Nov. 25, 1952 F. FIORUZZI 2,618,834

CONCRETE WALL MOLD

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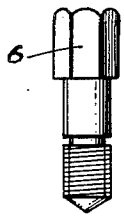


Fig. 8

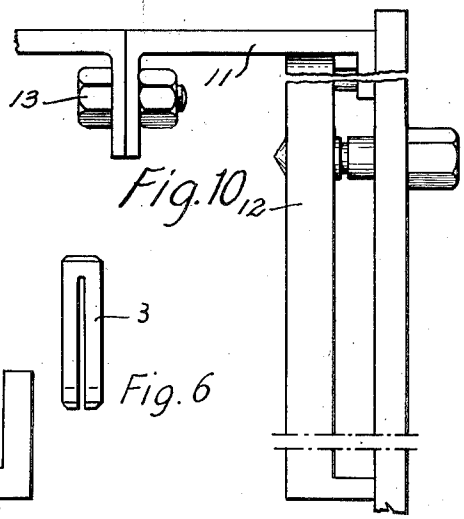


Fig. 10

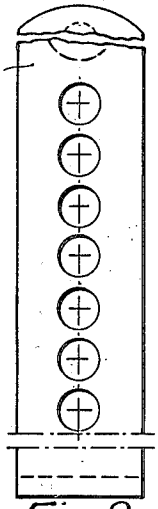


Fig. 9

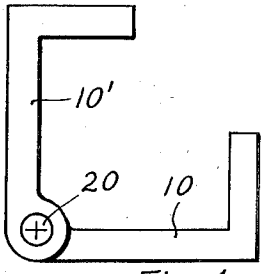


Fig. 4

Fig. 6

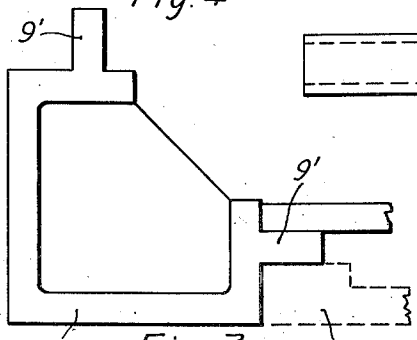


Fig. 3



Fig. 7

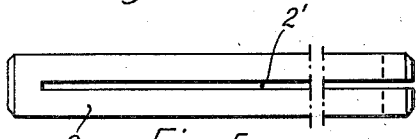


Fig. 5

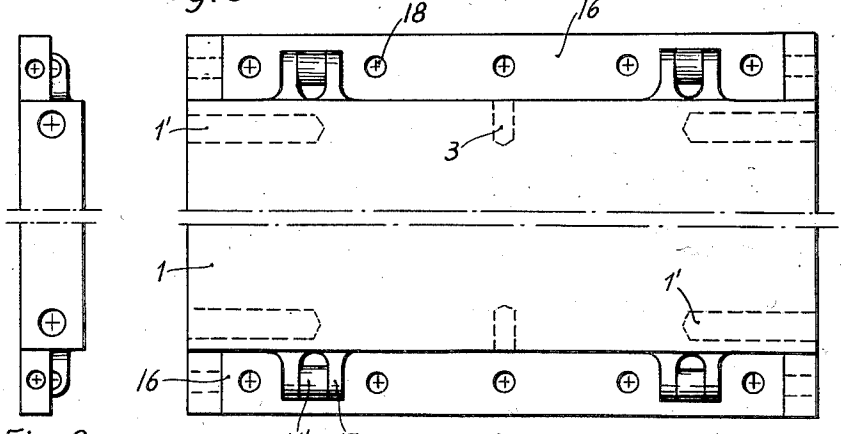


Fig. 2 Fig. 1

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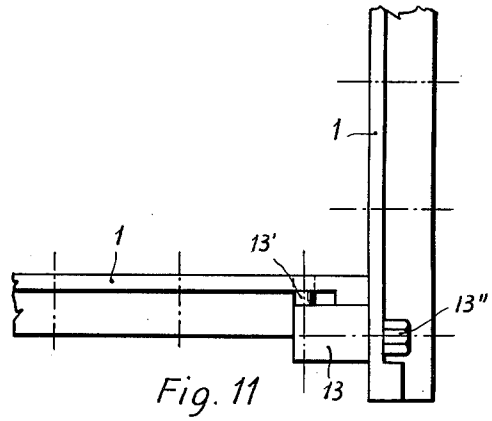


