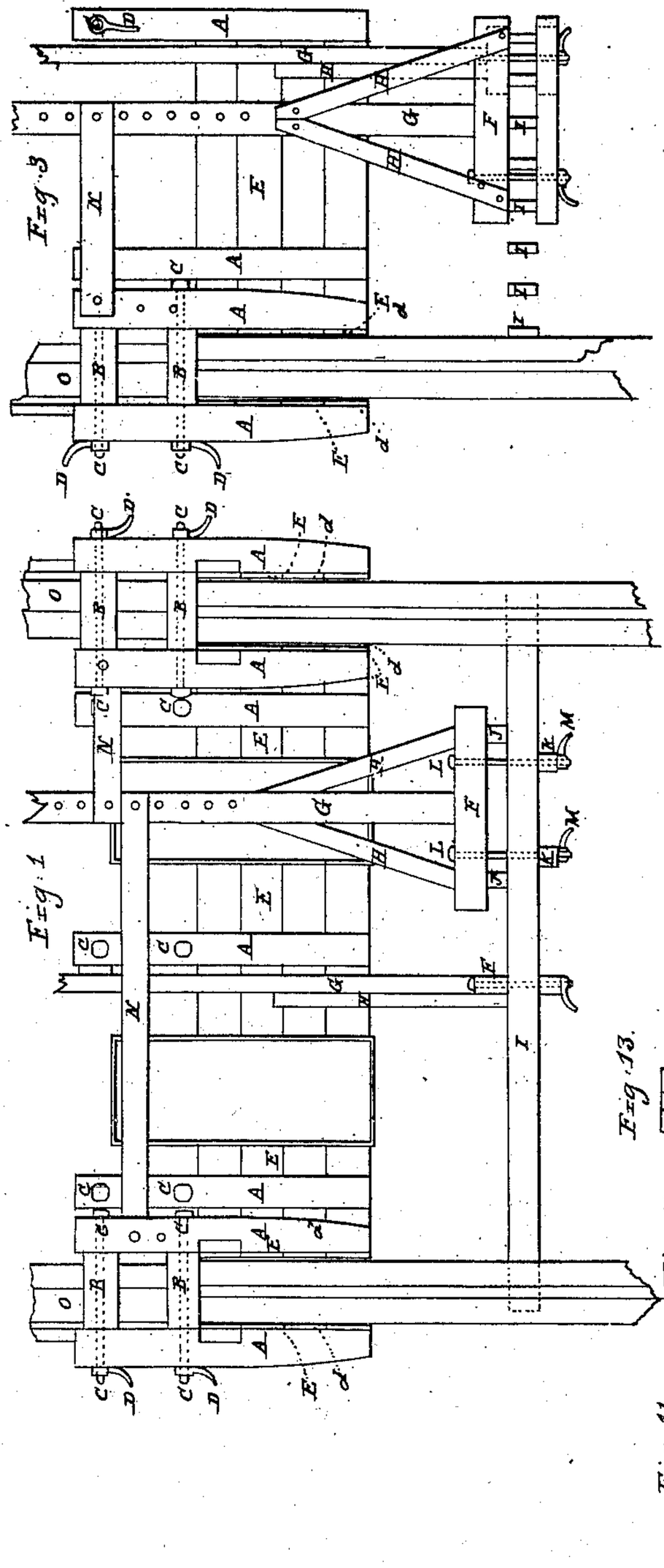
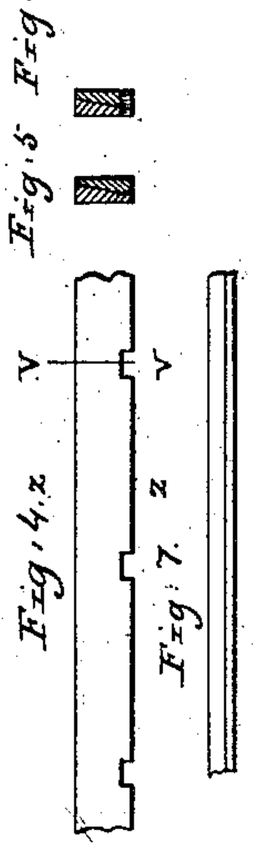
No. 27,692. PATENTED APR. 3, 1860.

