Dec. 26, 1950 B. A. FAMA 2,535,277

SHUTTER FOR USE IN BUILDING CONSTRUCTIONS

Filed Aug. 17, 1945 2 Sheets-Sheet 1

FIG-1-

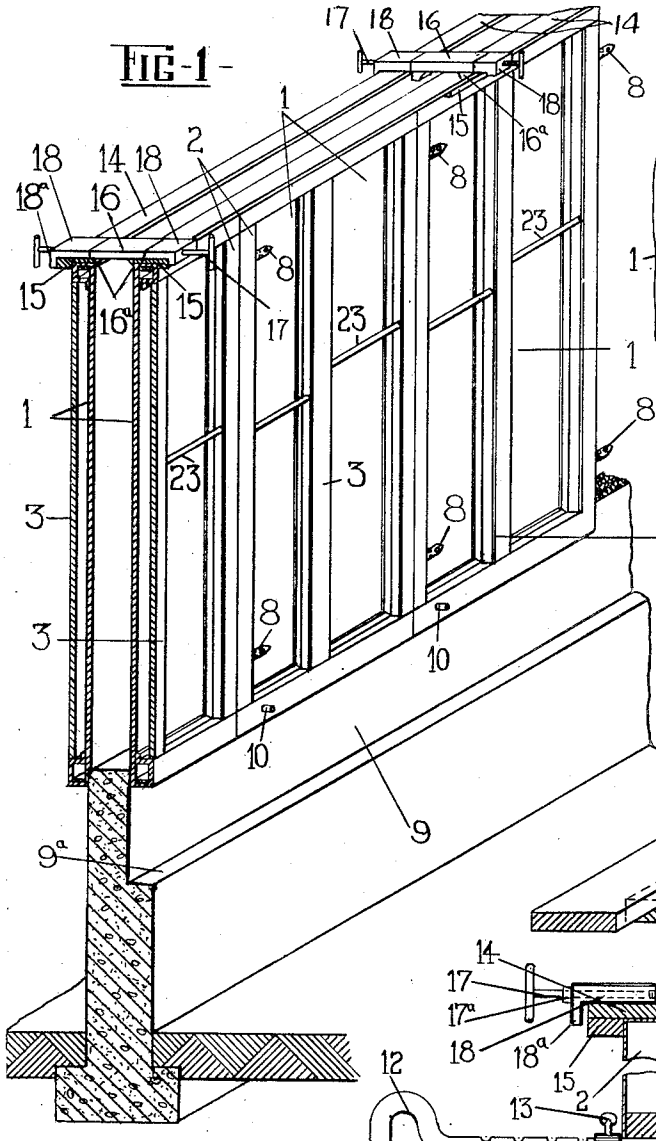


FIG-5-

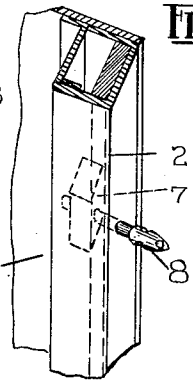


FIG-6-

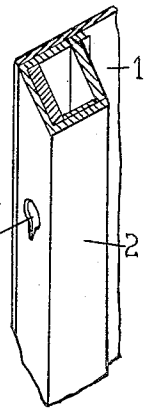


FIG-7-

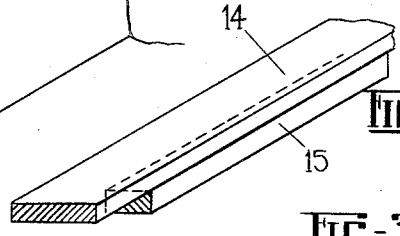


FIG-3-

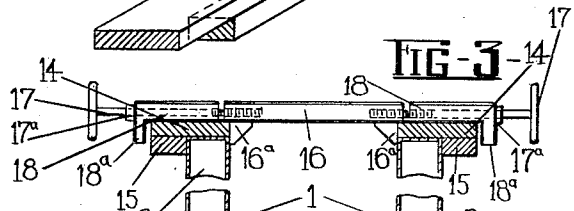
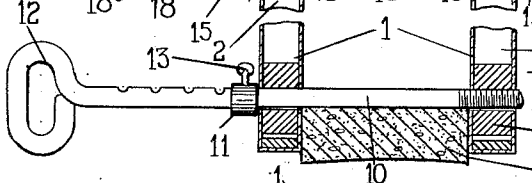


