

[54] **AN APPARATUS FOR PRODUCING A CONCRETE FORM BLOCK**

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[52] **U.S. Cl.**..... **249/52, 249/125, 249/176**

[51] **Int. Cl.**..... **B28b 7/20**

[58] **Field of Search** 249/50, 52, 119, 120, 122, 249/123, 124, 125, 117, 118, 163, 176, 177

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Primary Examiner—J. Spencer Overholser

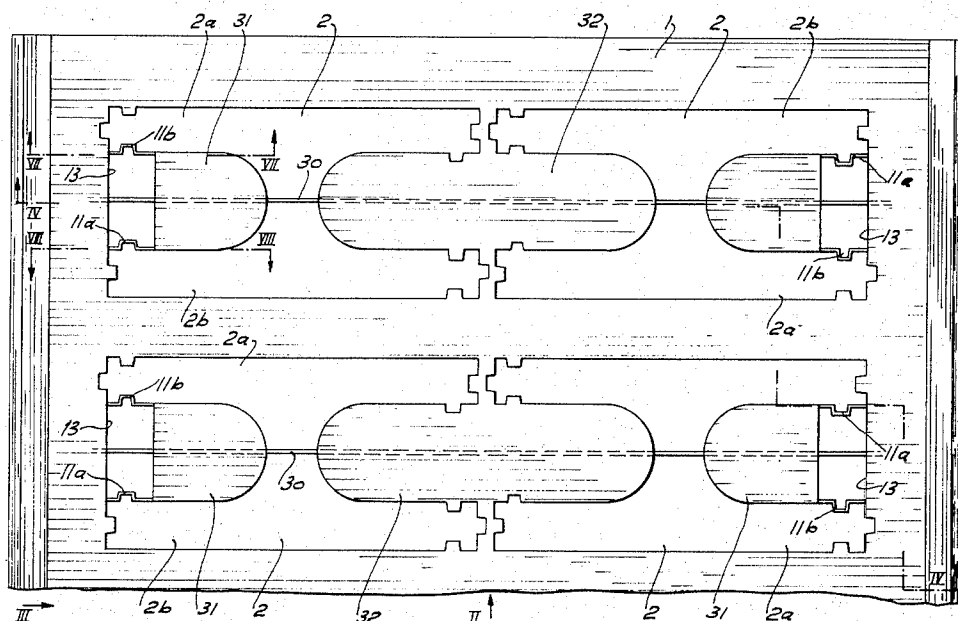
Assistant Examiner—John S. Brown

Attorney, Agent, or Firm—Woodhams, Blanchard and Flynn

[57] **ABSTRACT**

Apparatus for producing a concrete form block having an H or U shape and consisting of at least a central web and two side flanges. A closing block is provided between the free ends of the flanges of the form block. The closing block is molded in a common mold with the form block.

