systems which have been extensively tried, and under varying circumstances, and those which, however simple in the description, have not yet been so thoroughly tested that an architect can conscientiously adopt them at his client's expense without at least warning him of their experimental character.

With the professional adviser, who keeps himself informed of the progress of sanitary matters, it is true, the line between the certain and the experimental will be constantly advancing; but it is not less a real distinction, and there may be many persons to whom a few words about the established and approved modern

sanitary appliances, with their merits and defects, as well as the proper modes of putting them together, and the means of judging of the work after it is done, will be of as much service as the accounts of new inventions; and these will find their interest in the new contrivances much increased after having acquired a thorough knowledge of the old.

PIPES.

To begin with the raw materials of plumbing-work, following this afterwards with an account of the different apparatus, and the modes of putting them together, the most important portion of the plumber's stock in trade consists of pipes.

Of these we have now in common use the plain lead, tin-lined lead, and block-tin, all made by drawing the metal over a mandril; the seamless brass pipes, drawn in a similar manner; and pipes of wrought-iron, with welded seams, plain, tin-lined, enamelled, rubber-coated, and galvanized. All these are used for supply pipes, and each has its merits and defects somewhat as follows: —

The lead pipe is the most generally used, and is convenient to work with, moderately cheap, and has the merit of yielding somewhat, so that it may freeze and thaw without bursting, and when a rupture does occur it is usually only a small hole.

The grand defect of lead for pipes is its solubility in water. Well-water generally contains a little dissolved carbonic acid, and sometimes sulphate of lime, either of which will soon coat the inside of the pipes with an insoluble crust of carbonate or sulphate of lead, after which the metal no longer affects the water in ordinary cases; but river or pond water dissolves the lead slowly, and rain-water, which often contains a little nitric acid, quite rapidly, and the solution so formed is poisonous. In practice, the soft water supplied in cities is seldom affected to a serious extent unless it has been allowed to stand a long time in the pipes; but rain-water is often so affected, and it is safest, where rain-water is used, to avoid the use of lead.

In order to prevent the contact of the water with the poisonous metal, pipes are made by fixing a lining of pure tin inside the lead for making the pipes, and drawing them out together, thus coating the inside with about one-fiftieth of an inch of tin, which is unaffected by water.

This tin-lined pipe is admirable in itself, and it is sometimes claimed that although it costs about sixty per cent more per pound than the common lead pipe, the tin lining strengthens it so much that a pipe of about half the weight can be used, making the cost about the same; but in practice the tin-lined pipe is usually put in of the same weight as lead pipe in a similar situation. Nothing, however, is perfect; and it is found that in soldering the joints of the tin-lined pipe; the heat of the solder sometimes melts the coating of tin, which is very fusible, thus exposing the lead, and the galvanic action between the two metals causes the lead to dissolve in the water, occasionally to a serious extent.

The block-tin pipe is very costly, and is used only for the portions of pipe immersed in the water of cisterns or tanks, or for conveying ice-water or beer.

Plain iron pipes are little used for house-plumbing, for the obvious reason that they would soon fill with rust. They are protected by boiling in tar, which makes a cheap pipe, but retains a tarry flavor for a long time; or by a coating of black enamel; or by coating them inside and out with vulcanized India-rubber; or by galvanizing, that is, dipping them in melted zinc.

The enamelled pipes are made in several places, the rubber-coated only by Morris, Tasker, & Co. They are equally durable and good for their purpose, though the appearance of the red rubber-coating is, if any thing, rather pleasanter than the enamel.

The galvanized pipes are strong and durable for public buildings and other situations where roughly used, but their appearance is not attractive.

The cost of the enamelled, rubber-coated, and galvanized pipe is about the same; and each variety has couplings, branches, etc., which should always be of malleable iron for pipes of sizes used in plumbing, coated to correspond with the pipe. These are screwed together with red or white lead, precisely like gas or steam pipes; and all the varieties of pantry, bib, and basin cocks can be obtained with screws to fit them, so that no solder is used in jointing them. These pipes are so cheap, and the putting together so easy, that their use is economical; the average saving in house-plumbing by employing them instead of lead being eight or ten per cent.