Fig. 11

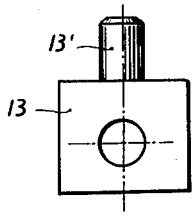


Fig. 13

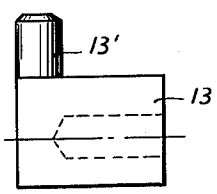


Fig. 14

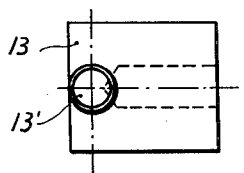


Fig. 15

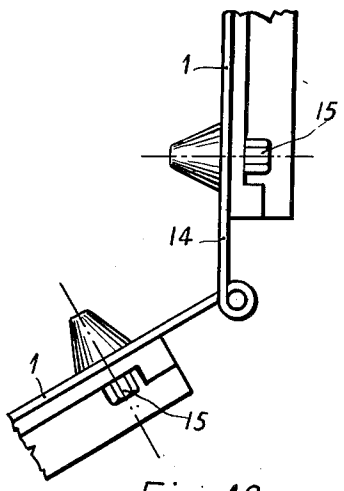


Fig. 12

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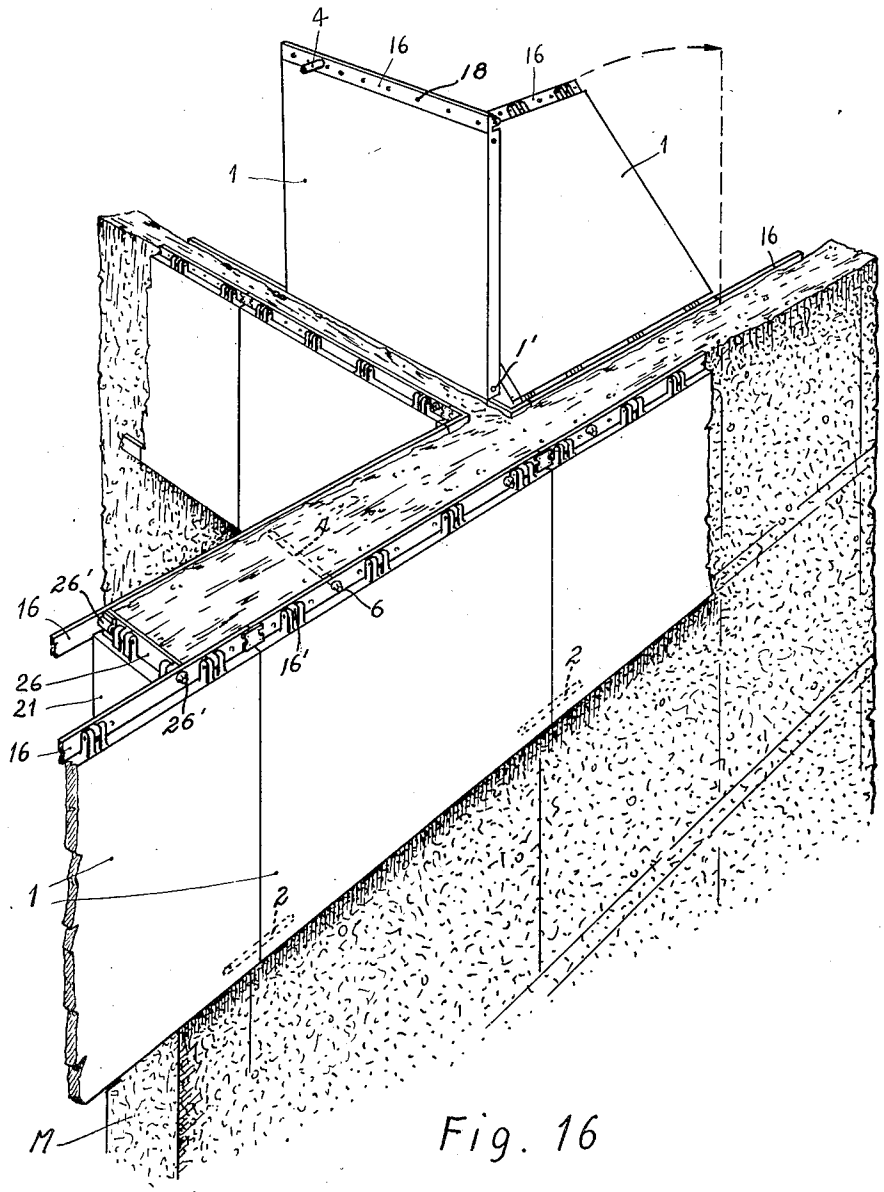