5 Claims, 14 Drawing Figures



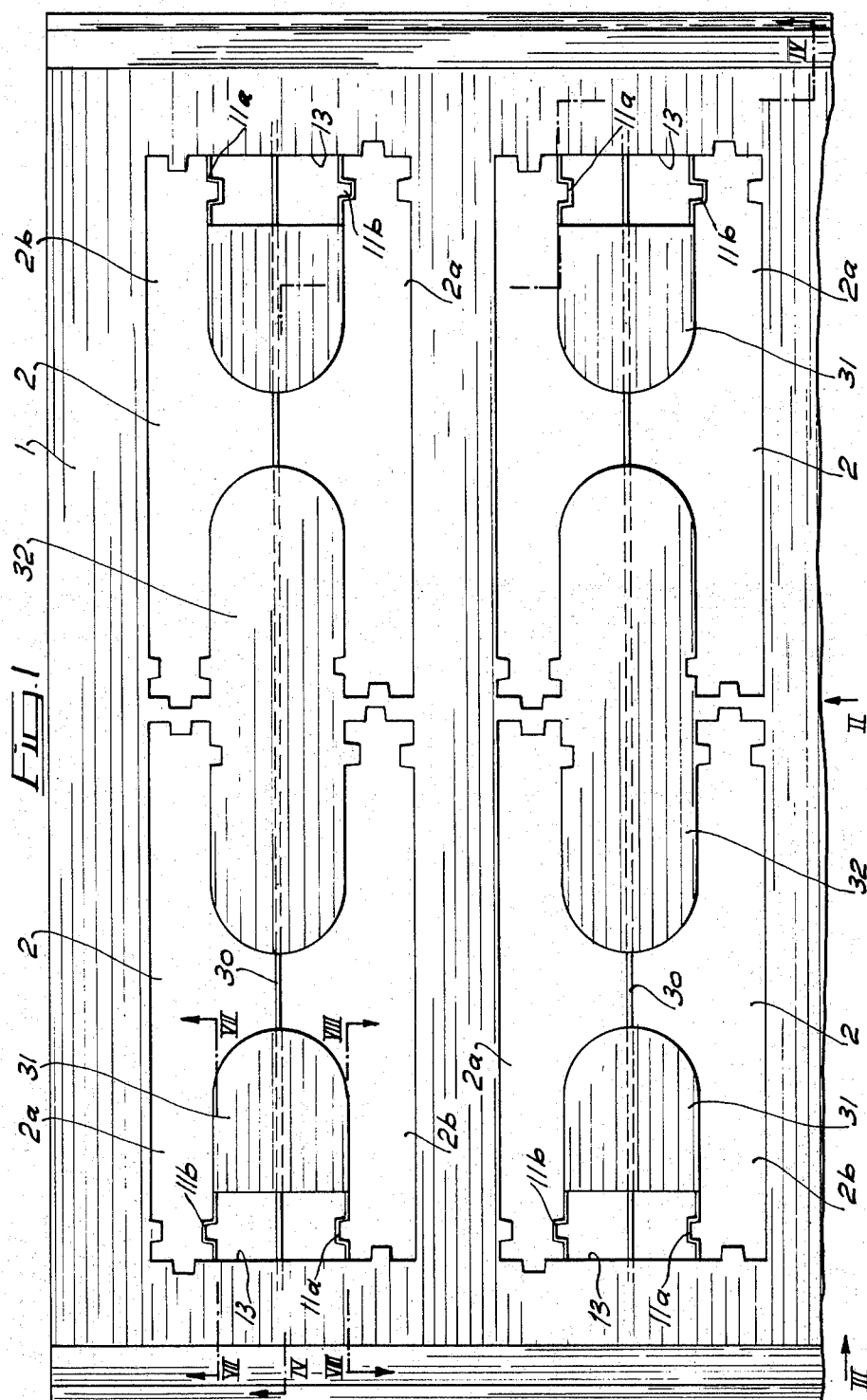
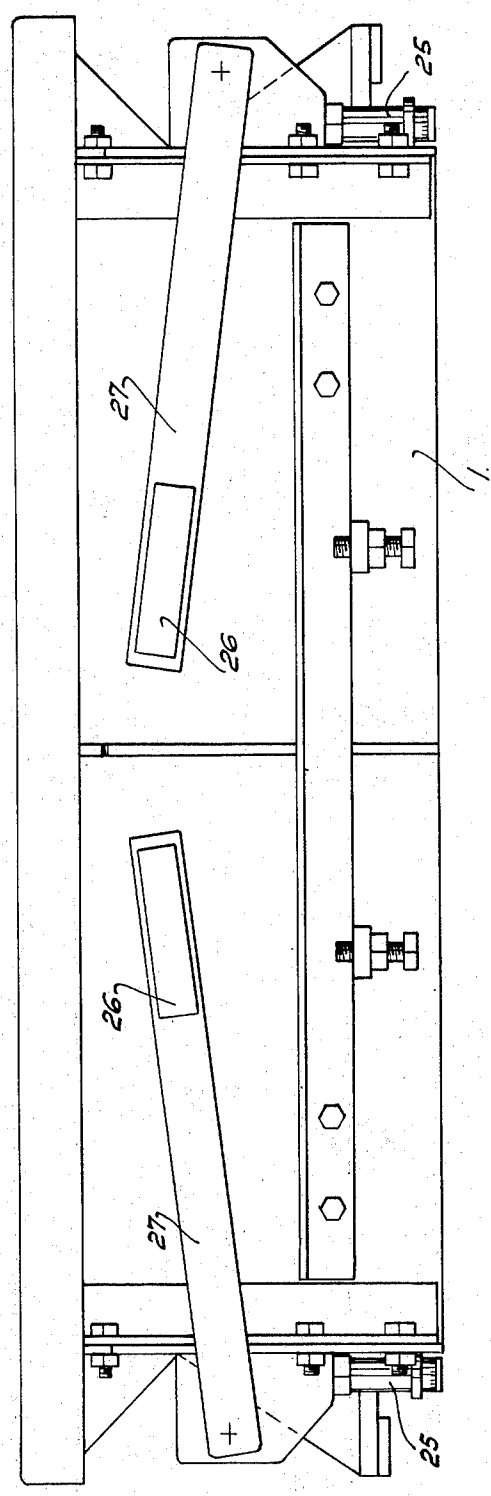


FIG. 2



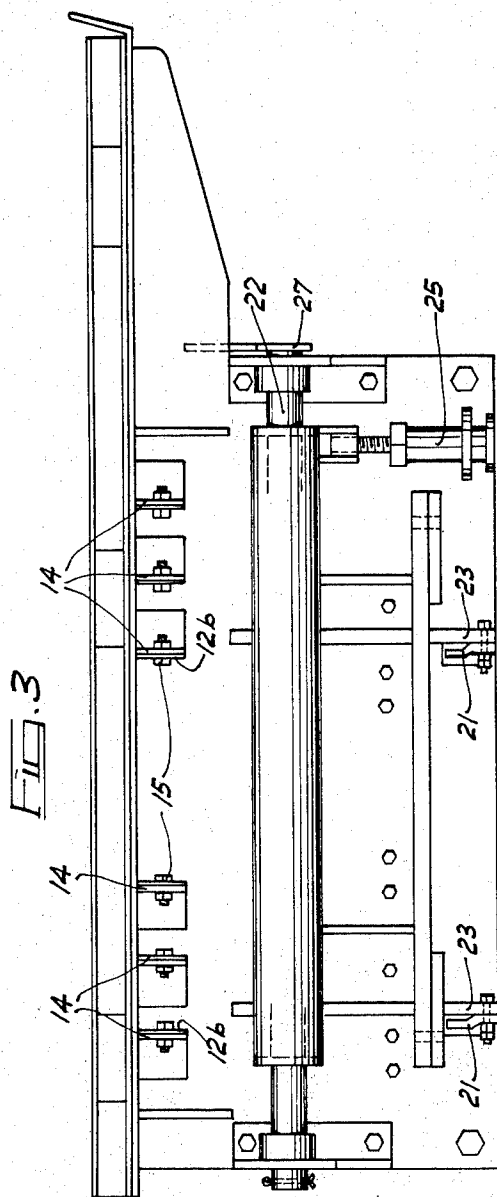
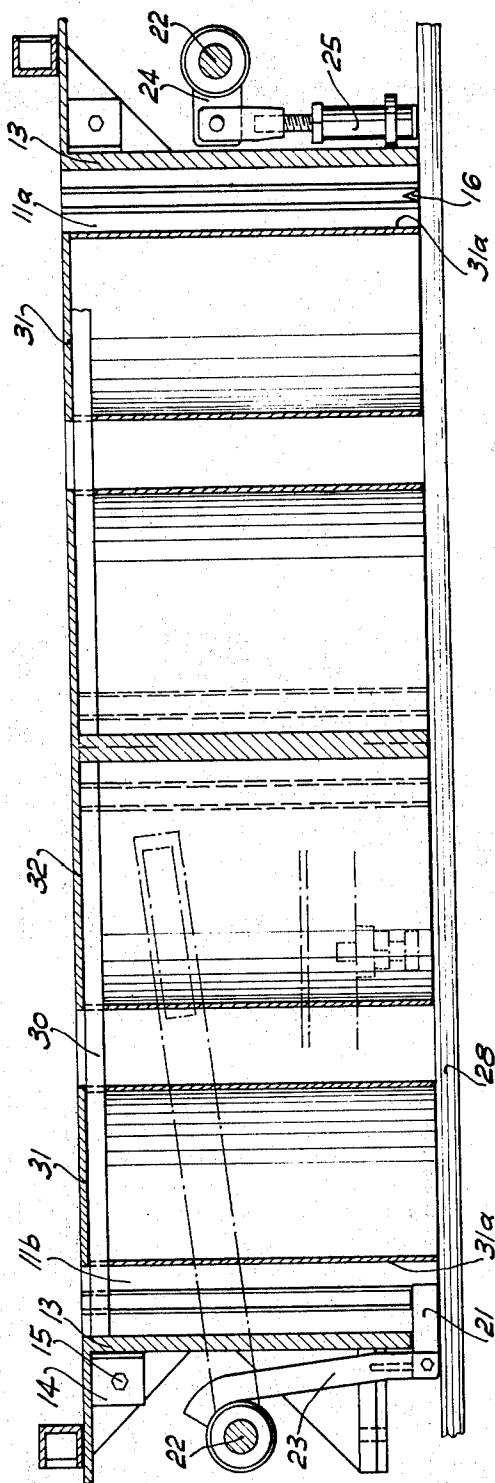