FIG-4-



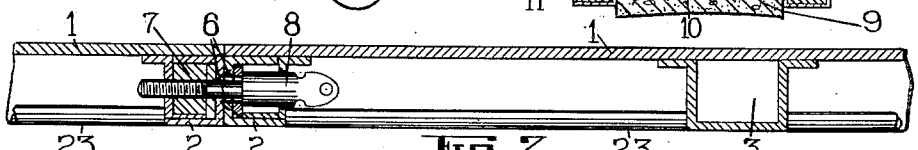


FIG-2-

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Dec. 26, 1950 B. A. FAMA 2,535,277

SHUTTER FOR USE IN BUILDING CONSTRUCTIONS

Filed Aug. 17, 1945 2 Sheets-Sheet 2

FIG 8

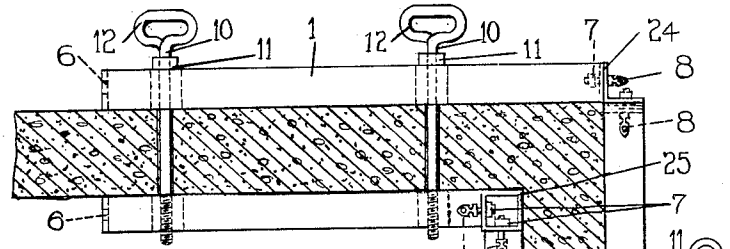


FIG-11-

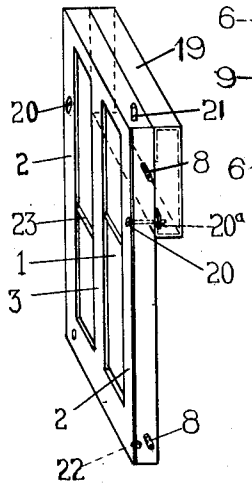


FIG-9-

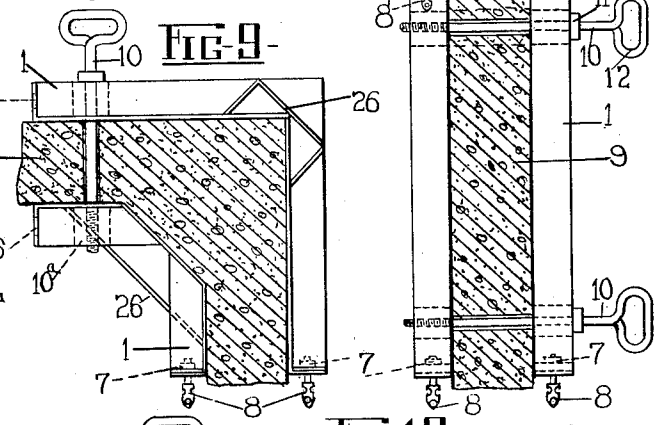


FIG-10-

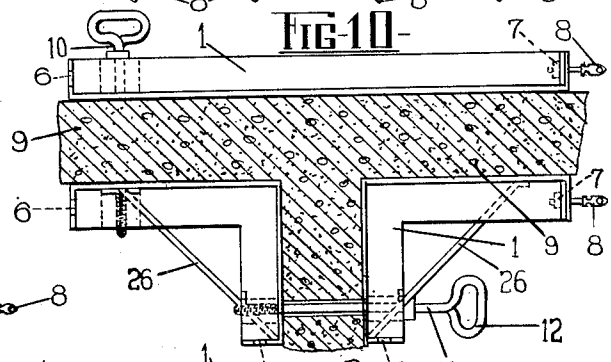
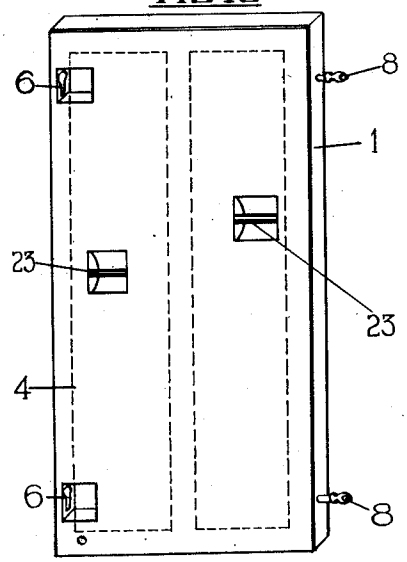