Fig. 16

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Patented Nov. 25, 1952

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UNITED STATES PATENT OFFICE

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CONCRETE WALL MOLD

Franco Fioruzzi, Milan, Italy

Application September 18, 1947, Serial No. 774,805
In Italy September 21, 1946

4 Claims. (Cl. 25—131)

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The present invention concerns a system for erecting walls for building construction made of concrete and like formable material. The shutterings into which the concrete is poured or placed in successive layers are essentially constituted according to the invention by elements which are adjustable and detachable, so as to render this system of construction speedy and efficient without requiring specialized labor and particular expensive devices.

According to the invention, the aforesaid elements include panels, having two smooth working faces, each one of which being used successively as the inner surface of the shuttering, bars being provided on which the panels are hinged, and further connecting means being employed to make up a continuous rigid unit assembly with various elements, as well as with particular members intended to ensure the quick and perfect obtainment of the construction corners and the like.

The accompanying drawings illustrate diagrammatically, and by way of example, a form of embodiment of the invention:

Figs. 1 and 2 are respectively a front and a side view of one of the panel elements employed for erecting the shutter structure.

Fig. 3 is an element which may be combined with the panel or panels to obtain an internal right angle corner for the upright wall.

Fig. 4 is an element analogous to that of Fig. 3, but articulated in order to allow formations of internal corners of any angle.

Figs. 5 and 6 are two connecting pins, respectively, for uniting panel elements to each other and to the hinge bars.

Figs. 7 and 8 are, respectively, a spacer capable to ensure uniform and constant thickness of the wall, and a fastening member for said spacers onto the hinge bar of the side shutters.

Fig. 9 illustrates a rod for fixing top members for lintels and the like to the side shutters.

Fig. 10 is a side elevation of Fig. 9, in assembled position to carry said top member.

Fig. 11 is an element similar to that of Fig. 3 but for an external right angle corner.

Fig. 12 is an element similar to that of Fig. 11 to obtain external corners of any suitable angle.

Figs. 13, 14 and 15 show in three different positions a piece constituting a part of the element of Fig. 11.

Fig. 16 shows in perspective view a wall under construction in which are seen in different positions of usage the main elements of the system according to the present invention.

Referring more particularly to the drawings,

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there is illustrated in Figs. 1 and 2, a panel element 1 having two smooth surfaces destined to come successively in contact with the concrete for forming the wall. Each panel element 1 is connected at both its sides, at the top and bottom, by hinges to a bar 16 which, to this end, is provided with hinge ears 16' capable of fitting intermediate similar ears 17 formed on the edges of said panels 1.