FIG. 4



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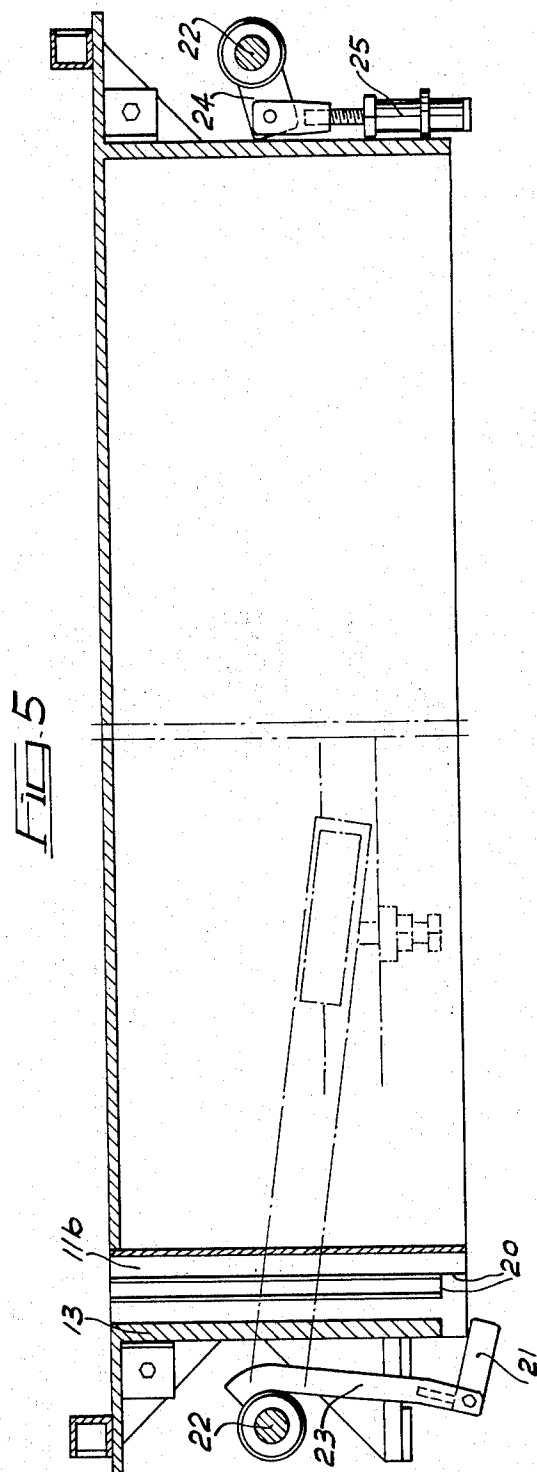


Fig. 6.