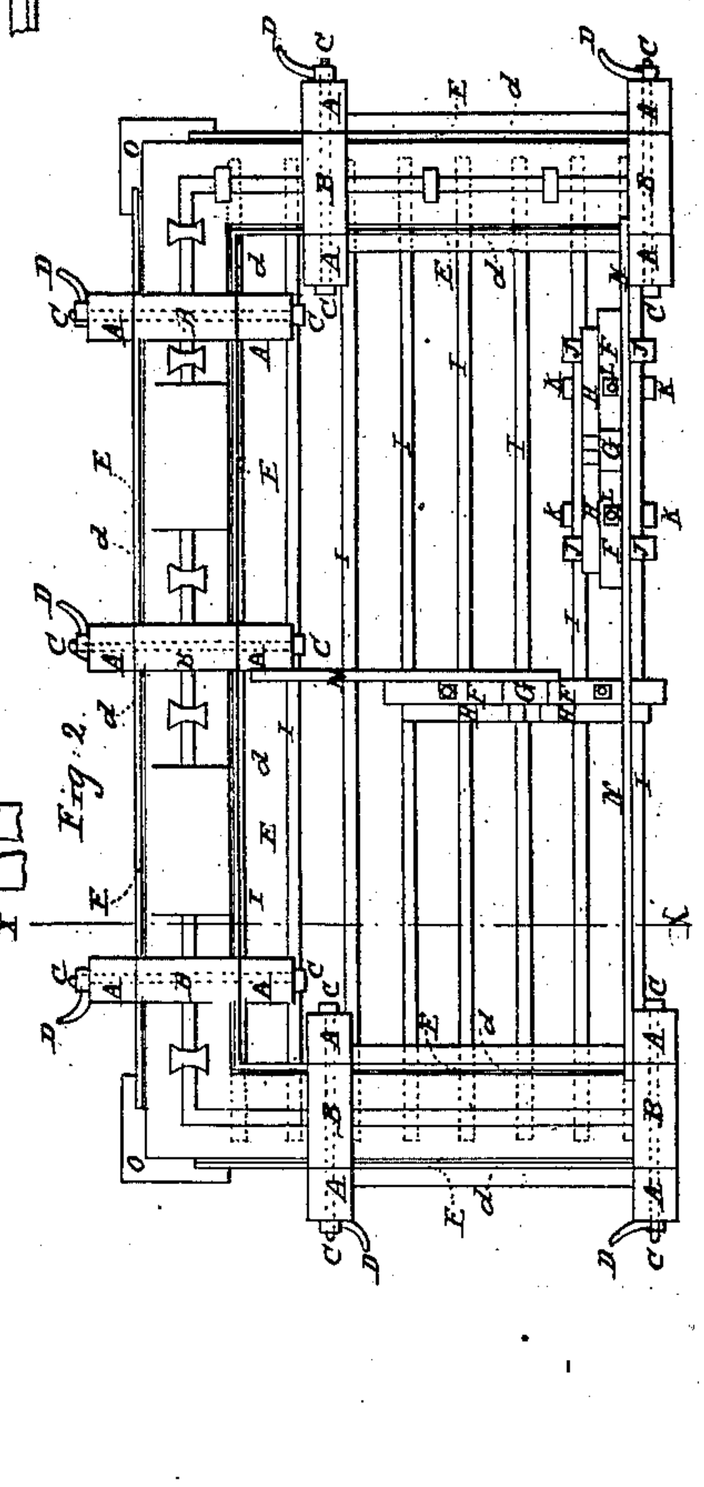
E. E. CLARKE.

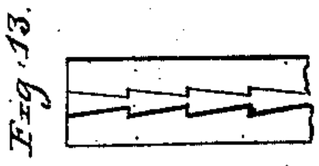
APPARATUS FOR BUILDING CONCRETE WALLS.

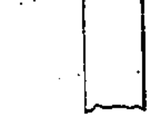
2 SHEETS—SHEET 1.











