Dec. 18, 1934. R. C. BLACKMAN 1,984,564

APPARATUS FOR MANUFACTURING CONCRETE BUILDING BLOCKS

Filed March 18, 1929 4 Sheets-Sheet 1

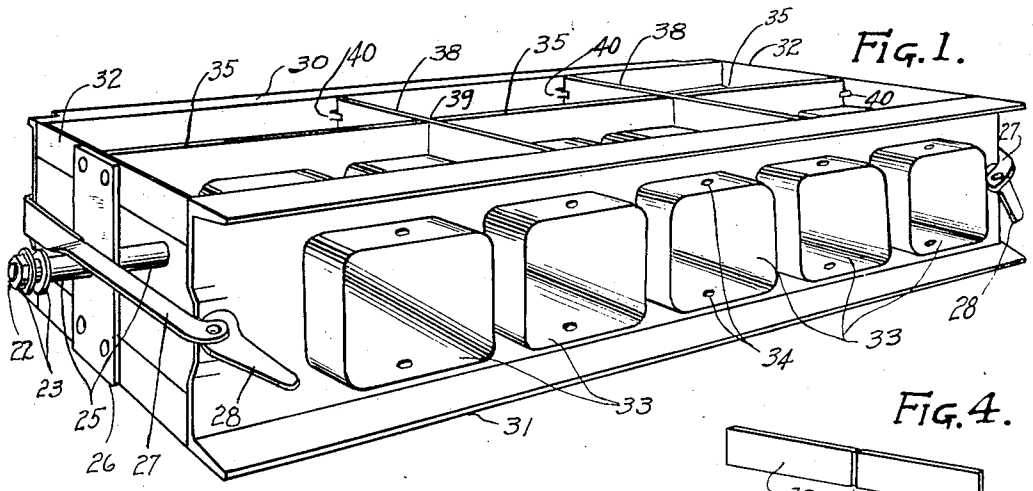


Fig. 1.

Fig. 4.

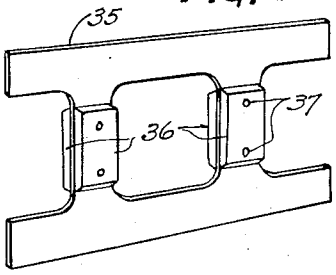


Fig. 3.

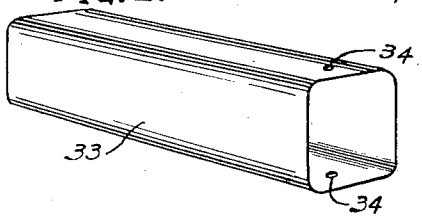


Fig. 2.

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Fig. 5.

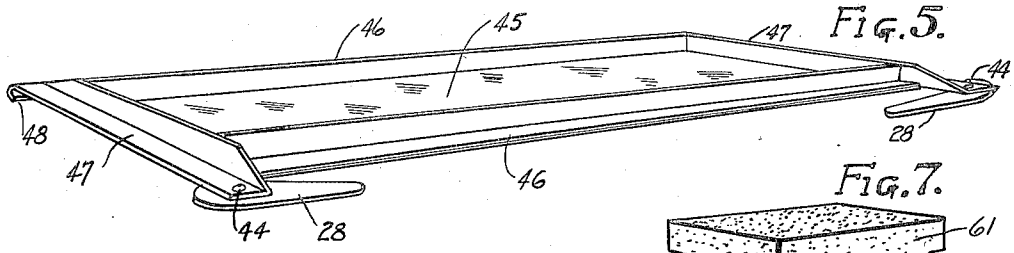


Fig. 7.

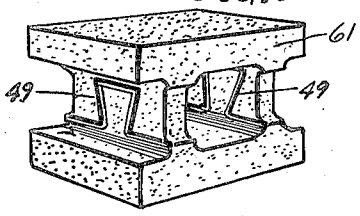


Fig. 6.