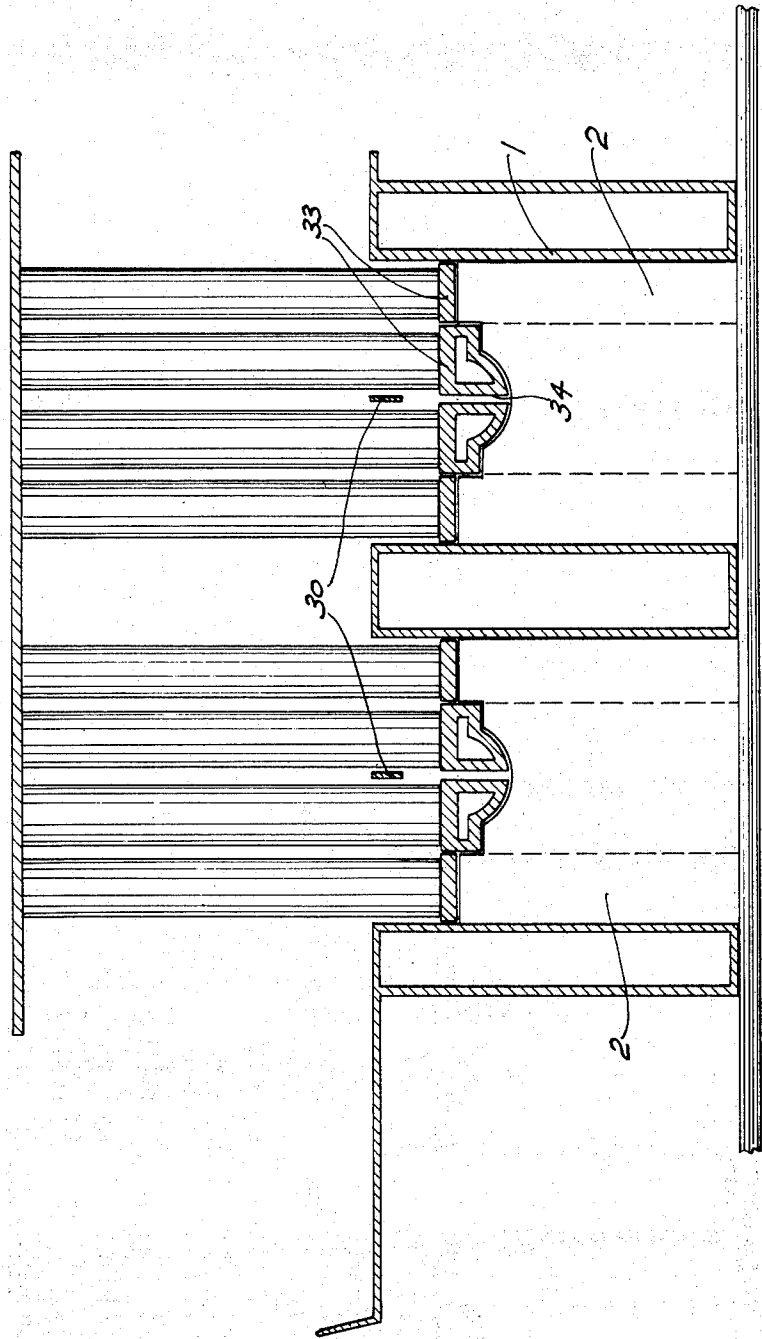


FIG. 7

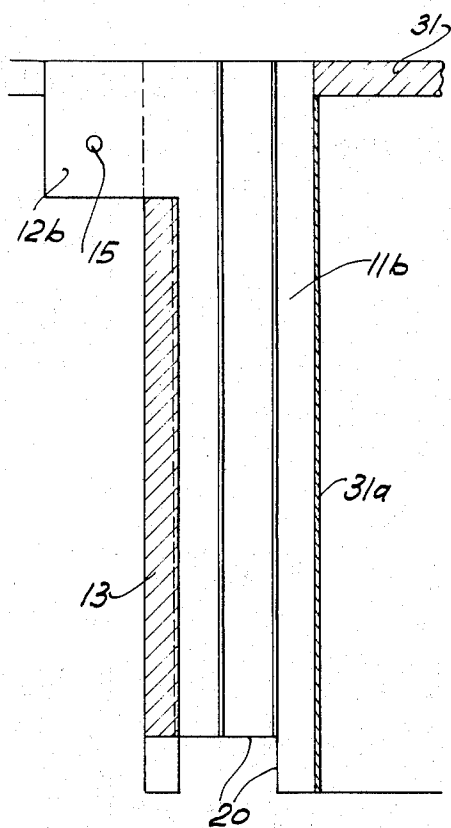
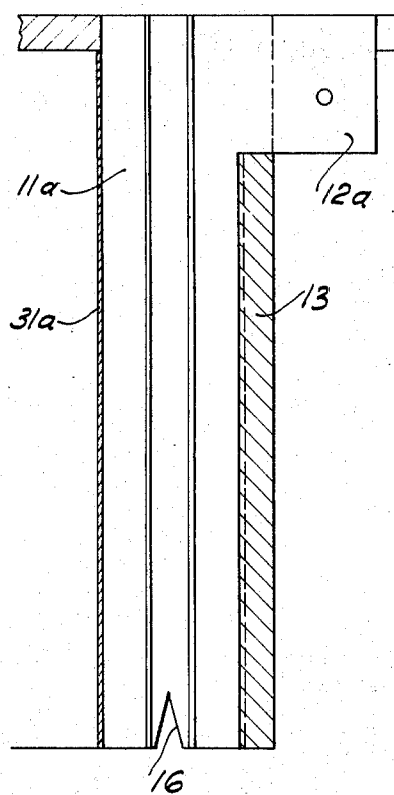
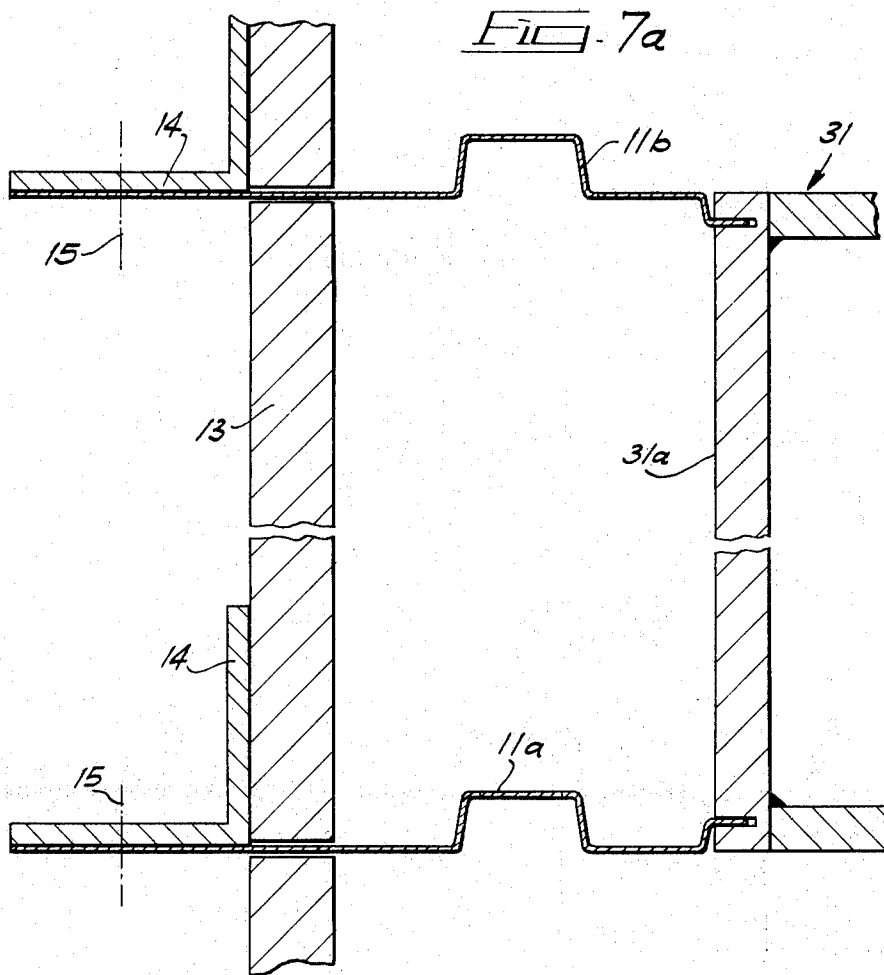