Thus bars 16 are T-shaped in cross-section at the locations of the spaced ears 16', whereby the stem of the T is hinged to the panel element at 17, while the outer face of the base or head of the T aligns with the contiguous face (working surface) of the panel element 1. Elements 1 of equal height and of various widths produced in a number of standard sizes, may be arranged side by side (Fig. 16), adjacent elements being connectable one to the other by means of pins 2 (Fig. 5) insertable into openings 1' provided for this purpose on either side of panel elements 1. Pins 2 are made resilient over their whole length by two longitudinal slots extending almost the entire length of the pin, said slots being perpendicular to each other so as to allow easy engagement and disengagement of the pins. Similar pins 3, but smaller (Fig. 6), are employed for uniting bars 16 to elements 1, said pins 3 being also provided with longitudinal and orthogonal slots to obtain spring action.

In Fig. 7 is shown a spacer formed by a round rod 4 provided at both ends with a bore 4', threaded in part only, into which may be screwed an extension portion for the spacers to obtain an overall length according to any desired wall thickness, or else screws 6 (Fig. 8) may be used for securing said spacers on bars 16. The aforesaid spacers 4 may be covered with grease and surrounded with a sleeve of strong paper, paper board, or the like, in order to allow for easy withdrawal and recovering of said spacers after the concrete has set. They are the elements which hold in place panel elements 1 constituting the shutters, before and after the setting of concrete.

Element 9, shown in Fig. 3, is constituted by a rigid right angle or by two parts forming such an angle, provided with longitudinal and transverse extension ribs, as well as with locking wings and jointing wings 9' for connection to adjacent panel elements 1. Such elements 9 are arranged in extension to said panel elements 1 constituting the sides of a shutter for a wall to be erected in accordance with a predetermined location or point where it is wanted to obtain a corner of a

room or the like. Thanks to suitable holes and corresponding connecting means, the assembly of such pieces 9 is made quite an easy and quick matter.

The element shown in Fig. 11 is used to obtain external corners; the same is formed by two panel elements 1, fixable in the position shown in Fig. 11 by means of piece 13 which is engageable with one of said panels by means of a protruding pin 13', and with the other panel 1 by means of bolt 13''. The element of Fig. 12, which serves to obtain external corners of any angle, has the two panel elements 1, fixed on a hinge member 14 by means of bolts 15.

The element shown in Fig. 4 is formed by two portions 10 and 10', hinged together at 20, and fixable in different positions so as to be capable of constituting parts of shutters for walls to be erected in correspondence to internal corners of any angle.

Fig. 9 illustrates a top member constituted by an elongated plate 12, provided with a series of holes for securing the top and bottom edges of panel elements 1 to the structure. More exactly, the same shall be constituted by a steel strip with shaped ends and threaded holes for connecting elements 11 (Fig. 10) to panel elements 1, said elements 11 being formed by a resisting plate and ribbed edges provided with guiding fins and jointing openings, to obtain the horizontal top of window and door openings.

More simply, window and door openings may also be obtained by means of detachable panel elements 21, similar to panel elements 1, and extending transversally thereto, as it is clearly shown in Fig. 16. Such elements 21 are hingedly mounted on corresponding bars 26, which, by means of pins 26', are secured on bars 16, where it is wanted to obtain an interruption in the wall as at M. Side panel elements 21 constitute then a part of the shutter, during the placing of a certain number of layers, corresponding to the height of the door or window that it is wanted to be obtained.

The embodiment of the invention employs other accessory means, such as double thread screws, for the connection of spacers 4, as well as operating levers for the screws of Fig. 8, and for the removal of panel elements 1 from the structure of concrete placed in them, as well as by special screws and bolts for the connection of other parts. It is well understood that means previously described may vary according to necessity without departing from the spirit of the invention.

