S. A. Clemens,

Constructing Walls,

No. 34,290, Patented Feb. 4, 1862.

Fig: 2.

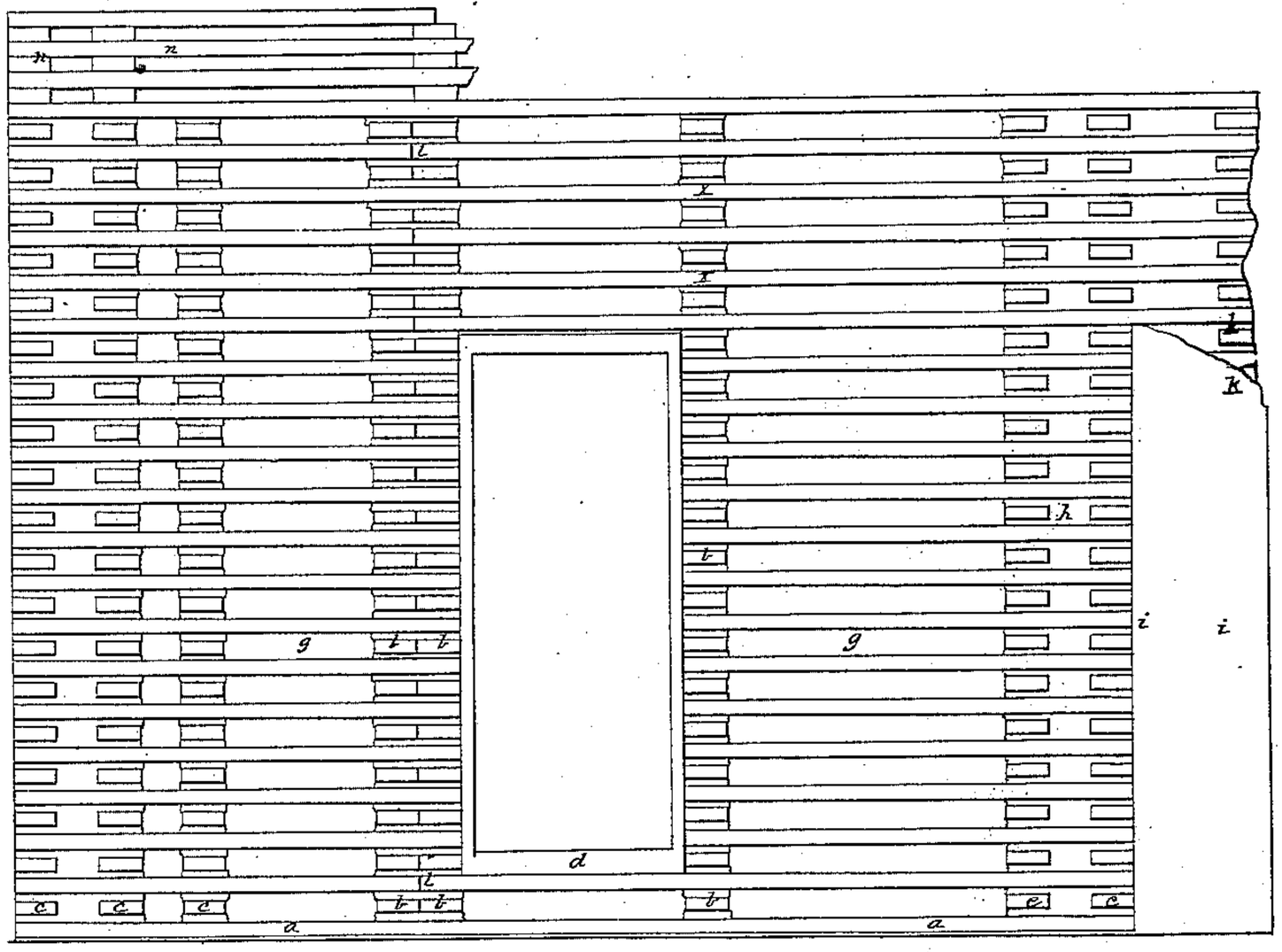
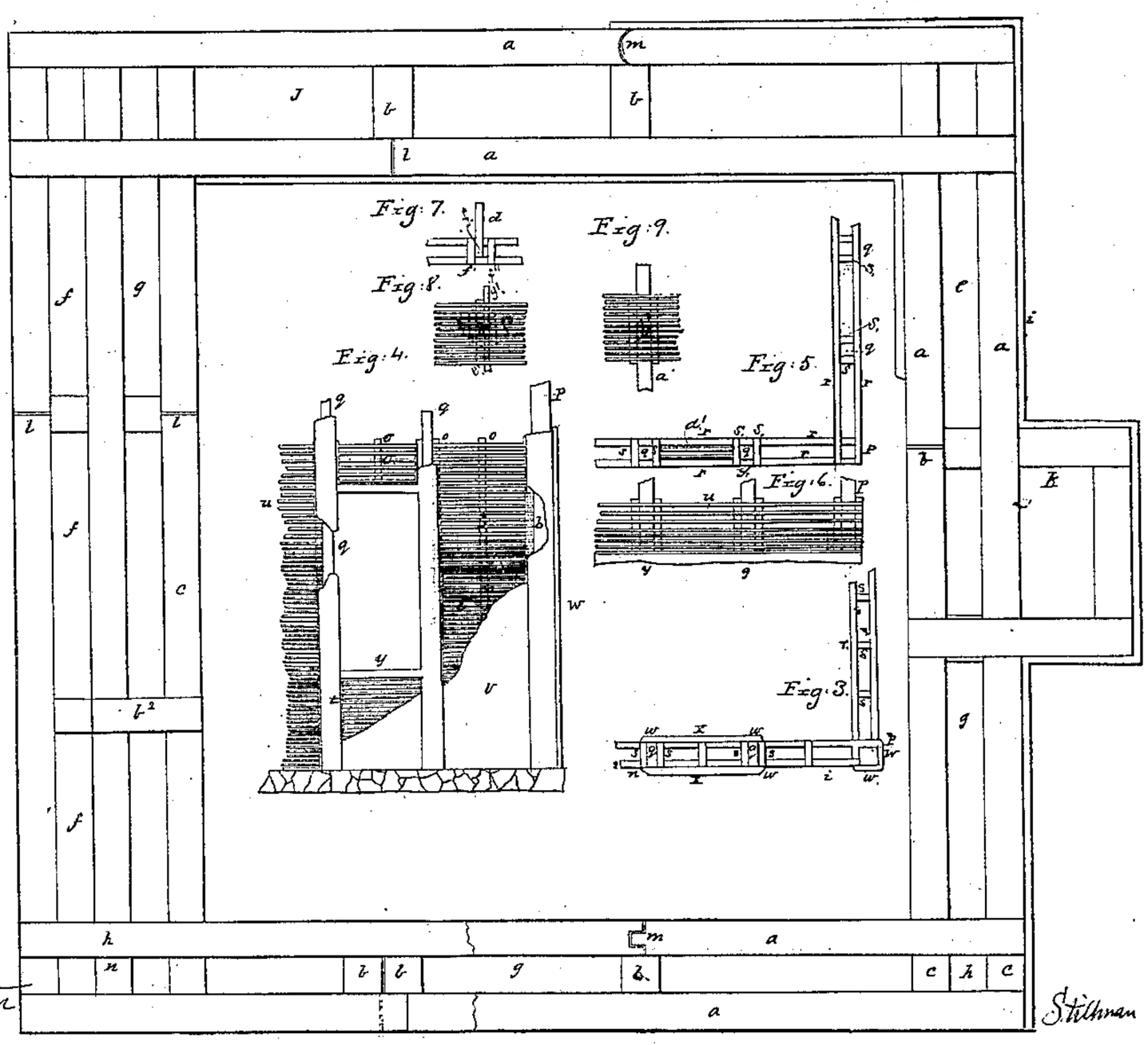


Fig: 1.