FIG. 8





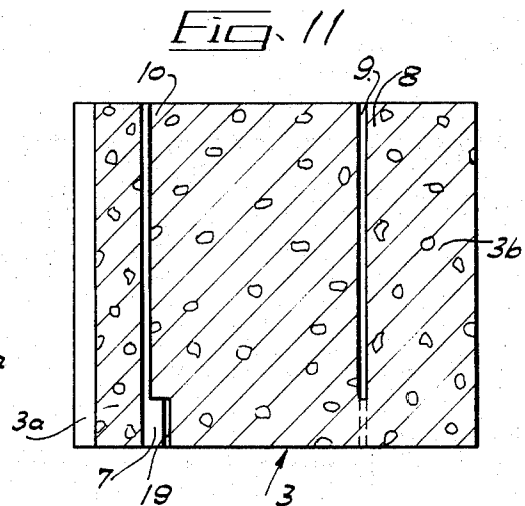
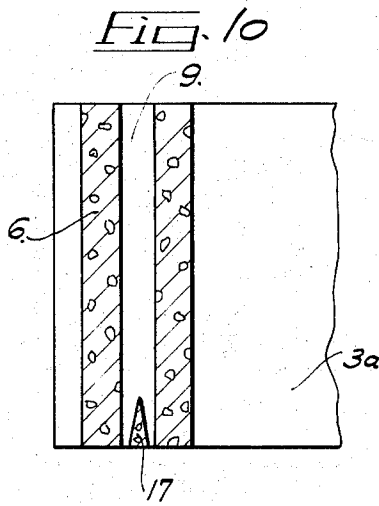
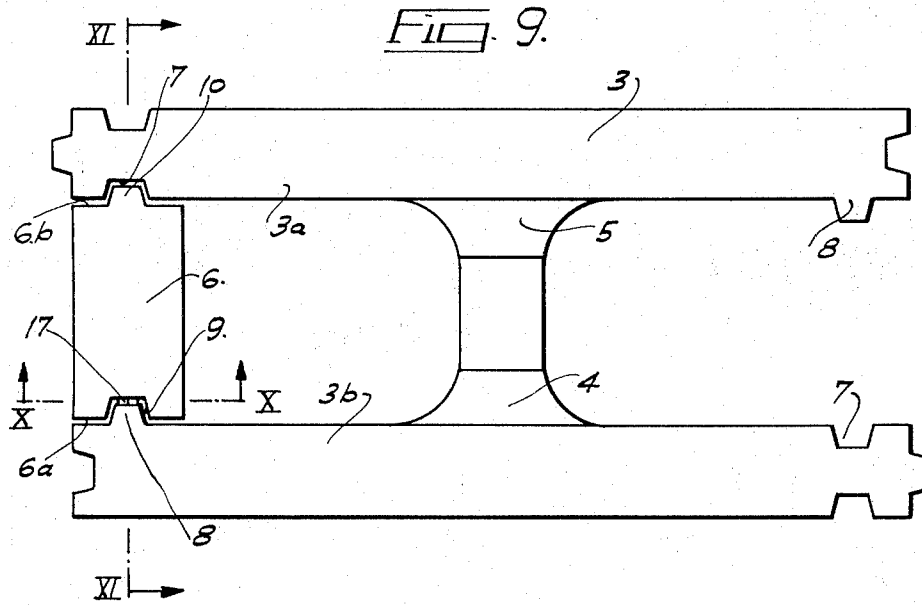