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APPARATUS FOR BUILDING CONCRETE WALLS.

2 SHEETS—SHEET 2.

Fig. 14.

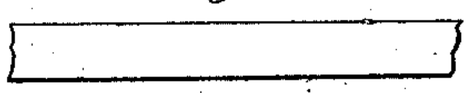


Fig. 15.

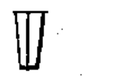


Fig. 16.

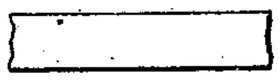


Fig. 17.

Fig. 18.

Fig. 19.

Fig. 20.

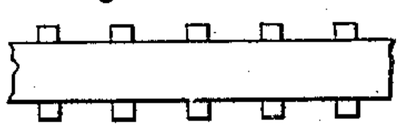


Fig. 21.

Fig. 22.

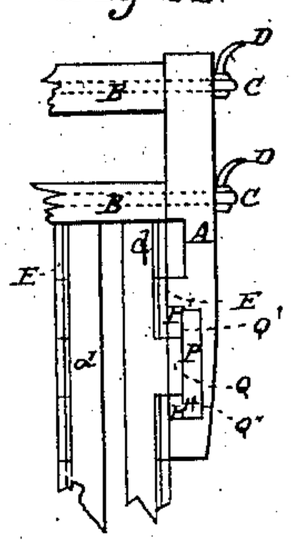


Fig. 23.

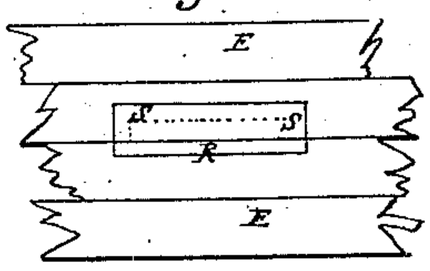
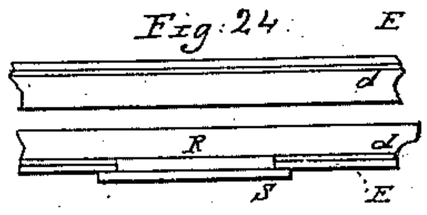


Fig. 24.



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UNITED STATES PATENT OFFICE.

ELIZUR E. CLARKE, OF NEW HAVEN, CONNECTICUT.

APPARATUS FOR BUILDING CONCRETE WALLS.

Specification of Letters Patent No. 27,692, dated April 3, 1860.

To all whom it may concern:

Be it known that I, ELIZUR E. CLARKE, of New Haven, in the county of New Haven and State of Connecticut, have invented a certain Apparatus for Building Concrete Walls, the construction and operation of which I have described in the following specification and illustrated in its accompanying drawings with sufficient clearness to enable competent and skilful workmen in the arts to which it pertains or is most nearly allied to make and use my invention.

My said invention consists in, first, preparing a number of frames in the manner hereinafter described, for supporting sheeting boards, between which boards the concrete is confined so as to be kept in a vertical position; the different parts of the said frames being attached together by rails and bolts entirely above the work, so as to keep the said parts firmly in connection with each other and not to interfere with the operation of laying the wall, as more fully described hereafter; second, connecting with the flooring timbers a number of adjustable braced uprights, supported on sills, and temporarily, but at the same time, firmly, attached to the floor timbers by means of bolts and nuts passing through auxiliary pieces and through the said sills, as more fully described hereafter, and connecting these uprights by means of horizontal ties with the frames before described, by which means I am enabled to keep the latter in a vertical position, while the space between the sheeting boards which they support is being filled with the concrete, as hereinafter more fully set forth; third, providing upright angular pieces to be attached to the external angles of the building for the purpose of confining and keeping in position the extreme ends of the sheeting boards which project beyond the frames before described and which, from their relative position with respect to the outer angles of the walls cannot be confined by the said frames, as hereinafter more fully set forth; fourth, providing a number of movable cores by which I am enabled to form a hollow wall, the said cores being so constructed as to admit of their being raised and placed in a new position, as more fully set forth hereafter; fifth, a method of so constructing the apparatus, that by means of slight additions to be hereafter described, I am enabled to form projections upon the walls, such as window sills, string courses, water tables, caps, &c.; sixth, interposing strips of thin wood or metal between the sheeting boards and the concrete, by which I keep the sheeting boards from getting into contact with the concrete, and am thereby enabled to more easily raise the frames when required.