FIG-12-



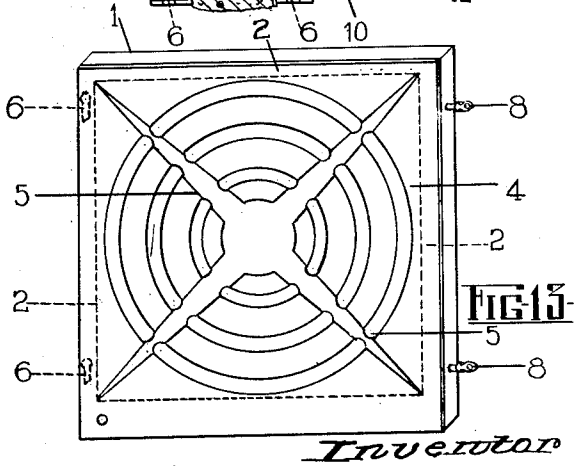


FIG-13-

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UNITED STATES PATENT OFFICE

2,535,277

SHUTTER FOR USE IN BUILDING CONSTRUCTIONS

Bernard Augustine Fama, Te Awamutu, New Zealand

Application August 17, 1945, Serial No. 611,067
In New Zealand August 25, 1944

2 Claims. (Cl. 25—131)

1

The invention relates to shutters used in the construction of buildings and the like in concrete, and has for its object the provision of improvements, the use of which enables shutters, preferably of steel, to be readily assembled and secured in position mainly by unskilled labour, to enable concrete walls and the like to be expeditiously and correctly formed with a minimum of trouble.

According to the invention, there is provided a shutter arrangement for use in moulding concrete, comprising opposed shutters, arranged in rows, with a horizontal aligning bar along each row, ties and spreaders across, and between the rows, and means for securing the shutters of each row together.

The rows of shutters are adapted to be supported by, and spaced apart on, preformed concrete, while the aligning bars, and the ties and spreaders, are adapted to engage the outer sides of the rows, the ties and spreaders also engaging between the inner sides of the rows.

Other features are incorporated in the invention, which will be more particularly described in conjunction with the accompanying drawings, wherein:

Figure 1 is a part view of shutters formed, and erected, according to the invention, on a preformed foundation wall, to provide for the formation of portion of a wall in concrete,

Figure 2 a part horizontal sectional view of the shutter arrangement, shown in Figure 1, and illustrating the formation of the shutters, and the means for fastening same together at their vertical edges,

Figure 3 a part cross sectional view, illustrating the combined spreader and tie, and aligning bars used at and along the upper edges of the shutters,

Figure 4 a part cross sectional view, illustrating the means for supporting the shutters at their lower edges, on the preformed concrete,

Figures 5 and 6 fragmentary views, of vertical edges of shutters, adapted to butt against one another, and illustrating the means for fastening the shutters together at said edges,

Figure 7 a fragmentary view, of an aligning bar used along the upper edges of the shutters of a row,

Figures 8 and 9 part sectional plan views of shutter arrangements for forming corners of external walls,

Figure 10 a part sectional plan view of a shutter arrangement for forming a junction between an internal wall and an external wall,

Figure 11 a view of a shutter for use in forming

2

a foundation wall, and provided with means for forming a recess in said wall to take a sleeper,

Figures 12 and 13 views of alternative forms of shutters.

The shutters 1 are formed preferably from steel plate of a gauge and weight suitable for the purpose, and in sizes which enable them to be readily handled, the sizes being standardised to facilitate the erection of walls to specified dimensions.

The edges of the shutters 1 are formed at right angles to their sides, and of such a width or thickness, that abutting vertical edges of the shutters are enabled to be fastened together.