There is another more expensive iron pipe, made in Philadelphia, and lined with a tin pipe, which is inserted and forced so strongly against the iron as to adhere quite perfectly to it. The connections are made by cutting away the tin from the joint and inserting a brass ferrule, tinned, and screwing up tight; the sharp edges of the ferrule force their way so firmly into the tin lining as to make a water-tight joint.

All the forms of protected iron pipe are liable in time, from careless workmanship, or the strain of contraction and expansion, or natural wear, to lose the protection in certain places; and when the water has once reached the iron, the pipe soon fills partially or entirely with rust. There may also be imperfections in the fittings, and if these or the joints should leak, the defect is not so easily stopped as in a lead pipe, and the freezing of a pipe opens a long seam, which will cause a flood when the water flows again.

With either iron or lead pipes for the cold water, it is well to have brass for the hot water pipes. The alternations of heat and cold strain the joints of the iron pipes so that a small opening is likely soon to be made in the enamel or other coating, exposing the pipe to rust. With lead, the expansion of a portion of pipe running horizontally, say across the kitchen ceiling, bends it slightly downward, unless very carefully supported; and when it cools, the contraction, instead of drawing the pipe back to the horizontal, stretches the metal a little. The next flow of hot water extends the pipe again, and it bends still further down, and so on until a "bag" is formed, which cannot be emptied when the water is drawn off from the house. The stiffness of the brass pipe prevents any such action, but the strain on the joints is so severe that they will sometimes leak. However, the advantage in using them is considerable, although they do not usually make so neat a job as the lead pipes.

Lead pipes are sold by weight, a $\frac{3}{4}$-inch pipe weighing two pounds, three pounds, or more or less, per foot, according to the thickness of the metal. In general, for supply-pipes, the thickness of the metal should not be less than $\frac{1}{16}$ of an inch, which will give for a $\frac{3}{4}$-inch pipe a weight of about three pounds per foot, and for a $\frac{1}{2}$-inch pipe about two pounds. With a heavy pressure the thickness must be greater, especially in the larger pipes.

The metal of iron and brass pipes is about $\frac{1}{16}$ or $\frac{3}{32}$ of an inch thick. They are sold either by the foot or by the pound, brass pipes more commonly by weight, and iron by length. In ordering pipes it should be remembered that brass pipes are classed according to their outside diameter, iron and lead by the inside diameter, so that the calibre of a $\frac{3}{4}$-inch brass pipe is less than that of a $\frac{3}{4}$-inch iron or lead pipe.

For waste-pipes, lead about $\frac{1}{10}$ inch in thickness of metal is commonly used, up to two inches in diameter. For two inches and larger, cast-iron is generally preferred in this country, on account of its stiffness, which keeps it perfect where a large lead pipe will lose its form and tear away from its connections by its own weight. There is a great difference in cast-iron pipes, some having the metal thicker on one side than the other, with other defects of imperfect casting. The only safety is to procure them of known and trustworthy makers or dealers. The thickness of the iron in two, three, and four inch pipes should not be less than $\frac{1}{8}$ of an inch. Heavier pipes are advised by many engineers, but not commonly used.

The two-inch pipes are used for bath and sink wastes, and four or four-and-a-half-inch for soil-pipes. Three-inch are seldom used in houses. It is a great mistake to use waste-pipes too large for their purpose. If two inches is sufficient diameter to give a sink waste which will not be obstructed, four or five sink wastes may join the same two-inch pipe at different points of its course, and the pipe will carry off the discharge of the whole, even if they should all run full at once. Where the drain within the house walls is of iron, a six-inch pipe is generally used, and is perhaps safest where it receives two or three soil-pipes and a rain-water pipe, which may all be running full at once, although a smaller pipe would keep itself clean better. Two waste-pipes should never join at right angles, in either a vertical or horizontal plane. If they approach at such an angle, the junction must be made with a bend, and a Y branch, the small end of the Y pointing down the current. This costs a dollar or so more than the right-angled junction, but is necessary to prevent obstruction.