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STILLMAN A. CLEMENS, OF ROCKFORD, ILLINOIS.

IMPROVEMENT IN CONSTRUCTION OF WALLS OF BUILDINGS.

Specification forming part of Letters Patent No. **34,290**, dated February 4, 1862.

To all whom it may concern:

Be it known that I, STILLMAN A. CLEMENS, of Rockford, in the county of Winnebago, in the State of Illinois, have invented a new and Improved Mode of Constructing the Walls of Buildings and other Structures; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 is a plan, and Fig. 2 an elevation, of a quadrangular structure, shown partly erected. Fig. 3 is a plan, and Fig. 4 is an elevation, of a corner of a wall in which the lath structure is combined with a frame. Fig. 5 is a plan, and Fig. 6 an elevation, of another mode of combining the lath structure with a frame. Fig. 7 is a plan, and Fig. 8 an elevation, of a section of the wall, showing the usual mode of attaching the ends of the joists and supporting them in the wall; and Fig. 9 is an elevation of a portion of a combined wall in one of the forms, showing the mode of attaching the studs to the joists.

The same letters refer to similar parts in all the figures unless otherwise specially designated.

My invention consists, first, in making a skeleton wall of a building or other structure wholly or in part of lath or other narrow strips of wood, which are laid flatwise upon any suitable foundation and carried up in two or more parallel tiers, the successive layers of lath being separated from each other by the interposition of cross pieces or ties of the same material, which, being laid across at regular intervals, also secure together the parallel and vertical tiers of lath and give strength to the structure by being laid in mortar or secured by nails to the wall-lath at the points of intersection. The skeleton wall thus made, having been carried up to any desired height, is plastered within and without as common lathed walls are plastered, the space between the plastered tiers of lath forming what is called a "hollow" or "chambered" wall; or it may be filled with concrete or any coarse mortar applied during the construction of the lath-work to give greater solidity to the wall. When three or more vertical tiers of lath are formed in the construction of the wall, making two or more parallel chambered spaces within it, one of the latter may be filled with mortar, concrete, or other material, and the other chambered space or spaces may be left vacant, together realizing the effects of solidity and the non-conducting influence of the hollow space; also, the structure of a skeleton wall of lath-work, as herein described, may be combined with a frame of studs and posts in various ways and plastered within and without.

In the accompanying drawings, Figs. 1 and 2 represent a quadrangular structure, illustrating modes of making a skeleton wall of lath and mortar or of lath secured by nails, &c. Upon any suitable foundation lath or other strips of wood *a a a* are laid flatwise in mortar, in parallel rows, and upon these cross-pieces *b b* are placed, each embedded in a thin layer of mortar placed on *a a* at the intersecting points. At the corners the ends of the lath in the rows are laid with the ends of the layers of lath on one side crossing and interlocking with the ends of the lath on the adjacent side, as represented at *c c c*, the crossing ends being embedded in mortar, as in the case of the cross-ties *b b*. Upon the cross-ties *b b* and upon the ends of the lath *c c c c c* mortar is placed, and upon this lath are again laid, and so on, alternately—lath, mortar, cross-ties, mortar, and lath again, as represented in Fig. 2. The lath in each tier are placed vertically one above the other, and are distant from each other about one inch, which is determined by the space occupied vertically by each cross-tie and the thin layers of mortar above and below it. In this way the mortar interposed between the surfaces of wood at the points of intersection becomes the binding material of the skeleton wall, of which the lath may be designated as constituting the ribs, and the plastering to be subsequently applied standing for the flesh and skin.