The way of usage and assembly of the different elements described above for the realization of the construction system is made evident in Fig. 16 and is as follows: In correspondence with the outer and inner surfaces of the walls following the plan of a building to be erected, different sizes of panel elements 1 are employed for any length of wall. These panel elements 1 are vertically assembled parallel and opposite each other, after having been connected at their side edges by means of pins 2. Elements, such as 9 and 10 (Figs. 3 and 4) are then assembled in according to the corners, then the assembly of the two parallel side shutters is stiffened by bracing them at the desired width by means of spacers 4 the length of which corresponding to the desired thickness, of the wall. Such spacers are threaded into and secured in openings 18 of bars 16 by means of and screws 6. Each spacer is wrapped or surrounded by a sleeve of paper or the like (not shown). A shutter having a height equal to that of panel elements 1 is ready for the placing and retaining of concrete. After the concrete or any other similar mixture has been placed, and after it has set, panel elements 1 are loosened and separated from each other and the initial removal of said elements from the concrete structure is performed. Then the elements 1 are placed upright about the axis of the hinges connecting them to the upper bar 16 and are thus swung 180 degrees to secure them anew in this changed vertical position. Thus the lower bars 16 are found to have taken an upper position and have to be turned for further 180 degrees about the axis of their respective hinges in order to have their flat face disposed towards the inside of the shutter. In Fig. 16 one of the panel elements 1 is shown in an intermediate position, during the upward swing. Thereafter spacers 4 are withdrawn from their protective sleeves (not shown) which remain in the wall. The removed spacers 4 are again assembled in position as described above, and inserted into the openings 18 of bars 16 which are now on top.

Thus the hinges which were before the upper ones, are now the lower ones. Having then loosened the corner elements and the top members, the same are also raised and secured in new positions similar to that hereinabove explained. There is thus provided a new shutter system into which concrete or similar mass may be placed. The aforesaid erecting operations of the panel elements constituting shutters may be repeated until the concrete wall has reached the desired height.

In correspondence to the level of location of the lintels for the different openings, the upper edges of the top elements 11 are aligned, which may slide vertically by loosening the screws which secure elements 12 on panel elements 1 (Fig. 10).

From the preceding description the advantages that may be obtained with such a shutter system are quite apparent, it being possible to carry out specialized masonry, with cheap labor, since the erection of the building is reduced to a series of forced operations easy to be performed. The new shutter system affords also the possibility of erecting the whole building without the need of costly external scaffolding, since the horizontal joints as well as the vertical walls are automatically obtained. It is possible to make use of concrete vibrators for the whole building structure and to obtain perfectly smooth faces without requiring mortar, finishes or other tiresome and costly finishing operations.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent, is:

1. A shutter system for use in casting concrete and like material for building purposes comprising in combination a set of panels each having opposite smooth working surfaces and terminating in a lower and upper longitudinal edge, elongated horizontal bars for connection with the horizontal edges of said panels, respectively, spacers extending transversely to and interconnecting said horizontal bars to substantially maintain parallelism therebetween and between the panels whereby the wall thickness of case concrete is predetermined, hinge means arranged to swingably connect the upper and lower horizontal edges of said panels to said horizontal bars, whereby said latter bars may swing about 180° in relation to the respective edge of

the panels, said panels upon swinging movement thereof about 180° from below to above and relatively to said horizontal bars coming to lie with their outer surfaces innermost and in face-to-face relation, said horizontal hinge bars being T-shaped in cross section at the locations of said hinge means, each stem of the T forming part of said hinge means and extending to the respective horizontal edge of the panel, the remainder of said hinge bars being disposed to extend with one face in the same plane and in alignment with the contiguous working surface of the respective panel.

2. A shutter system according to claim 1, wherein said spacers are insertable into openings provided between said stems in said horizontal hinge bars and for removal therefrom.

3. A shutter system according to claim 1, wherein said panels are provided with smooth vertical side edges and are arranged in side-by-side relation to each other, and slotted free pins interconnecting said panels with each other at adjacent side edges thereof.

4. A shutter system according to claim 1, wherein some of said horizontal bars to which said panels are hingedly connected, are arranged in angular relation to the remainder of said bars and panels.

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