T. M. Clark.

CORRESPONDENCE.

IMPROVEMENTS IN FIRE-PROTECTION. — AUTOMATIC HATCHWAY-CLOSERS. — FIRE AND SMOKE ESCAPES FOR THEATRES.

Chicago.

As in 1872, with the experience of a great disaster before us, the thoughts of many were turned towards providing against the contingency of its recurrence, so now, with the news coming in from every quarter, of death-dealing and property-destroying conflagrations, the subject is being agitated in Chicago and the West with renewed vigor. The first awakening resulted only in the erection of buildings with heavy walls, where before they had been of the flimsiest description. It is safe to say that the average thickness of the walls of Chicago business-buildings is greater than can be found among a similar grade of buildings elsewhere. Several isolated fires in the late burned district have demonstrated this. A year ago a six-story double warehouse, with three sides exposed, was burned, and only a few bricks fell from the top of a rear wall. The interior was rebuilt with the original walls. The fire of 1874, sweeping half a mile through frame structures, was stopped by the heavy party-walls of the rebuilt district.

But beyond the erection of thick walls but few improvements calculated to guard against fire have been adopted until recently. Several buildings with iron floor-beams, which were supposed to be fire-proof, were erected after the great fire; but none of them show any advances upon heretofore well-known methods which are now known to be any thing but fire-proof, for the particular reason that the necessity for protecting the constructive iron-work has not

been recognized. Three years ago the first fire-proof iron columns ever used in this city were introduced by Messrs. Treat & Foltz, in the elegant Chicago Club House. We are now to see an attempt to build a really fire-proof store, that of the Singer Manufacturing Co., which has already been described in this correspondence; and it yet remains to be seen if the promises held forth are fulfilled.

In one respect Chicago has not been behind other cities in adopting protection against what is now considered by the press of the whole country as the greatest evil existing in our modern system of building, — the open elevator-shaft. Some ephemeral attempts in this direction were made in the wholesale store of J. V. Farwell & Co., on Monroe Street, in 1872; but the experiment failed, as the machinery was not adequate to cope with the speed of the elevator. During the past year a number of elevators in stores have been protected by automatic hatch-closers. In the large new building of Steele & Price on Randolph Street, designed by Mr. Carroll, architect: a hatch-closer of novel construction is now in successful operation. The elevator is a little more than six feet square, is operated by steam, and travels about seventy-five feet per minute. As used, it averages two hundred and fifty trips per day, or five hundred openings for every floor. The doors, or rather valves, — for they are intended solely to intercept fire and smoke, — are made of corrugated iron riveted to solid frames of angle iron, with square iron pivot bars or shafts which work on journals. There are two principal doors to each opening, and, as it is a corner-post elevator, two subsidiary doors or flaps six inches wide which fill the spaces caused by the thickness of the corner guide posts. In connection with these hatch-closers an automatic gate is worked on each floor. The elevator-holes are railed off on the sides, and it is impossible to encroach on them except when the elevator is at one of the floors.