The ties *b b* are cut from lath, and are of a length corresponding to the thickness of the wall, as shown at b^2, Fig. 1. These ties are carried up in vertical rows, which are at such distances from each other as is convenient in respect to the length of the lath or strips used for the longitudinal tiers or for the support of the window and door frames, and more especially to afford, with the mortar intervening between the ties of each row, solid col-

umns of support, upon which the ends of the floor-joists may rest. The vertical rows of cross-ties may consist either of single pieces, one above the other, embedded in mortar, as at *b*, or of two pieces side by side in each layer, as at *b b*, which last form is used when an unusually strong column of support is required for the ends of the floor-joists above. The ends of the joists for the floors of the building are formed and inserted in the same way as is usual in brick walls, the ends of the joist not passing entirely through the wall, but only coming up to the outmost tier of lath and resting directly upon the vertical column of ties and mortar. This is represented by Figs. 7 and 8, in which *d'* is a joist resting upon the column of cross-ties *e'*. Between the ties the inner vertical tier or tiers (as the case may be) of lath are carried up in line by cutting pieces of lath to fit the distance between the joists and laying ties and mortar each side of the end of each joist, as shown at *f' f''*, Fig. 8, between the layers of the longitudinal tiers alternately, as described. The structure is thus carried to the level of the top of the joist, when the vertical column of cross-ties is carried up directly over the joist in line with its direction below, as also shown in Fig. 8. The ends of the joists may be anchored in the wall by nailing short and narrow strips of plank *g'*, Figs. 7 and 8, vertically to one side of the end of each joist in such a position that the ends of the anchor-strips shall extend above and below into the space between the tiers of wall-lath, and when the anchor-strips are used the ties *f''* are laid against the side of the strip *g'* in building up between the joist, as shown in Figs. 7 and 8.

A window or door frame is represented at *d*, which is built into the lath and mortar wall, as is usual in building of brick or stone. The ends of the wall-lath as they are laid up against the sides of the window or door frame are secured to it by small nails driven obliquely through them into the lath; or the frame may be secured in the wall by nailing upon each side of the frame a narrow strip of plank of a width corresponding to the distance between the tiers of wall-lath, and the ends of the lath being laid each side of the frame-strips and abutting against the frame, and the adjoining rows of ties being carried up next the sides of the strips, (in a mode similar to the ties *f''* to the anchor-strip *g'*, Figs. 7 and 8,) before described, the frame of the door or window is securely fixed in its place.

The skeleton wall of lath-work may be made with two parallel tiers of wall-lath, as *a a*, or with three, as *c c c*, or even more than three may be used for extraordinary purposes. The space or spaces *g g* between the tiers of lath are suitably made three inches in width; but the dimensions may be varied, according to circumstances and the choice of the builder. For cellar and foundation walls it is found advisable to fill the space between the two tiers of lath with coarse-gravel mortar, which is applied as the wall goes up, the tiers of lath on each side constituting the containing-walls of the mortar. This mode of filling the hollow space in the wall is shown in Fig. 1, where *e* represents the mortar filling lying in the space between the parallel tiers of wall-lath *a a*. This mode of construction may also be advantageously employed to make a fence-wall, and also for military fortifications, as the thickness of the wall may be increased to any extent, and the chambered spaces between the tiers of wall-lath may be multiplied at pleasure and filled with clay, earth, mortar, or grout-work, or by laying the lath so as to form a ground system of quadrangular spaces and filling them alternately with mortar, &c., and leaving alternate spaces vacant, the mortared portions of the fortification-wall will acquire greater solidity from the access of air, which would not be the case if a solid mortar structure of great thickness were made. For common building purposes it is found advisable to fill the space in the wall with coarse mortar to a height a few inches above the level of the first floor and above this to leave the space *g* in the wall vacant to secure the well-known advantages of a hollow or chambered wall. This chambered space *g* is thus continuous in a vertical direction, or is, rather, a range of chambered spaces separated by the columns of cross-ties *b* and *b b*, &c., each of which extends the entire height of the wall unless interrupted by the window or door frames, &c., lying in its line of direction. For building-walls when solidity is regarded as of leading importance, the space *g* may be filled with mortar, &c., as seen at *e*, Fig. 1. To secure a combination of great solidity with the advantages of the vacant space in the wall, the latter may be made with three tiers of wall-lath, as seen at *c c c*, in which the outmost space *f* between two of the tiers of lath is filled with mortar, &c., and the inner space *g* is left vacant. The filling of the spaces *f* or *e* is most conveniently done as the tiers of wall-lath are being laid up. The vertical space *h* is filled with mortar to advantage in all cases, as this greatly increases the solidity and strength of the corner of the structure. The skeleton wall thus described is plastered within and without in the usual way of plastering common lathed walls. Portions of wall plastered are shown at *i i i*. The plaster-mortar is best made rather harder than for common plastering, though this is not of indispensable importance, and being forced through the interstices of the lath by the trowel of the workman it forms a "lock" on the inside, and the mortar penetrating and filling adjacent interstices of the lath in consequence of the thinness of the latter the portion of mortar which comes through on the inside tends to connect together and form a continuous sheet of plaster on the inside, which adds much to the permanency of the plastering and also to the general strength of the wall. Furthermore, as the distance be-