The right angle edges of the shutters 1 can be provided by fabricated hollow rib formations 2 adjacent the edges of the plates which constitute the bodies of the shutters, and intermediate reinforcing rib formations 3, can also be provided on the shutters 1, which can be left open at the outer sides to expose the rib formations 2, 3, (Figures 1, 2 and 11), or said outer sides can be closed by a further plate 4, (Figures 12 and 13), the latter if desired being reinforced by means of ribs 5 pressed therein to any approved formation or design.

Opposite right angle edges of the shutters 1 are formed, one edge with keyhole shaped slots 6 therein, the other edge having formed or secured therein, fixtures such as nuts 7 into which bolts 8 are screwed so that the heads of the latter and portions of the shanks of the bolts 8 extend outwardly from the shutter edge, abutting edges of adjacent or separate shutters 1 being secured together by passing the bolt heads projecting from one shutter 1, through the larger diameter portions of the key hole shaped slots 6 in the right angle edge of the other shutter 1, and dropping the exposed portions of the shanks of the bolts 8 into the smaller diameter portions of said slots 6, with the bolt heads, inside the edge of the adjacent shutter.

The heads of the bolts 8 are elongated, and are pointed as shown, to facilitate their being entered in the slots 6, said heads also containing cross holes to take a dwang or bar to enable the bolts to be screwed up or unscrewed as required, also the larger diameter portions of the slots 6 increase in diameter inwards, to facilitate or give a lead to the heads of the bolts 8 when withdrawing same from the shutters 1.

In the erection of shutters 1 to form portion of a wall, on preformed concrete 9 such as a foundation wall, the shutters 1 are supported from the concrete 9, by bolts 10 which rest across same,

one through each of a pair of opposed shutters 1 near a vertical edge thereof, and a distance above the lower edges of the shutters, so that the latter extend below the upper edge of the concrete 9, which serves as a spreader, opposed shutters 1 being tied together at their lower edges by the bolts 10, made to screw into bosses or nuts 10a (Figure 4) in shutters 1 at on side of the concrete 9, and having thereon collars 11 which bear against the shutters 1 at the opposite side of the concrete 9, and so tie the opposed shutters together.

The bolts 10 are provided with handles 12 suitable for enabling them to be screwed into and out of the shutters 1 as required, and if desired the collars 11 can be secured on the bolts 10 in selected positions, (indicated by the spaced recesses in Figure 4), by means of a set screw 13 to enable the bolts 10 to be utilised as ties in forming walls of different thicknesses.

At their upper edges, the shutters 1 are aligned and maintained in alignment, by means of aligning bars 14 (Figure 1, 3 and 7), placed one along the top of each row of shutters, said bars 14 each being provided with a downwardly projecting flange or projection 15 either continuous or at intervals, along its outer edge, said flanges or projections 15, being disposed at the outer side of each row of shutters.

In order to maintain the shutters 1 the correct distance apart at their upper edges, spreaders which also serve as ties are employed, said spreaders and ties each comprising an intermediate portion 16 with downwardly projecting stops 16a thereon adapted to be inserted between opposed shutters 1, and containing screw threaded holes in their ends to receive screw bolts 17, passed through outer portions 18 with downwardly projecting stops 18a at their outer ends, the bolts 17 being provided with collars 17a thereon and also with means, whereby they can be gripped and turned so as to screw into the intermediate portion 16, and clamp the portions 16 and 18 together, and the bars 14 and shutters 1 between the stops 16a and 18a.

Shutters for forming foundation walls such as illustrated at 9 Figure 1, are arranged and utilised in a similar manner to the main wall shutters, except that in order to provide the recess 9a in the wall 9 to take sleepers, shutters 1 used at the inside of the wall are provided along the upper portion of their inner sides with a projection 19 (Figure 11) adapted to give the required form to the recess 9a when concrete is poured between outer and inner rows of shutters.

The projection 19 can conveniently comprise a steel plate formation detachably secured to the shutters 1, by screws 20 adapted to be screwed through the shutters 1 into nuts or bosses 20a, in the plate formations.