In the matter of protecting theatres from the danger arising from fires, Mr. Cleaveland, the superintendent of buildings, has made great efforts to have the proper reforms introduced, but has generally been thwarted in his attempts, principally from want of authority. Hooly's Theatre is the only one in which much has been done. New stairways, additional exits, and standpipes always supplied with water, have been introduced. But the principal improvement has been the introduction of Karls's apparatus to facilitate the exit of the audience without danger. The theory of Mr. Karls is that they should get rid of the fire and the audience at the same time, not by extinguishing the fire, but by letting it escape from the building without hurting any one. Heretofore the placing of a large ventilator over a central chandelier has been the cause of drawing fire and smoke from the stage directly over the heads of the audience, as was the case in the Brooklyn Theatre. Assuming, therefore, that the danger to the audience proceeds mainly from a fire on the stage, he provides an exit for it above the stage by a very simple contrivance which simultaneously closes the outlet over the audience. He assumes that the proscenium wall is fire-proof, and that all openings in it are stopped by fire-resisting doors provided with strong springs to keep them closed. In the Hooly Theatre there was no fire-wall, so he has made the partition as nearly fire-proof as possible by covering it with sheet-iron. The under side of the roof and trusses were then covered in the same manner, so as to allow them to stand fire for some time at least. Directly over the centre of the stage he places a boiler-iron flue eight feet in diameter and thirty feet high. In this flue is a valve made of a wooden frame covered with canvas; a balance weight keeps it closed. The next thing to do is to provide for opening it from as many points as possible. A wire cable connection is carried down to each side of the stage. On one side it is directly opposite the prompter. Other cables are carried to the door-keepers on the first floor and first balcony, and another cable is carried to the door from the second balcony and secured to it. As this door is only opened for the exit of the audience, the valve must be opened with the door, which is sure to be the case every night — and very likely to be the case if there is a panic. At each place where the valve cords can be used, is a large sign explaining their use, painted on iron, and securely fastened to the wall. By pulling a large ring at any one of them, the valve is opened, and simultaneously a valve in the dome ventilator is closed. The opening of the doors creates a current of air toward the stage, and the flames and smoke go up through the scenery and out through the ventilator. If the valve is not worked, being of canvas it will be destroyed by the fire. Not long since, an exhibition of this apparatus was given; and though repeated experiments were made by Fire-Marshal Benner and others, it never failed to discharge all the smoke that could be raised by artificial means. It is not difficult to see that in a new building this arrangement could be made more effective. In Hooly's Theatre it gives the additional advantage of providing ventilation for the stage when desired, rapidly freeing it from the smoke often made in theatrical representations. In the presentation of "Der Freischütz" recently, the manager was enabled to use an extraordinary amount of fire-works without fear of discomfort to any one, by keeping the flue open at the right time.

IN 1850 the Catholic bishops in the United States held $9,000,000 worth of property. They now hold $110,000,000.

SOME DISPUTED POINTS IN HOUSE-DRAINAGE.

NEW YORK.

TO THE EDITOR OF THE AMERICAN ARCHITECT AND BUILDING NEWS.

The article in your issue of Feb. 23, entitled "The Sanitary Pamphlet of the New York Board of Health," raises some questions of sufficient public interest to justify their further consideration. The pamphlet you criticise certainly merits disapprobation, as it is evidently the work of gentlemen imperfectly acquainted with the mechanics of hygiene; and is doubly calculated to mislead, because published with the seal of official authority.

But while the pamphlet in question calls for sharp criticism, your own remarks suggest several topics which might be discussed with advantage. Alluding to the arrangement of pipes, etc., shown in the illustration on p. 65, you say: —

"1. In place of the underground drain, we should recommend an iron soil-pipe, starting just under the ground floor near the rear wall, and running out just above the cellar-bottom through the front wall. The running trap in this drain we should place outside of the foundation wall in a covered well. We should make this trap a very deep one."