tween the lath is greater than is usual in common lathing of house-walls, and the distance through which the plaster-mortar goes to form its lock on the inside is compared with the common way as the width of lath is to their thickness, the surface of plaster on the outside is more continuously and firmly attached than by the old mode. When the space within the tiers of lath is filled with mortar, &c., as described, the plastering-mortar penetrating between the lath, as described, attaches itself to the mortar within, and thus has most favorable adhesion. When the space within the skeleton wall is not filled with mortar, as represented at *g*, on the application of the plastering-mortar on the sides of the wall the spaces *g g* are inclosed and become close air-chambers, affording most favorably the well-known advantages of non-conduction in respect to heat and moisture.

When lime and sand or gravel for mortar are difficult to procure, clay mortar may be used in part or throughout for laying up the lath, &c., and for daubing or plastering, but of course with inferior results.

A mode of constructing an attached pilaster or buttress to the wall is shown at *k*. This is shown filled with mortar to give solidity, and may be used to give strength to a high wall, as for a church building, which cannot be conveniently braced by partitions on the inside, or any modification of this attachment may be employed for architectural effect, and the general principle of construction may also be used to make pillars and other architectural devices.

The buttress *k* is represented as built up with the wall, the lath forming two of its sides, crossing and interlocking with the lath of the wall like the cross-ties. The partitions between the apartments of a building constructed in the way herein described may be built in the same general way as the walls, being carried up at the same time with the latter, and their lath crossing and interlocking with the wall-lath at the ends of the partitions the strength of the structure is increased.

In constructing the described skeleton wall it is advisable to make the ends of the lath or wooden strips abut against each other on different rows of ties alternately, and also alternately with the lath in the same layers, as shown at *l l*. In this way the weakness which might arise from bringing the ends of successive layers of lath on one line of cross-ties is avoided by alternating distribution. Greater strength may be given to the wall by shaping the contiguous ends of the lath so that they will lock one to the other, as is represented in two different ways at *m m;* but for all ordinary purposes the lath-work is sufficiently firm when the ends are left square, as shown at *l l*.

The method of construction above described may be modified and combined with the parts of a common building in many ways and securing the general objects of the invention in various degrees, according to circumstances.

Instead of using mortar interposed between the adjacent surfaces of the wall, lath, and cross-ties, as described, the lath and ties may be laid one upon the other with their surfaces in contact and nailed together, as represented at *n*, on one corner of the wall, Figs. 1 and 2. In this modification of the mode of building, which in other respects is carried out as before described, it is best to make the cross-ties of thicker stuff than common lath, or two thicknesses of lath may be used for each tie, as shown at *o o o*, Fig. 4.

In Figs. 3, 4, 5, and 6 parts of walls are shown, in which the described skeleton lath-work is represented as combined with parts of a common frame of a building, of which *p p* are corner-posts and *q q* studs, the latter placed at suitable distances apart to support the window and door frames and accommodate the general details of construction. These posts and studs are supposed to rest on foundation-sills. (Not shown in the drawings.) The lath laid flatwise are represented at *r r* with the interposed cross-ties *s s s*, as before described.