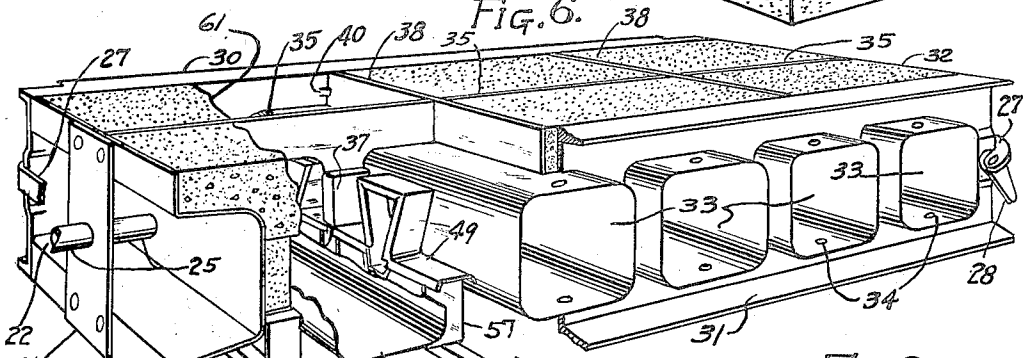
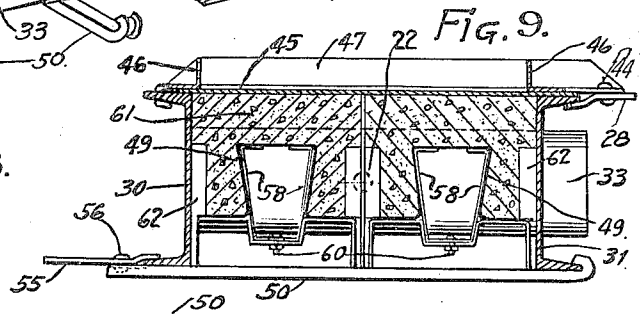


Fig. 8.

Fig. 9.



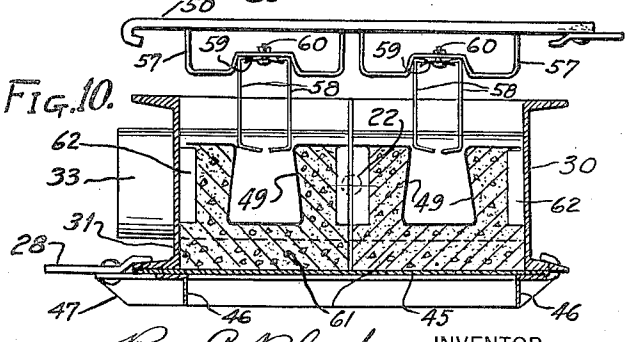


Fig. 10.

WITNESSES:

Jos. M. Swartz

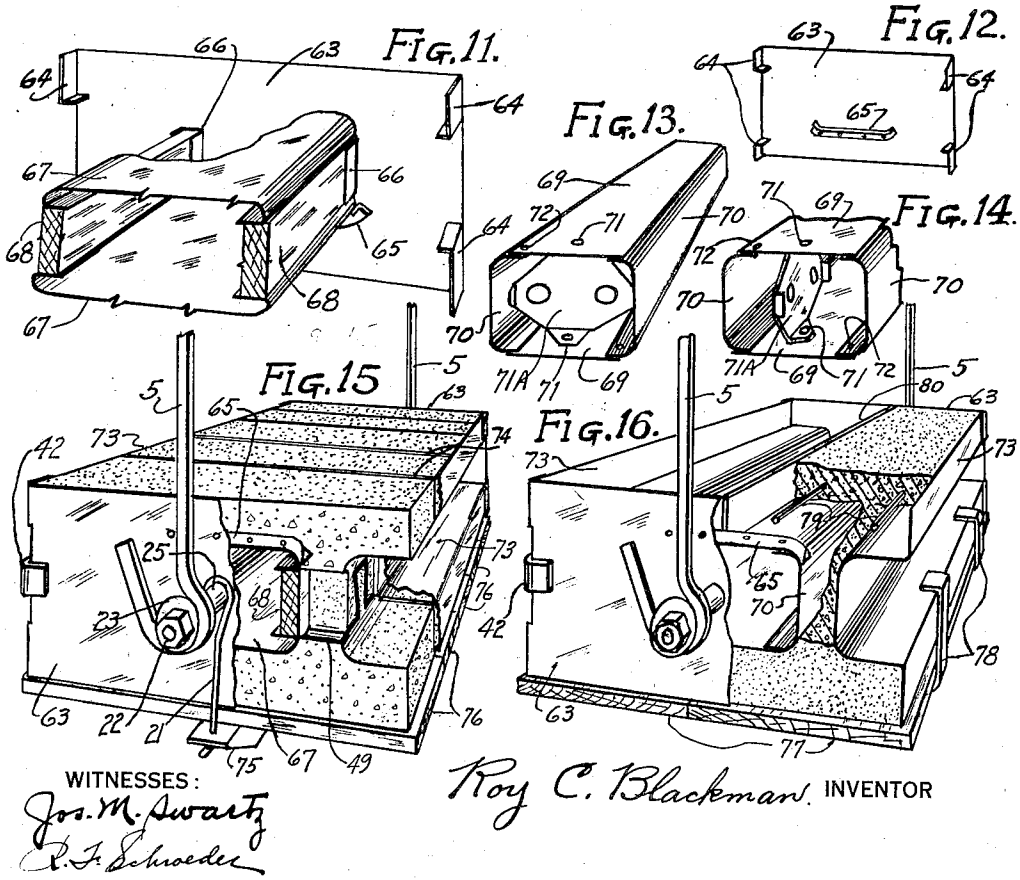
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Dec. 18, 1934. R. C. BLACKMAN 1,984,564