In my judgment, the placing of a trap in the soil-pipe is one of the most objectionable recommendations of the Health Board's pamphlet. The change you suggest would not, I think, help matters. If it be true, as you say in a paragraph subsequent to the one above quoted, that "no water-trap will prevent the passage of gases," of what use is such a trap in a pipe vented above the roof? To hold the foul air of sewers in suppression by means of a water-seal in a trap is known to be an impossibility; and in view of this well-understood fact, I cannot see any benefit in putting a trap where it will only reduce the scouring power of the descending water by the increased friction due to a double curve. On the other hand, I can see many and serious objections to a trap in such a place; and the deeper the seal, the greater the objections. There is no circulation of air in a trapped pipe; and a column of air held motionless for even a few moments in contact with the foul, slimy lining of a soil-pipe, becomes charged with impurities. Air from pipes is practically as bad as air from sewers, and cannot be breathed with any more safety. Now suppose that in such a pipe a fixture on one of the upper floors is discharged. The rush of water down the vertical line of soil-pipe sets in motion the whole column of air in the pipe. In other words, the down-flow of water, especially when discharged in considerable volume as from a closet, causes a down-rush of air with it. In an untrapped pipe this air would be discharged into the sewer, and fresh air would come in at the top of the pipe to take its place. When, however, the soil-pipe is trapped at any point, the air within the pipe, set in motion by a discharge of water, cushions on the seal, and, being elastic, is slightly compressed. Then comes the trouble. The depth of seal being greater and the volume of water larger in a trap of four inches or more diameter than in the traps of one and a half, two, or three inch branch-wastes, the latter yield first; and before the confined air has forced its way through the seal in the soil-pipe trap, we have a puff of foul air from the pipe, discharged from every fixture below the point at which the flush of waste water started. A trickling stream would not accomplish this result in a four-inch pipe; but a wad of soil and paper from a water-closet trap, falling like a piston through the soil-pipe, would do it every time. As there is abundant evidence in support of the assertion that the air of waste-pipes is foul and unwholesome, I cannot consider it good practice to put a trap where the resistance offered by its seal will cause this air to blow out through fixtures into living and sleeping rooms.

I am also compelled to take issue with the following suggestion: —

"4. The main soil-pipe (rising through the house) should not be turned over at the top, but should be capped with an Emerson ventilator."

The object of turning the pipe over is to keep its mouth free from ice and snow which might otherwise close it in stormy winter weather. I have never seen any form of cowl or top which was adapted for use at the end of a soil-pipe vent. All we want is an adequate opening through which air may pass in or out without hinderance. Its flow in either direction cannot be assisted with advantage.

I believe the time is not far distant when sanitary engineers will reach the conclusion that any attempt to hold the gases of the sewers in suppression is a dangerous mistake. If we will only ventilate our sewers and soil-pipes sufficiently, the evil of sewer-gas poisoning will cease to exist. If every manhole cover in our streets were replaced with a strong open grating, and every house draining into a sewer were required to carry its soil-pipe above the roof, unobstructed by traps at any point, we should find that there was no sewer-gas and no pressures of bad air in pipes to deal with or provide for.

Respectfully,

J. C. BAYLES.

NOTES AND CLIPPINGS.

The Competitions in Interior Decoration. — It has not been possible to return the drawings submitted for the first competition by "Nemo," "*Omnia Expecto Superne*," "Onward," "Prairie Queen," "A Fish," and another, because we are unable to identify their authors. To prevent similar delays, and to simplify the work of identification, competitors are requested to enclose with their real names the device attached to the drawing. They are also requested to send their names and addresses upon half-sheets of note-paper of the ordinary size, that they may be easily filed away. We also suggest that competitors assume new devices for each competition.

The Chicago Court House. — The county attorney, Mr. Wallace, has come to the conclusion that there is nothing in the records of the County Board that indicates the existence of any contract on the part of the city to build a dome: therefore it seems that the money already spent by the county in building the "foundations" for the dome — some $75,000 — has been absolutely wasted.

Cincinnati's Public Buildings. — Mr. Henry Probasco, who some years ago gave the city of Cincinnati a bronze fountain, has offered to give the city his art collection, which is said to be valued at $200,000, provided that a suitable fire-proof building shall be built to receive it.

Panic. — At a meeting of Cuban sympathizers held at Masonic Hall in New York on March 17, the floor settled suddenly some three or four inches near the doorway. The attention of the audience was drawn to the accident by the noise of cracking wood; and a panic immediately taking place, numbers were knocked down and trampled on.

Rapid Bridge-Building. —The new wooden bridge across the Raritan River at New Brunswick, N.J., was completed by the Pennsylvania Railroad Company in a little over four days. The new structure is 900 feet long, cost $20,000, and was put up by 500 men.