Fig. 12

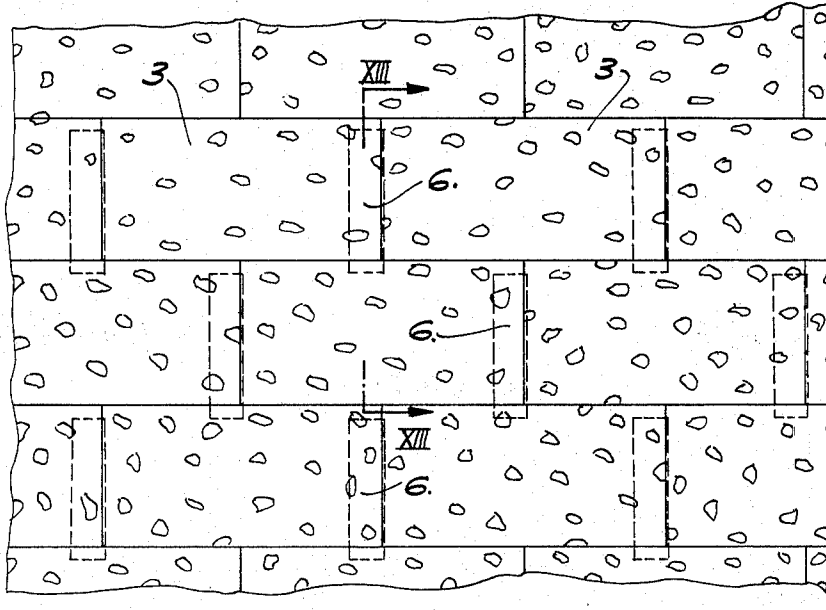
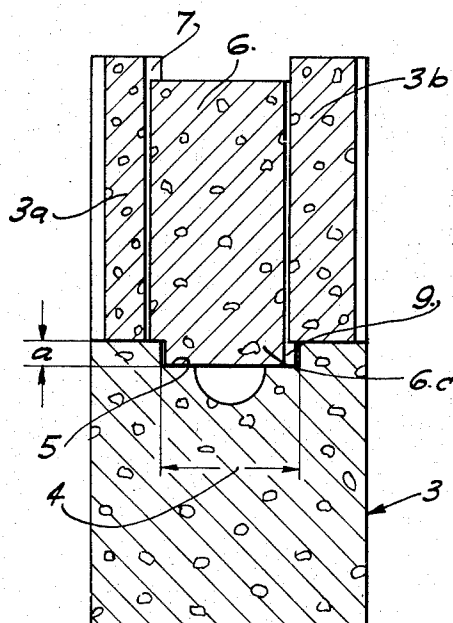


Fig. 13



AN APPARATUS FOR PRODUCING A CONCRETE FORM BLOCK

This invention relates to an apparatus for producing a concrete form block of H-shaped or U-shaped plan consisting of a central web and two side flanges between the free ends of which a closing block is arranged and can be locked by means of groove-shaped recesses and ridge-shaped projections, respectively, arranged on the insides of the side flanges and the end faces of the closing block.

A conventional method of producing such form and closing blocks consists in that a plurality of form blocks, for example four, are produced in a common steel mould. The steel mould has recesses corresponding to the plan of the form block. The mould is placed on a mould base and the recesses are then filled with concrete and the mould is shaken. A press ram penetrating into the recesses from above thereupon terminates the moulding operation. The mould is thereafter lifted away from the base, the moulded form blocks then being left on the base and being made to dry accompanied by the same. The closing blocks are manufactured in a similar manner. This known method and the known apparatus are disadvantageous insofar as the form blocks and closing blocks are made separately and must always be stored and transported separately until they finally arrive at the building site. In addition, when the form blocks are laid, the form blocks themselves must be laid first and then the closing blocks must be inserted between the side flanges of the form blocks. Separate handling of the form block and the closing block is therefore always necessary. Due to the separate manufacture and handling of the blocks until they are set or laid, they are more costly to produce and work up. Moreover, the closing blocks take up additional space in the storage yard and during transport and their sensitive ridge-shaped projections and the lateral portions defining the groove-shaped recesses may be damaged.

Therefore, the problem underlying the invention is to provide an apparatus for producing a concrete form block of the type mentioned at the beginning which make the inexpensive production of the form block and the closing block possible, while these blocks can be subsequently stored, transported and worked up at lower cost.

According to the invention, this is achieved by a form block and a closing block which facilitate a simultaneous moulding in a common mould and the closing block is moulded in its subsequent position between the side flanges with the interposition of a thin dividing wall.

This novel apparatus makes it possible to produce the closing block and form block in one operation. As the closing block is not formed at any place whatsoever in the mould, but in that position which it later occupies between the side flanges of the form block, there is no danger of the relatively tall and slender closing block tipping over after the mould has been stripped and the blocks are transported further on the mould base. On the contrary, the closing block is prevented from tipping over by the groove-shaped recesses and ridge-shaped projections. Thus, to begin with, no separate handling and moulding of the form block and closing block are required during manufacture, but both

blocks are produced in one operation and remain on the mould base until they have finally set.

By suitable measures, preferably by forming a narrow predetermined-break web during the moulding process between at least one of the side flanges of the form block and an end face of the closing block by omitting the dividing wall in the region of the predetermined-break web, it is possible to cause the form block and the associated closing block to remain together even during subsequent transport and other handling of the blocks until the two blocks have been laid together. Only after the laying proper, is the closing block separated from the form block in the region of the predetermined-break web by a blow on the closing block and can this block then slide downwardly along the ridge-shaped projections and groove-shaped recesses for a distance, so that it engages in known manner in a corresponding recess in the subjacent form block. The locking system between the form block, closing block and subjacent form block is described in German Patent No. 1 659 167. If the form block and closing block can be transported and laid together, less space is required when the two blocks are stored and transported. Moreover, the handling is substantially simplified, because when the form block is moved the closing block is also moved at the same time. In this way, the working times involved in the laying of the two blocks can be shortened. Furthermore, the risk of damage to the blocks is also smaller.

If necessary, it would also be possible by suitable choice of the thickness of the dividing wall left between the closing block and the form block during the moulding process to cause a certain light connection to be produced between the form block and closing block after the stripping of the mould, this connection holding the two blocks together until after they have been laid.