My invention is illustrated in the accompanying drawings as follows:

Figure 1 is a side elevation showing the frames and braced uprights, with the method of attaching the different parts of the former together, and of securing the latter to the floor timbers, and showing also the horizontal pieces which attach the frames to the uprights so as to keep the latter in vertical position. Fig. 2 is a plan showing the same parts. Fig. 3 is a section showing the parts to the right hand of the line XX on Fig. 2. Fig. 4 is an elevation of one form of core, with notches on the lower edge, to allow it to rest on the vitrified bond bricks hereafter alluded to. This core is made in two parts. Fig. 5 is a vertical section of the core, through the line Z, Z, on Fig. 4, showing the manner of forming the core in two parts, so that it may be more easily withdrawn. Fig. 6 is a vertical section through the line V, V, on Fig. 5, showing the notch on the lower edge. Fig. 7 is a plan of the core represented in Fig. 4, showing the thicknesses of the two portions of which it is composed. Fig. 8 is an elevation of a core of another kind in which the cavities for the bond bricks hereafter alluded to are formed by planting blocks of the proper shape on the sides of the core, so as to be flush with the upper edges. This core is also composed of two thicknesses. Fig. 9 is a plan showing the blocks planted on, and showing also the thickness of the parts of which it is composed. Fig. 10 is a section through the line Y, Y, in Figs. 8 and 9. Fig. 11 is an elevation of still another kind of core composed of one solid board of a wedge-shaped form. Fig. 12 is an end elevation of the same core. Fig. 13 is a vertical transverse section of the wall, showing the form of the cavity or hollow left when the cores shown in Figs. 12, 15, and 17, are used. Fig. 14 is a side elevation of another description of core composed of two wedge shaped boards. Fig. 15 is an end elevation of the same core, showing the two wedge shaped pieces of which it is composed, joined together at the center. Fig. 16 is a side elevation of another kind

of core formed of three boards. Fig. 17 is an end elevation of the same, showing the core composed of two boards of a uniform thickness at the outside, with a wedge shaped piece inserted between them. Fig. 18 is a side elevation of another form of core composed also of three boards. Fig. 19 is an end elevation of the same, showing the manner of its construction with two wedge shaped pieces on the outside, separated by a third wedge shaped piece, the three pieces being so formed and arranged as to present a rectangular outline when placed together in position. Fig. 20 is an elevation of still another kind of core composed of two boards separated by fillets. Fig. 21 is an end view of the same, showing the boards and fillets in position.

The cores of which end elevations are shown in Figs. 5, 6, 10, 19, and 21, being rectangular in section, will leave a vacuity between the two thicknesses of wall of the same breadth throughout. The core of which the end elevation is shown in Fig. 12, may, in consequence of its wedge like form, be easily withdrawn from between the two thicknesses of wall; the same remark is applicable, but in a greater degree, to the cores of which the end elevations are shown in Figs. 5, 6, 10, and 15, inasmuch as each of these cores is composed of two wedge shaped pieces, one of which being withdrawn, the other can be lifted out, and the operation, if conducted with an ordinary degree of care, will produce but very little disturbance in the portions of the newly formed wall which are in immediate contact with them. But the remaining cores, of which the end elevations are shown in Figs. 17, 19, and 21, being composed each of three parts, admit of the center part being withdrawn, which allows the two outer parts to be simply lifted out, without producing any disturbing effect whatever upon the wall.

Fig. 22 is an elevation of part of one of the frames, showing the method of preparing it so as to form a water table or other continuous projection from the surface of the wall. Fig. 23 is an elevation of part of the sheeting boards, showing the method of preparing them so as to form a window sill or cap. Fig. 24 is a plan of the same.