In Fig. 4 a portion of the lath structure at *v* is represented as plastered on the outside, and the lower part of the lath-work at *t* is represented as having thin tie-pieces interposed between the lath, while the upper part at *u u* represents the tie-pieces as of greater thickness or consisting of two thicknesses of common lath laid together to form one tie-piece, as described above.

In Fig. 5 the lower part of the lath-work at *t* has thin tie-pieces nailed to the wall-lath, as described, while the upper part *u*, Fig. 6, represents the lath and tie-pieces laid in interposed mortar, as before described.

In Figs. 3 and 4 the sections of lath-work between the studs *q* and the posts *p* are secured in their places by the batten and corner-post boards *w w*, which are nailed, respectively, to the outside of the corner-post *p* and to both the outside and inside of the studs *q q*. The battens on the studs and the corner-boards on the posts extend about one inch outward at their edges on each side from their attached studs or posts to embrace and secure the ends of the lath on both the outside and the inside of the wall, as shown in Figs. 3 and 4.

In Figs. 5 and 6 the lath are represented as built up on the outside and inside of the corner-post *p* and the studs *q q q*, with the cross-ties interposed, as before described. When the posts and studs represented in Figs. 5 and 6 are erected upon their foundation-sills, the structure of wall-lath and cross-ties may be carried up either with nails or mortar to secure them together, and the same also with the intermediate lath-work represented in Figs. 3 and 4, in which, the corner and batten boards being made fast to their places, the intervening structure of lath and

ties may be put up, and in this instance by laying the lath and cross-ties in contact as for nailing, as elsewhere herein described, and putting a small quantity of mortar upon each cross-tie between the ends of the lath in each layer the mortar prevents the lath from being moved toward each other, while the batten and corner boards keep them in their places on the outside, and, at choice, also, the mortar may be so applied, as before described, that both lath and ties shall be embedded in it.

Figs. 3 and 4 represent a window-frame at *x*, which is secured to the contiguous studs *q q* in the usual way.

The ends of the floor-joists are attached to the wall, as before described, resting either upon the column of cross-ties of the lath-work, which are put at suitable distances apart for this purpose, or the ends of the joists, or a part of them, rest upon shoulders cut near the top of the studs for this purpose, as is represented in Fig. 9, in which *a′* is the top of the lower stud, and seen through the interstices of the outside tier of lath is the end of a joist *b′*, resting upon a shoulder of the stud *a′*, and the foot on upper joist *c′* is also seen resting upon the top of the joist *b′*. A part of the end of the stud *a′* is left to project beyond the shoulder, and is conveniently nailed to the side of the joist *b′*, with which it is in contact. The lower ends of the studs of the upper story are also secured to the joists at their lower ends in the same way.

In the modification represented in Figs. 3 and 4, the frame-work of studs and corner-posts being erected, the lath-work may be built upon the spot, as described, or, the batten and corner boards being left off on the outside, the lath-work may be nailed together elsewhere in convenient-sized blocks or sections of, say, one and a half feet in height and of the proper thickness and the length suitable for the distance between the studs and posts where they are designed to go. Being transported to the frame, these sections can be readily put into their places between the studs and posts, and the batten and corner boards being nailed to their places, the lath-work of the wall is ready for plastering, or the sections may be plastered with a first coat before laying them up in the wall. In like manner the lath-work, as described, between the posts and studs in Figs. 5 and 6 may be made into blocks or sections of any convenient size in advance of the erection of the wall, the ends of the wall-lath or strips of the sections each being made so as to fit and embrace both the outside and the inside of the stud a part of the width of the latter, as shown at *y y*, Fig. 6. In this modification of the invention, the lath-work being nailed together beforehand in blocks or sections of sizes suitable for the places where they are to go in the wall, the erection is most conveniently made by first setting up a corner-post *p*. Then the two corner tiers of lath-work sections are erected upon the foundation-sills by sliding the sections horizontally, so that as each is put in its place one upon the other the ends of the lath may embrace the post *p* on each side, and so that the corresponding ends of the layers of lath in the sections on the two sides of the building shall interlock the ends of the one section lying upon those of the other side at right angles to it, as shown in Figs. 5 and 6, and for this purpose the ends of the lath in the corner-sections are made to project beyond the cross-ties, as shown at *z*, Fig. 6, somewhat farther than when they embrace the stud *q* at the other end. Other obvious expedients for connecting the sections to the corner-posts can also be employed. The corner-sections of lath-work having been erected to a height suitable for one story, the adjacent studs *q q* are set into the mortises prepared for them in the sills below, and are raised upright to their places between the ends of the lath-work of the corner-sections made to receive them, as described. Other tiers of the sections of lath-work may be successively erected until the inclosure of the first story of the building is completed, when a second story may be built up in the same way, the window and door frames being put in their places as the work progresses.