Shutters used for forming foundation walls are provided each with a fixed upwardly projecting pin 21 on its upper edge, near a vertical edge, and with a hole 22 in its lower edge directly below the pin 21, so that where, in building walls on sloping or uneven ground, shutters require to be arranged and used with upper shutters resting on lower shutters, the holes 22 in the lower edges of upper shutters, fit on the pins 21 on the upper edges of shutters below, so as to retain the shutters in vertical alignment.

The shutters 1 can be of any suitable dimensions according to the nature of the work being done, and the conditions obtaining, and they can be provided with handles or gripping means 23 formed and arranged as desired.

Also, the means for securing the shutters 1 together, comprising the keyhole shaped slots 6 and the bolts 8, shown in, and on, opposite vertical edges of the shutters, can also be provided in, and on, opposite horizontal edges, in addition to in, and on, the vertical edges, in order that the shutters 1 may be utilised with either set of opposite edges, vertical, as may be desired.

In the arrangement illustrated in Figure 8, for forming a corner, the shutters 1 are formed the same as before, but of dimensions to suit, outer shutters 1 being secured together at the outer angle of the wall by a vertical member 24 of angle iron cross section, one flange of said member 24 having secured thereon bolts 8 which are inserted in keyhole shaped slots in the vertical edge of one outer shutter, while the other flange of said member 24 contains keyhole shaped slots, which receive bolts 8 on the other outer shutter 1.

Inner shutters 1 in the arrangement illustrated in Figure 8, are joined together per medium of a vertical member 25, of hollow square formation in cross section, said member 25 having secured on the inner surfaces of adjacent sides nuts 7 into which bolts 8 are screwed through the member 25 and adjacent vertical edges of the shutters 1.

In the arrangements illustrated in Figures 9 and 10 for forming a corner, and a junction of an internal wall with an external wall, respectively, the shutters 1 are themselves formed to give the formation required, and are strengthened or stiffened where required by braces or stiffeners 26.

In all of the arrangements illustrated in Figures 8, 9 and 10, bolts 8 and key hole shaped slots 6, are provided where required to enable ordinary shutters 1 to be utilized in conjunction therewith and form a continuation of the shutter arrangement.

What I do claim and desire to obtain by Letters Patent of the United States of America is:

1. A shutter arrangement for use in molding concrete comprising opposed shutters arranged in rows above a wall of preformed concrete, means in the form of tie bolts for maintaining the shutters spaced apart at their lower edges and resting on the wall to support the shutters in clamping relation therewith, an elongated and rigid horizontal shutter aligning bar extending along the length of each row and supported thereby and detachably engaged with the outer sides of the shutters, relatively adjustable ties and spreaders extending across the upper edges of the rows and separately clamping the aligning bars and also engageable between the inner sides of the rows, and means for securing the abutting edges of shutters together comprising bolts having threaded shanks adapted to screw into one of the abutting edges, the other of the abutting edges having keyhole shaped slots enlarged at one end, elongated pointed heads on said bolts adapted to be passed through the enlarged ends of the slots and operable when the shutters are relatively displaced to engage behind the small ends of the slots to secure the shutters together, said heads provided with means for enabling said bolts to be screwed inwardly or outwardly of the shutter edge in which they are held, for the purpose of tightening or loosening the joint between the shutters, and the larger diameter portion of each keyhole shaped slot increasing in diameter inwardly of the shutter.

2. A shutter arrangement for use in molding concrete comprising opposed shutters arranged

in rows above a wall of preformed concrete, means in the form of tie bolts for maintaining the shutters spaced apart at their lower edges and resting on the wall to support the shutters in clamping relation therewith, an elongated and rigid horizontal shutter aligning bar extending along the length of each row and supported thereby and detachably engaged with the outer sides of the shutters, relatively adjustable ties and spreaders extending across the upper edges of the rows and separately clamping the aligning bars and also engageable between the inner sides of the rows, the ties and spreaders each including an intermediate portion having downward projections insertable between the rows and outer portions with downward projections thereon engaging the outer sides of the aligning rods, and screws with collars thereon passing through said outer portions and adjustably engaged with said intermediate portion, for the purpose of varying the distance between the projections, on said intermediate and said outer portions, and means for securing abutting edges of the shutters together.

BERNARD AUGUSTINE FAMA.

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