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FIG. 19

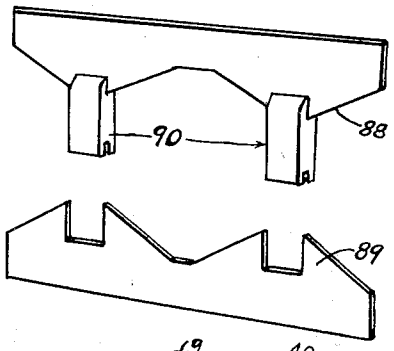
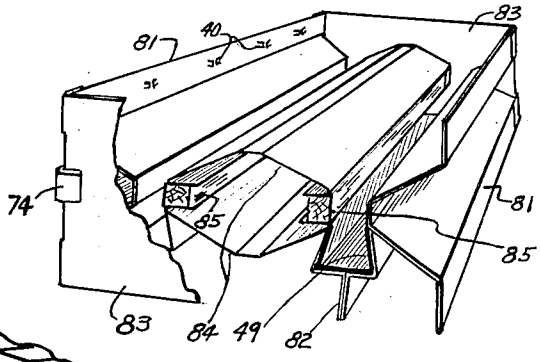


FIG. 17.



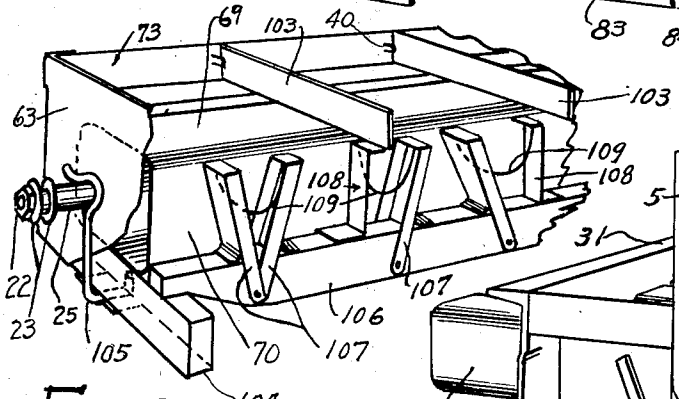
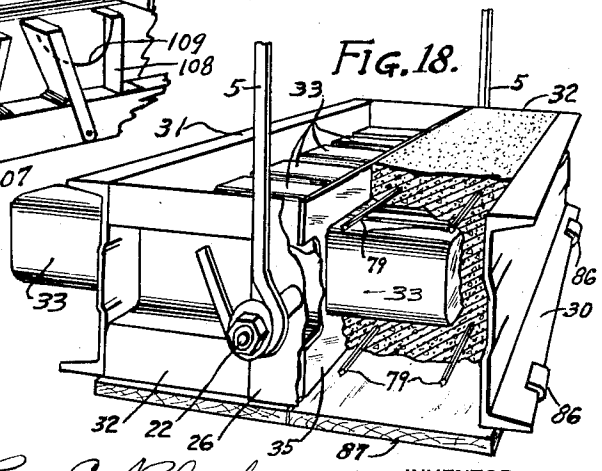


FIG. 20.