In all cases provision is made for the support and attachment of the ends of the floor-joists to the studs or over the vertical columns of cross-ties between the studs, substantially as described, either by sections of the prepared lath-work or parts thereof made for this purpose, as represented in Figs. 7 and 8, or the lath-work may be built up between the ends of the joist in the like form on the spot, as before described. The sections or blocks of lath-work described may, at choice, be plastered with a first coat of mortar before laying up in the wall, a portion of fresh mortar being applied at the junction of the contiguous sections as they are put in their places.

At *d′*, Fig. 5, is represented a mode of laying narrow strips of wood inside of the wall-lath which are to be plastered, the ends of the strips resting upon the cross-ties the same as the lath and lying parallel and in the same layers with the latter and removed from their adjacent lath about the distance of one-half of an inch. The chambered space in the wall is somewhat narrowed by the presence of these secondary strips; but is not interrupted of its continuousness in a vertical direction. The purpose of the strips marked *d′* is to support the plastering-mortar thrust through the spaces between the wall-lath and cause it to form a continuous sheet on the inside of the latter in the vertical line of the space between the strips *d′* and the wall-lath. Straw, hay, or any similar material partly non-conducting of heat may be used also for the like purpose with the strips *d′*, the latter, however, being regarded as best, since, in addition to their preservation of the air-space,

they give additional strength to the wall independently of the mortar which they are used to support.

To secure the sides of the wall of the building, which are parallel to the direction of the floor-joists, it is recommended that cleats and staying-strips be nailed to the sides of the joists adjacent to the wall and made fast to the studs or anchored in the lath-work of the latter by passing the stays through the interstices of the inside tier of wall-lath. The sections may also be made with the lath standing vertically in the wall.

The different modifications of my invention herein specified may be interchanged as is found convenient, and also other variations of the general mode described may be employed. It is also obvious that the dimensions of the lath or strips of wood used in this mode of construction may be varied at pleasure, though when mortar is used as the binding material between the wall-lath and cross-ties breadth of surface like that afforded by common lath laid flatwise is desirable.

I am aware that walls of buildings have been made of narrow boards laid in tiers one above the other, separated by cross-pieces, and the alternate overlaying of the ends of the boards of the adjacent sides at the corners and secured in their places by nailing, and the whole plastered on the edges of the boards, both inside and without; but this mode of building differs essentially from my invention herein described in respect to economy of material and the important particulars that the plastering cannot form a lock on the inside to secure it from falling off from the wall, and there is no vertical space continuously for any useful distance within the wall, which are favorably realized in my invention and are of well-known importance in connection with common modes of building. Nor do I claim the combination of lath and mortar with parts of a frame, irrespective of the mode in which they are employed, substantially as described.

What I claim, and desire to secure by Letters Patent, is—

The method of constructing the walls of buildings and other structures of lath or any narrow strips of wood put up in two or more parallel tiers or rows with cross-ties of the same secured between the lath by mortar or nails, to be finished by plastering when combined either with the vacant space or spaces between the tiers or rows of lath, or with a filling of mortar or other material in the said space or spaces, whether the entire skeleton wall be constructed of the lath-work or it be combined with parts of a frame, substantially as described, and for the purposes specified.

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