More specifically, the apparatus comprises a mould having a plurality of recesses each corresponding to the plan of a form block with cores arranged therebetween for the simultaneous moulding of a plurality of form blocks. In each of the recesses a steel plate is arranged as a dividing wall on the inside of each of the parts of the recess which form the side flanges, this steel plate abutting the side wall of the mould, on the one hand, and the core, on the other hand, corresponding in its inner contour to the plan of the end face of the closing block and in its outer contour to the contour of the inside of the adjacent side flange and extending approximately over the entire height of the mould in such manner that the closing block is formed and defined with respect to the form block by the side wall of the mould, the end wall of the core which extends parallel thereto, and the two steel plates.

The steel spring preferably has at the bottom edge of at least a U-shaped limb a notch which is open at the bottom and serves to form the above-mentioned predetermined-break web.

The apparatus and the new form block produced with this apparatus are described more fully hereinafter with reference to an embodiment shown in the drawing.

In the drawing:

FIG. 1 is a plan view of the mould;

FIG. 2 is a side view in the direction II of FIG. 1;

FIG. 3 is a side view in the direction III of FIG. 1;

FIG. 4 is a section on the line IV—IV of FIG. 1 during the moulding operation;

FIG. 5 is a simplified representation of the same section after the blocks have been removed from the mould;

FIG. 6 is a cross-section on the line VI—VI of FIG. 1;

FIG. 7 is a partial section on the line VII—VII of FIG. 1 on a larger scale;

FIG. 7a is a horizontal section through the steel plates and the adjacent part of the mould;

FIG. 8 is a section on the line VIII—VIII of FIG. 1 on a larger scale;

FIG. 9 is a plan view of the form block together with the closing block;

FIG. 10 is a partial section on the line X—X of FIG. 9;

FIG. 11 is a section on the line XI—XI of FIG. 9;

FIG. 12 is a diagrammatic representation of a wall erected with the new form blocks;

FIG. 13 is a section on the line XIII—XIII of FIG. 12.

In the drawing, the reference 1 designates the mould consisting in known manner of steel, this mould having four recesses 2 in the case of the embodiment shown. Each of the recesses 2 corresponds to the plan of a form block. The inner faces of the form block are formed by cores 31, 32 which are fixedly connected to the rest of the mould.

A form block 3 of this kind is shown in detail in FIGS. 9 to 11. The form block 3 has a substantially H-shaped plan and comprises two side flanges 3a, 3b which are interconnected by a central web 4. As is described in German Pat. No. 1 659 167, the form block 3 has in the zone of the central web 4 on the top thereof (and, if necessary, also on its underside) a recess 5 in which the closing block 6 of another form block disposed above a particular form block can engage, as will be described in detail hereinafter. The side flanges 3a and 3b are provided with groove-shaped recesses 7 and ridge-shaped projections 8 at their free ends. The closing block 6 has at its end faces 6a and 6b a corresponding groove-shaped recess 9 and a ridge-shaped projection 10 by means of which it engages the corresponding groove-shaped recesses 7 and ridge-shaped projections 8 of the form block after the fashion of a tongue and groove joint. The purpose of this method of locking the closing block can be seen from FIGS. 12 and 13. After a particular form block 3 has been laid, the closing block 6 is pushed downwardly by a small amount a and consequently engages by means of its lower end 6c in the recess 5 of the subjacent form block 3. In this way, the course on top in each instance is connected to the subjacent course of form blocks, as can be seen in particular from FIG. 12. As the overlying course is staggered in each case by the length of half a block with respect to the subjacent course, form blocks in which the side flanges 3a, 3b project from the central web only in one direction are required at the ends of the wall. These form blocks then have a U-shaped plan and can be produced in principle in the same way as the block which has just been described. After the form blocks have been laid, concrete is poured into the cavities from above, the closing blocks preventing any mutual shifting of the form blocks placed one on top of the other.

According to the invention, the form block and the closing block are to be formed at the same time in a common mould and in the process the closing block is to be formed in its subsequent position between the side flanges with the interposition of a thin dividing wall.

To this end, in each of the recesses 2, a steel plate 11a, 11b is arranged as dividing wall on the inside of each of the parts 2a, 2b of the recess 2 which form the side flanges 3a, 3b. Each of the steel plates 11a, 11b abuts on the one hand the side wall 13 of the mould and on the other hand the core 31 located opposite this side wall. As a closing block 6 is to be moulded for each form block 3 and two such steel plates are required for each closing block, a total of eight such steel plates is present in the embodiment illustrated. Each steel plate 11a, 11b corresponds in its inner contour to the plan of the end face 6a, 6b, respectively, of the closing block 6 and in its outer contour to the contour of the inside of the adjacent side flange 3a, 3b, respectively, with the groove-shaped recesses 7 and ridge-shaped projections 8 arranged on these side flanges. The steel plates 11a, 11b extend approximately over the entire height of the mould. They are fixed by their free ends 12a, 12b to the side walls 13 of the mould, to which end corresponding lugs 14 are welded to the side walls. Due to the chosen method of fixing by means of bolts 15, the steel plates 11a, 11b can easily be exchanged when damaged or worn. The closing block 6 is formed by a part of the side wall 13 of the mould, the end wall 31a of the core 31 extending parallel thereto, and the two steel plates 11a, 11b. Owing to the special shaping of the steel plates 11a, 11b, not only are the projecting ridge 10 and the recess 9 formed on the closing block 6, but also at the same time the groove-shaped recess 7 and the ridge-shaped projection 8 are formed on the form block.

As is apparent in particular from FIG. 8, the steel plate 11a furthermore has at its bottom edge a notch 16 which is open at the bottom, this notch advantageously widening downwardly and being V-shaped in the embodiment illustrated. This V-shaped notch 16 serves to produce a predetermined-break web 17 described in detail hereinafter and connecting the closing block 6 and the form block 3 to one another until the form block 3 is finally laid in the masonry.

As has already been explained hereinbefore, the closing block 6 engages by means of its lower end 6c in the recess 5 and also between the side flanges 3a, 3b of the subjacent form block. This engagement would not be possible because of the projecting ridge 10, for which reason this projecting ridge 10 has a clearance 19 in the lower zone (FIG. 11).