FIG. 18.



WITNESSES:

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Patented Dec. 18, 1934 1,984,564

UNITED STATES PATENT OFFICE

1,984,564

APPARATUS FOR MANUFACTURING CONCRETE BUILDING BLOCKS

Roy Chester Blackman, Cleveland, Ohio

Application March 18, 1929, Serial No. 347,925

5 Claims. (Cl. 25—121)

This invention relates to apparatus for manufacturing concrete blocks, or concrete building units in general and pertains particularly to the manufacture of insulated and reinforced concrete building units. The insulated concrete units referred to are illustrated and described in my patent dated, June 8, 1926, Patent No. 1,587,500.

The principal object of the invention is to provide an apparatus whereby insulated, plain or reinforced concrete building units or blocks can be produced. A further object of my invention is the provision of multiple molds or forms supported and handled in such a way that either poured or dry tamped method of manufacture can be used. Other and further objects of the invention will appear in the course of the following description.

Heretofore, the two systems, referred to, the pouring system and the dry tamping method, were each used with entirely different equipment. When making concrete blocks in forms ordinarily used for the pouring process, it has heretofore been done only in forms which are located in a stationary position, or which are positioned on cars for transporting same, and such forms are not readily handled. The cores passing through such forms horizontally do not permit dismantling the same until such time as the concrete has set sufficiently, thus requiring a great number of forms and cars in quantity production operations. The ordinary dry tamped method is carried out with a machine from which the finished blocks, on pallets, are placed on cars and removed to curing rooms, and require several handling operations.

My improved method is preferably carried out with a multiple mould used in multiple forms or like arrangement, and can be used for manufacturing blocks by the wet or poured method or by the dry tamped method. The invention provides a process and apparatus whereby the production of concrete blocks or building units may be carried out effectively at a minimum of cost, and with a resulting product of uniformly high quality.

The forms are preferably formed of suitably shaped outer frame members provided with end members having trunnions, and said members having means for clamping them together in a rigid manner. The frames are provided with cores, division members, and pallets supporting therefrom.

Various size blocks can be made in the same forms by simply changing the position of the division members thereby rendering unnecessary a further set of forms for each different size of block to be produced.

The forms are provided with suitable, removable insulation retainers which hold the insulation material in a definite location when the pouring operation takes place. The retainers are easily loaded with insulation strips, locked in position in the forms between core members. The concrete is poured in on top of the form and insulators and when the forms are filled with concrete and properly tamped, the pallet members are attached to the top. Each form is then tipped so that the pallet is on the under side and the insulation holders are removed from the top, leaving the insulation strips in position. The remainder of the form is then filled with concrete.

When using the poured system, it is necessary that filled forms be allowed to set sufficiently before dismantling. When the forms are filled and tamped by the dry method, they can be removed from the handling system and placed in the curing section with the cores in an upright position. The walls and web members of the blocks are then standing in a position, giving a direct column action, with no overhanging portions of green cement to break away. Such breaking away often will happen in usual operations when pulling cores from sides. There is thus no arched effect of green concrete and the cores can be pulled out at once with the same overhead trolley hoist. This leaves one side of the form in place, as well as the division members which act as pallets for supporting the blocks until hard, thereby rendering the outer members of the form, all the core members and the transporting units, available for the repeating of the operation. The blocks may be piled two deep to economize floor space in the curing room. To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawings and the following description set forth in detail certain means and one mode of carrying out the invention, such disclosed means and mode illustrating, however, but one of various ways in which the principle of the invention may be used.