Elevator Accident. — The Paris *Figaro* gives the following account of the elevator accident at the Grand Hôtel, that we mentioned a short time ago: "The elevator was worked by water. A reservoir on the top of the hotel supplied a powerful stream of water through a large tube, which acted on the end of a long piston and, with the aid of two heavy counter-weights, forced it to the roof. In descending the water was gradually let out, so as to allow the piston to go down gradually. At the top of the piston was a large casting, surmounted by a broad platform on which the car was placed. At about eight o'clock in the morning Baron and Baroness de Shack were about to leave the hotel. The Baron went down from the second story by the staircase, but the Baroness, being fifty-six years of age and somewhat infirm, naturally preferred the easier and more agreeable method of descending by the elevator. So she rang for the elevator to be brought up to the second story. She took her place in the car, or cage, with a superintendent of the building and the man who worked the apparatus. The conductor touched the button, but instead of descending, the car began to mount with alarming rapidity. The casting which united the piston to the platform on which the car rested had broken. While the force of water was beneath the piston, and the car was ascending, this was not felt, as the piston ran up and lifted the load as usual; but immediately the escape-valve was opened at the foot of the supply-pipe, the piston darted downward by itself with fearful speed to the bottom, while counter-weights, now much heavier than the car and its load, began to run down, and pulled the cage up at a dizzy rate. Arriving at the top floor, the car was violently rammed against the top beam. The shock was so great that it broke the chains which held the counter-weights, and the car went flying down to the basement. The weights fell with a report almost equal to a cannon-shot, attracting nearly every person in the building. The three occupants of the cage were dead, all bleeding from the mouth and ears, showing cerebral congestion. A doctor was called, but his aid was unnecessary. At the inquest it was ascertained that a 'blister' in the casting was the cause of the disaster."

The Palais de Justice at Brussels. — It is comforting to know that American building committees are not the only ones who let the cost of the buildings they have in charge exceed the appropriations. It is said that the new Palais de Justice at Brussels will cost some $7,000,000, although the original appropriation was only $1,600,000.

One of the Highest Mountains. — According to recent geographical surveys it seems that the Aconcagua peak is the loftiest of the Andes range, and the highest in America. It is 100 miles east of Valparaiso, and nearly in latitude 32° 30′ south. Its actual height is not accurately known, but the measurements made by M. Pissis and other noted scientists make it reasonably certain that the elevation is between 22,400 and 23,900 feet above the waters of the sea. The French explorer made it 22,422, or four miles and 1,302 feet over, which would be 998 feet higher than the snowy summit of Chimborazo, as Humboldt measured the latter, when in 1802 the great German made his famous ascent of that mountain with Bonpland to a height of 19,286 feet. Aconcagua, seen from the Chilian seaport of Valparaiso, is shown only as a peak, towering above the other heights of the Andes at a distance of 100 miles or more inland, toward the sunrise. Aconcagua has been called an extinct volcano, but the best examinations yet made of its summit do not appear to bear out that idea. The recent observations make the height of the Chilian mountain 23,200 feet, and "probably" over that figure. The elevation of Mexico's highest mountain — Popocatepetl, or "smoking mountain" — is nearly 5,000 feet less than that of the Chilian peak, and Mount Shasta and Mount Hood fall short to about the same figure. Pike's Peak is about 9,000 feet lower than Aconcagua.

How to trace a Leak. — A correspondent of the *Plumber* says that when called on to detect a leak in the soil-pipe of a house, he goes at once to the roof, if the soil-pipe be carried above the roof: if not, he goes to the uppermost water-closet; and pours into one or the other something like an ounce of oil of peppermint, and follows it up with enough water to insure its being carried the full length of the soil-pipe. He then traces the soil-pipe from the bottom, throughout its course; knowing that if there is any crevice through which sewer-gas can enter, the pungent odor of the volatile essential oil will be readily perceptible even in the presence of odors of a baser kind. This practice in the hands of an ignorant or scheming plumber may be made the ground for an order to thoroughly overhaul and change the pipes throughout a whole house; for the plumber has but to slyly open for an instant the bottle containing the powerful essence, for the proprietor to think he has nasal evidence that his pipes are aleak, and his family in imminent danger.