A, A, are the uprights of the frames, which are connected by means of the rails B, and screw bolts C, which latter are operated by the levers D, which form part of the nuts. The uprights or cheeks of these frames have sheeting boards E, attached to their inner surfaces in the manner shown on the drawings, inside of which sheeting boards are placed slips of thin boards, metal, or other material *d*, shown by a dark tint on Figs. 1, 2, and 3, the rails B being of such length that the distance between these slips of boards will be equal to the thickness of the wall. The braced uprights or inverted tees, are each formed of a sill F, into which the upright G is mortised, and which is kept at right angles to the sill by means of the braces H. Two of these braced uprights are shown upon the drawings, the sill of one being parallel to, and of the other at right angles to, the direction of the floor timbers I. The former is fixed to the floor timbers and sustained in a vertical position as follows: Two short pieces of timber J, J, of sufficient length to reach across two of the floor timbers are laid thereon in a direction at right angles to their length; the sill of the braced upright is placed upon these, and the uprights temporarily supported, until two other pieces K, K, are introduced under the floor timbers; these latter pieces are perforated as is also the sill of the upright, to admit the passage of the bolts L, L, which pass through the timbers K, K, between the floor timbers and through the sill of the upright, and by operating the handles M, M, of the nuts, I secure the short timbers, the floor timbers, and the sill of the upright, all firmly together, and by that means I am enabled to keep this braced upright in a vertical position as long as may be necessary. In the case of the other upright, the sill of which is at right angles to the direction of the flooring beams, the intervention of timbers between the sill and the beams is not necessary, as in the previous case; in this case the sill is placed upon the flooring beams, and then, by introducing a piece of timber beneath it, with the flooring beams intervening, the whole may be secured as before by bolts passing between the timbers. This is fully illustrated in Fig. 3, its position not allowing it to be distinctly shown in the other figures. The frames are then tied to these uprights by means of horizontal stretchers N, one extremity of each of these stretchers being secured to a frame, and the other to an upright; and inasmuch as these horizontal ties are required to be at different heights as the frames are raised, I therefore perforate the uprights G to receive dowels, or bolts and nuts as may be preferred for securing them. By this means I preserve the frames in a vertical position. By making the rails B of different lengths, I am enabled to increase or diminish the thickness of the wall at pleasure, and can therefore make the inner or cross walls of the building of a thickness as much less than the outer walls as may be desirable.

The cores are made as shown upon the drawings, any of which may be used. They have each been particularly described before, and it now only remains to be added, that the cores of which the end elevations are shown in Figs. 12, 15, 17, and 21, may have the wing like projections shown in Figs. 8, 9, and 10, attached to their upper

parts, or they may be notched out on the lower edges, as shown in Figs. 4, and 6. The object of the notches which are cut out of the lower edges is to admit the core to be passed down upon the binding bricks before alluded to, and which are more particularly described in my application for a patent for "certain improvements in concrete walls" which is filed at the same time with this. These binding bricks are laid across the cavity formed by the core after the latter has been withdrawn. The object of the small blocks or wings planted on the sides of the cores so as to be flush with the upper surface, as shown in Figs. 8, 9, and 10, is to leave a depression in the concrete of the proper shape for receiving the binders.

The core being on the center of the wall, the frames are laid in their proper position, so that the lower rails will take a bearing on the core; a pair of thin boards or plates of metal, each about the depth of the core, are then placed inside of the sheeting boards, one on each side, and the frames tied to the braced uprights as before described; the spaces between the thin boards and the core is then filled with concrete so as to be flush, or nearly so, with the top of the core. The latter is then removed, the bond bricks inserted, the horizontal ties taken away, the frames raised, the core replaced, the frames placed so that the lower rails will again take a bearing upon the core, the horizontal ties again fixed in position, another height of sheeting boards and lining strips introduced, and the concrete filled in as before, and this operation is repeated until the walls are sufficiently high to receive the next floor beams. These are then laid, and the space between them filled in by hand, when the frames and braced uprights are removed above them, and the work carried on as before.