In said annexed drawings:

Fig. 1 is a perspective view of a multiple concrete form made of a built-up frame with trunnion ends, with means for clamping the frame

members together, and having cores and division members in place;

Fig. 2 is a perspective view of one of the tapered cores;

Fig. 3 is a perspective view of an assembled longitudinal division member;

Fig. 4 is a perspective view of a cross division member;

Fig. 5 is a perspective view of a reinforced cover plate which serves as a bottom pallet for blocks as the form is turned over on its trunnions;

Fig. 6 is a perspective view of a multiple concrete block form with a portion broken away, showing the means employed for supporting and locating the insulating material, and also showing concrete in place forming one-half of the blacks, such concrete having been poured from the upper side;

Fig. 7 is a perspective view of a concrete block showing insulation interposed in the webs of same;

Fig. 8 is a perspective view of a straight insulation holder with a U-shaped wire reinforcement;

Fig. 9 is a view in cross-section of the multiple block form shown in Fig. 7, showing an insulation holder in place with insulation material on top of same, and with concrete poured from above and the cover plate applied;

Fig. 10 is a view in cross-section of a multiple block form like that shown in Fig. 9, after it has been revolved 180° on the end trunnions, and showing the previously poured concrete at the bottom of form, with the insulation material in place and insulation holder in course of removal from the top of the form;

Fig. 11 is a fragmentary perspective view, with parts broken away, showing a removable core in engagement with an end plate with core supports;

Fig. 12 is a perspective view showing a block form end plate with a projecting member to support a removable core;

Fig. 13 is a perspective view showing a collapsible core having an expanding diaphragm, in expanded position;

Fig. 14 is a fragmentary perspective view showing one end of the collapsible core with the diaphragm swung into position to allow the core to collapse;

Fig. 15 is a perspective view, with parts broken away, showing a multiple block form with a collapsible core extending longitudinally with core supports, and insulation strips interposed in a completed concrete block, with a plurality of pallets clamped to the form and the hooks of an over-head trolley hanger;

Fig. 16 is a perspective view with parts broken away showing a multiple block form with a collapsible longitudinally extending core with an elongated lintel or beam building unit in place, with steel reinforcing rods therein, and with pallet members and supports, and the hooks of an over-head trolley hanger;

Fig. 17 is a perspective view showing a modified form of multiple concrete block form, with the division plates removed, and with a portion of the ends broken away, and showing the insulation strips in the outer body of the block;

Fig. 18 shows a perspective view showing a multiple concrete block form, like Figs. 1 and 6, and illustrating the method of making a lintel unit, with reinforcing rods in place and with the cores slightly withdrawn, to form a solid bottom for same, and showing longitudinal pallets and supports, and the hooks of an overhead trolley hanger;

Fig. 19 is a perspective view showing two sections of a division plate for the oval type core form, whereby, the upper half is inserted in the form when pouring the first half of the block, the other portion is applied after the insulation support is removed; and

Fig. 20 is a fragmentary perspective view showing a portion of a form with one side removed and with an end plate broken away, to show a detachable support for the cores and insulation retainers.

As shown in Figs. 15, 16 and 18, supporting hanger rods 5 are provided with hook-shaped ends to take forms.

In Fig. 1 of the drawings there is shown a concrete form consisting of side members 30 and 31, and end members 32 clamped rigidly together by means of hooked clamp bars 27, each provided with eccentric levers 28. The end plate 32 is provided with a reinforcing plate 26 through which the trunnion bar 22 passes. Bar 22 is provided with suitable pipe sleeve separators 25 and washers 23 for spacing hook rod supports. The side member 31 is provided with holes to receive the core members 33. The side member 30 is not provided with holes to receive these cores, but both side members are provided with lugs 40 to position the division bars 38. The end members are likewise provided with the lugs 40 to position the longitudinal members 35 and likewise a groove 39, shown in Fig. 4 in each cross division member 38, positions the adjacent division member 35. As is shown in Fig. 3 raised portions 36 are provided on division plates, and are fastened by rivets 37 to cause depression in the web member of the concrete blocks. Holes 34 are provided in the core members for withdrawing the same from the molds.