A New Cement. — Herr Pollock of Saxony has invented a cement, composed of pure oxide of lead and concentrated glycerine, which is adapted for cementing both iron and wood-work. The mixture is insoluble in acids, hardens quickly, and is not influenced by heat. When this compound is used, and after it has become properly hardened, it is more easy to break the solid stone than to separate the parts thus cemented.

Unsuspected Explosives. — We have mentioned that the dust of flour, starch, and also finely triturated cork have been known to be the cause of explosions more or less violent; and we now learn from the *Revue Industrielle* that charcoal must be added to the list of these ordinarily innocent substances. A workman carrying a lighted candle in his hand opened a cylinder wherein a copper chain was being polished by friction with pulverized charcoal, and the charcoal dust igniting caused an explosion of considerable violence. The *Revue* suggests that explosions in coal-mines often may be due not to fire-damp, but to the fine coal-dust suspended in the air, and supports the suggestion by the fact that explosions are more frequent in dry mines than in damp ones.

Self-Luminous Wall-Paper. — Referring to the suggestion made by the *Papier Zeitung*, that wall-paper could be coated with oxalate of copper, which appears lighter as the room grows darker, and *vice versa*, the *Manufacturer and Builder* suggests that a room might be made temporarily self-luminous by similar means. There are several salts which absorb light if exposed to it, and give it out afterwards. Among these are the sulphides of barium and strontium, and certain coal-tar extracts of the anthracene series. Probably the best agent to employ would be the electric light, which could be shut off when the wall-paper had acquired its phosphorescent power. It would practically be of use only in the initiation performances of a secret society.

Fire-Escape. — An Iowa deaf-mute has invented a novel fire-escape. It is a cap or turban to be placed on the head, and fastened securely under the chin. It contains enough material to form, when inflated, a small balloon. It is so arranged that, when placed on the head in its collapsed condition, the air can enter it from underneath and expand it. In case of danger, it is adjusted firmly on the head, and the wearer may then jump from the window of a burning building; the air instantly rushes into the turban, swells it into a balloon, and, buoyed by it, the wearer comes down so gently as to strike the ground with little force. The inventor asserts that with it one can jump safely from a fourth-story window.

Artificial Black Walnut. — A Belgian journal says a new process has been applied to the manufacture of artificial black walnut, by which ordinary wood has imparted to it the appearance of the most beautiful specimens of walnut, adapted to the very finest cabinet-work. The wood, first thoroughly dried and warmed, is coated once or twice with a liquid composed of one part by weight of extract of walnut peel, dissolved in six parts of soft water by heating it to boiling, and stirring. The wood thus treated is, when half dry, brushed with a solution of one part by weight of bichromate of potash in five parts of boiling water, and, after drying thoroughly, is rubbed and polished. The color is thus said to be fixed in the wood to a depth of one or two lines; and in the case of red beech or alder, for instance, the walnut appearance is most perfect.

Bill Stumps Redivivus. — An amusing story is told of a German amateur antiquary, which recalls Mr. Pickwick and the headstone of Bill Stumps. While in search of curiosities that might have been neglected by his predecessors, this antiquary stumbled upon a farm-building which had built into one of its walls a stone with the date 1081 very rudely cut upon its face. The farmer readily sold the stone, and agreed to deliver it at the hotel. So agreed, so done: but when the stone arrived, it had become less venerable by 720 years; for the date was now clearly 1801. The farmer accounted for this rejuvenation by saying that his grandfather, who built the barn, finding that the stone did not bond well in its proper position, had set it in the wall upside down.

Trade Mottoes. — Some of the mottoes of the London city companies are very curious: the Blacksmiths', for instance, have for their motto, "By hammer and hand all arts do stand;" the Distillers', "Drop as rain, distil as dew;" the Founders', "God the only Founder;" the Framework Knitters', "Speed, strength, and truth united;" the Innholders', "Come, ye blessed! when I was harborless, ye lodged me;" the Joiners', "Join loyalty and liberty;" the Saddlers', "Hold fast; sit sure;" the Watermen's, "By command of our superiors;" Weavers', "Weave truth with trust;" and the Needlemakers', "They sewed leaves together, and made themselves aprons."