The object of the slips of wood or metal described above is to facilitate the raising of the frames and sheeting boards, by allowing them to slide upon the plates.

Where the ends of the sheeting boards project beyond the frames near the external angle of the building, and where therefore the frames are of no use in keeping their ends in position, I provide a vertical stay *o*, composed of two pieces of timber joined together at the proper angle, whether right or oblique, each half of which is rabbeted from its outer edge to a depth equal to the thickness of the sheeting board; by placing this stay vertically in the proper position, as shown in Fig. 2, its internal surface will be flush with the internal surface of the sheeting boards, while the rabbets before described will keep their ends in position. The object of these uprights is to furnish the means of lining up the work. They are clearly shown in Fig. 2. To keep these uprights in a vertical position, they may be stayed by pieces passing obliquely from them to the ground in a manner well known to any carpenter.

In Fig. 22, a method is shown, by which projections such as a water table may be formed upon the outer surface of the wall. This is effected by planting cleats P, upon the inner surface of the cheeks of the frames. The object of these cleats is to support the ends of a depth of sheeting boards Q, the cleats being so placed that these sheeting boards Q, when placed in position, will stand out from the face of the wall, a distance equal to the intended projection of the water table. By this means, the concrete is allowed to form a projection from the face of the wall, as will be evident from an inspection of the figure. Should it be deemed necessary, horizontal cleats P′, P″, and horizontal boards Q′, and Q″, may be placed so as to form a box; this, or something equivalent to it will be necessary when the projection is continuous, and elevated above the surface of the ground, as for instance a string course.

Figs. 23 and 24, show the method of preparing the sheeting boards to form window sills and caps. A perforation, the size and shape of the window sill or cap, is cut out of the sheeting board, as shown by dotted lines in Fig. 23; a piece of board S of sufficient size to cover this perforation and overlap the edges sufficiently, is planted on the sheeting board over the perforation, as shown by the full lines surrounding the dotted ones in the same figure, and a small fillet R, is planted on the lower edge of both boards to prevent the concrete from falling through. By this means a small box is formed, which receives the concrete to form the projection, the latter being equal to the thickness of the sheeting board. When the sill or cap has been formed, the covering piece and fillet may be removed, and the piece cut out replaced and secured, which restores the sheeting board to its normal condition. Fig. 24 is a plan of the same parts.

It is evident that an apparatus of the same kind may be applied to the building of farm fences or other works of a similar nature, which, in localities where stone and lime are plentiful will be a decided advantage over wood fences, inasmuch as it is not liable to be affected by any of the accidents or causes of decay to which the latter are so peculiarly subject.

The particular improvements which constitute my said invention, and which I claim as having been originally and first invented by me, are:—

1. The combinations of the frames and sheeting boards with the braced uprights or inverted tees, when combined with each other and with the walls and floor timbers in the

manner hereinbefore described, and for the purpose stated.

2. The cores shown in Figs. 4 to 21 inclusive, made as described, either whole or in separate parts, said cores being provided at suitable intervals either with core prints to form recesses in the wall for the reception of the binders, or with notches to fit upon the binders and allow their lower edges to extend down between the said binders to meet that part of the wall which is already built, substantially as set forth.

3. The combination of the rabbeted corner stays or guides O, with the sheeting boards as described, for the purpose stated.

4. The combination with the frames A, B, and sheeting boards E, of the lining plates *d*, of wood or metal, when placed inside of the sheeting boards, to facilitate the raising of the frames, as stated.

5. The combination of the cleats P, P′, P″, and boarding, Q, Q′, Q″, with the frames which support the sheeting boards, for the purpose of forming string courses, water-tables, and other continuous projections, as stated.

6. The combination of the covering piece S, and the fillet R, with the perforation in the sheeting boards, for the purpose of forming window sills, caps, &c., as stated.

7. So constructing the frames which hold the sheeting boards, that the connection of the two sides shall be made entirely above the work, so that the concrete boxes may be raised by simply loosening the bolts which hold them together, and without any connection through the wall, as stated.

ELIZUR E. CLARKE.

Witnesses:
JOHN CRUMLY,
THOS. P. HOW.