This type of form can be provided with a single pallet member as shown in Fig. 5 consisting of a light angle frame with side members 46 and end members 47 which are provided with hook ends 48 and eccentric clamp 28, pivoted on a rivet 44. This frame is provided with a cover plate 45. As is shown in Fig. 8 a cross bar support 50 is provided for insulator holders which is provided with a hook end at one side, and with an eccentric lever 55 pivoted on a rivet 56 at the opposite end. Attached to said bar 50 are suitable elevated members 51 intended to support insulation strips 52, and having holes 54 through which the reinforcing rods 53 pass. For interlocking insulator strips, the bar 50 is formed with a raised portion like 57, shown in Figs. 6, 9 and 10, and suitably bent bars 58 are held in position with spring members 59 and a bolt 60, and form an insulation holder for insulation 49 of interlocking shape. Projecting parts 62 on the inner faces of the form cause depression in concrete block web members similar to those formed by the projections 36 shown in Fig. 3. In Fig. 9 is shown the first operation of filling the forms with concrete, while in Fig. 10 the concrete 61 is shown at the bottom of the form after the form is reversed on its trunnions 22.

When cores run lengthwise of the form, as shown in Figs. 11, 15, 16, 17 and 20, the clamps 42 are arranged longitudinally of the form and have an eccentric member 28 at one end and a projection 43 at the opposite end, which latter is adapted to be engaged by a holding member. As is shown in Fig. 15, forms of this type have

end plates 63 which are provided with end trunnion bolts 22, spacers 25, and washers 23.

As is clearly shown in Figs. 11 and 12, the end plate 63 is provided with a projecting shelf 65 to support the core member, the ends of plate 63 having corner extensions 64 which are bent inwardly at right angles to the plate, for a purpose to be presently explained. Various types of removable cores may be used. One type of core, as shown in Figs. 11 and 15, is formed with bent plates 67 providing the top and bottom of the core and with members 68 forming the sides thereof and being held in position in the form by U-shaped projections 66 attached to the end plates 63, the entire core being set together in the form from the top and resting on the shelf angle 65.

Another type of collapsible core is shown in Figs. 13, 14 and 20. It is formed of four plate sides, the top and bottom plates 69 being separated by bent side plates 70, maintained in spaced position by a pivoted diaphragm 71A, at each end of the core. Said diaphragm is connected by rivets 71 to the top and bottom plates 69 and permitted to be rotated to a position parallel to the side plates. The opposite corners of the side plates are riveted to the top and bottom plates respectively, as shown at 72, thereby allowing the remaining corners to be free to be moved about said rivets as a pivot, and the core thus collapsed.

In the type of form shown in Fig. 15, the side members 73 of the form are formed from a single sheet of metal, the pallet members 76 being clamped to the form by means of a supporting cross bar 75 running longitudinally of the frame and clamped by means of hook rods 21 to each trunnion. When long concrete blocks are made in this form, as shown in Fig. 16, longitudinal pallets 77 may be secured to the frame by clamped members 78. The only difference in the form shown in Fig. 15 and that shown in Fig. 16 is in the substitution of a longitudinal division bar 80, in the last-mentioned form, in place of the cross division members 74, shown in Fig. 15. When making these long blocks reinforcing rods 79 may be embedded in the concrete. Diamond shaped core openings may be formed by substituting side members 81 and ends 83, provided with suitable projections and cores formed by plates 84 and sides 85, thereby making a suitable arrangement for concrete blocks with insulation members 49, retained in position by supporting member 82, thus embedding the insulator in the wall of the block instead of in the web portion thereof. Division plates for this form of block may be made of one plate with diamond shaped openings, similar to Fig. 3, or as shown in Fig. 19, may be formed of two plates each, 88 and 89 with an enlarged center part 90 attached to the plate 88 with grooved ends to engage the plate 89, thereby allowing the division plates to be placed into the forms after the core members are placed.

A removable support for core and insulation retainers is shown in Fig. 20, together with a different type of insulation holder which allows the insulation material to divide the blocks at the web porton. A plain bar division member 103 is used at the top and the bottom of the form. With no web division being necessary, the core members 69 and 70 are supported by a suitable shaped hooked cross member 104 provided on opposite ends of the form members. Insulation retaining members 106 with hinged type means 107 for spacing the insulation is similarly supported. Said hinged supporting members are maintained in an expanded position by a light wire U-shaped spring 109. A continuous strip of insulating material can be applied over the top surface of the insulation holder, before placing the same in the form, said strip following a definite course along web division members 108, thereby allowing the insulation material to divide the concrete blocks at the webs in line with the bar divisions 103 at the top and bottom. In this construction the loaded insulation retainers and core members can be first placed in the removable supports, and after filling the top with concrete and revolving the form, the hooked supports and the insulation retainers may be removed from the upper side leaving the core and insulating material in the proper locations.

Each of the concrete molds consists of a single frame, or a single undivided frame having a plurality of divisions, extending longitudinally or transversely, or both longitudinally and transversely. The outer frame consists of side and end members, shaped where necessary to produce the desired profile of the block with means for clamping and retaining said members in a secure and rigid manner. Means for rotation of the frame is provided so that the frame may be inserted making either side the top or bottom, and means of locking the frame in either position is also provided. The division members are definitely positioned by lugs on the abutting members. Air spaces are formed in the blocks by the shape of the outside members and core members, which have means for supporting the same, preferably by portions projecting inwardly from the outer members; or by passing through one outer member. At every opening between the cores or members a quick detachable member of a suitable shape is provided with means for clamping the same in position to prevent concrete from passing through these openings and also to serve as a support and as a means for definitely positioning the insulating material. The concrete is poured in on top of the cores and retainers, is then struck off and the pallets or covers with clamping means are applied to the top. The form is then inverted, locked in position, and the insulation retainers are removed in an upward direction. The remainder of the form is then filled with concrete from above.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the means herein disclosed, provided those stated by any of the following claims or their equivalent be employed.

I therefore particularly point out and distinctly claim as my invention:

1. A mold for two stage filling in the manufacture of insulated concrete block units which comprises a separable frame, core members separably supported therein, and insulation-supporting means removably disposed between adjacent core-members and cooperating therewith in such manner that the insulation on said supporting means constitutes with said core members the bottom of the mold-half during the first stage of the filling of the mold.

2. A mold for two stage filling in the manufacture or insulated concrete block units which comprises a separable frame, core members sep-

arably supported therein, and insulation-supporting means removably disposed between adjacent core-members and cooperating therewith in such manner that the insulation on said supporting means constitutes with said core members the bottom of the mold-half during the first stage of the filling of the mold, said means also having provisions for supporting reenforcing elements for the concrete blocks.

3. A mold for two stage filling in the manufacture of insulated concrete block units which comprises a separable frame, core members separably supported therein, insulation-supporting means removably disposed between adjacent core-members and cooperating therewith in such manner that the insulation on said supporting means constitutes with said core members the bottom of the mold-half during the first stage of the filling of the mold, and trunnions at the ends of said frame for rotatably supporting said mold.

4. A mold for two stage filling in the manufacture of insulated concrete block units which comprises a separable frame, and core members separately supported therein, said frame having a plurality of transverse divisions therein, and removable means having displaceable resilient members for supporting strips of insulation at an intermediate point between said core members within said frame, said removable means serving as a portion of the bottom of the mold-half during one stage of the filling of the mold.

5. A mold for two stage filling in the manufacture of insulated concrete block units which comprises a separable frame, and core members separately supported therein, said frame having a plurality of transverse divisions therein, and removable means having expansible spring-pressed members for supporting strips of insulation at an intermediate point between said core members within said frame, said removable means serving as a portion of the bottom of the mold-half during one stage of the filling of the mold.

ROY CHESTER BLACKMAN.

CERTIFICATE OF CORRECTION.

Patent No. 1,984,564. December 18, 1934.

ROY CHESTER BLACKMAN.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, line 18, first column, for "blacks" read blocks; page 3, second column, line 22, strike out the word "undivided" and insert the same before "frame" first occurrence in same line; and line 74, claim 2, for "or read of; and page 4, second column, lines 2 and 14, claims 4 and 5 respectively, for "separately" read separably; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 19th day of February, A. D. 1935.

Leslie Frazer

(Seal) Acting Commissioner of Patents.