For the purpose of forming the clearance 19, one steel plate 11b is first provided with a cutout 20. During the moulding process, this cutout 20 is engaged by a bar 21 which is adapted to be swung out. The bar is attached to the supporting arm 23 connected to the horizontal swing shaft 22. The axis of the swing shaft 22 extends at right angles to the recesses 2a, 2b for the side flanges 3a, 3b. The swing shaft 22 is rotatably mounted in the side wall 13 of the mould and fixedly connected to an actuating lever 24. The actuating lever 24 cooperates with a variable-length push rod 25. Furthermore, a return lever 27 loaded by a weight 26 is connected at both ends of the swing shaft. If necessary, a spring could also be provided instead of the weight, but

the loading by a weight is less susceptible to trouble in view of the relatively harsh operation. The swing shaft is so swung by the weight-loaded return lever 27 that the bar 21 swings out of the mould. If, however, the mould is placed on the mould board 28, the push rods 25 come to bear and swing the swing shaft 22 in opposition to the loading by the weights. In this way, the bars 21 are brought into the moulding position and produce the desired clearance or recess 19 during the filling process and the subsequent moulding of the block. The amplitude of the swinging movement of the swing shaft 22 can be regulated by means of adjustable stops and a push rod 25 of variable length.

For the sake of completeness, reference is also made to the connecting rod 30 which is provided between the two opposite side walls 13. In particular, the cores 31 are held in their correct position by this connecting rod 30. The press ram 33 is provided with a slot 34 for the passage of the connecting rod 30.

FIG. 7a shows further details of the fixing of the steel plates 11a and 11b. Their vertical longitudinal edges engage in corresponding grooves in the core 31 and also in the side wall 13. The steel plates 11a and 11b are thereby securely retained. Moreover, if wear or damage occurs, exchange is also possible at any time.

FIGS. 9 to 11 show a new form block 3. This differs from the form blocks known heretofore in that the closing block 6 is already arranged during manufacture between the side flanges 3a and 3b of the form block and locked by the groove-shaped recesses 7, 9 and the ridge-shaped projections 8, 10 to the form block. Moreover, between at least one side flange 3b and the adjacent end face 6a of the closing block 6 there is provided a predetermined-break web 17 which interconnects the two parts 3 and 6. In this way, the base surface of the closing block 6 is arranged substantially in the plane of the base surface of the form block 3 until after the block has been laid. The two blocks can be made, transported and laid together. Only after the form block 3 has been placed together with the closing block 6 connected thereto on the formwork already erected by using further form blocks is the closing block 6 detached from the form block 3 by a blow with a hammer, preferably a rubber hammer, and the predetermined-break web 17 broken. As is apparent from FIGS. 12 and 13, the closing block 6 then slips downwardly for a small distance into the recess 5 of the subjacent form block 3 or between the side flanges 3a and 3b thereof as well. In the latter case, any further downward movement is prevented by the projecting ridge 10, which has the said clearance 19 only at its lower end.

As can furthermore be seen from FIGS. 9 to 11, the predetermined-break web 17 is arranged in the region of the groove-shaped recess 9 and the ridge-shaped projection 8. The predetermined-break web tapers upwardly in V-form in cross-section and consequently makes possible a satisfactory release of the mould without the predetermined-break web being destroyed in the process. Moreover, this web is provided adjacent the lower base surface of the form block, which likewise renders simple manufacture possible.

The present invention is not intended to be limited to the embodiment illustrated. Thus, it would also be conceivable, for example, to interconnect the two steel plates by a crossbar at their free ends facing the central web 4, so that together with this crossbar they have a

substantially U-shaped form. Moreover, the same principle may also be used for differently shaped form and closing blocks, for example when the closing block is provided with groove-shaped recesses at its two end faces. In this case, the form block would then have to be provided with a continuous shoulder or step in its upper zone between the two side flanges 3a and 3b, so that the closing block is prevented from moving further by this shoulder during its downward sliding movement.

I claim:

1. Apparatus for the manufacture of a concrete form block having at least one of an H- or U-shaped configuration and consisting of a central web and at least two side webs, a closing block located between the free ends of the two side webs and is connected thereto by means of groove-shaped recesses or riblike projections arranged on the opposed inner sides of said two side webs and the two outwardly facing front surfaces of said closing block to define an opening, a core mounted in said opening to thereby define an H- or U-shaped recess, a mold having several of the aforesaid arrangements therein for the simultaneous forming of several form blocks, comprising the improvement wherein in each one of said H- or U-shaped recesses a partition wall is provided and consists of one plate on the inner side of both of the legs of said H- or U-shaped recess, one side edge of both of said plates engaging a sidewall of said mold and on the other side edge the core, said plates including means corresponding in its inner contour to the contour of said outwardly facing front surfaces of said closing block and in its outer contour to the contour of said opposed inner sides of said side webs of said form block and extends approximately over the entire height of said mold whereby an inner wall of said mold, an opposed wall of said core extending parallel thereto and said pair of plates form the sidewalls of said closing block, at least one of said plates having in the lower edge thereof a downwardly open downwardly enlarging notch of a dimension to receive concrete material therein and define a severable connection whereby said form block and said closing block become integrally and severably connected together during a molding procedure through said downwardly open downwardly enlarging notch.

2. The improvement according to claim 1, wherein said notch is V-shaped.

3. The improvement according to claim 1, wherein said notch is located in alignment with one of said groove-shaped recesses.

4. Apparatus for the manufacture of a concrete form block having at least one of an H- or U-shaped configuration and consisting of a central web and at least two side webs, a closing block located between the free ends of the two side webs and is connected thereto by means of groove-shaped recesses or riblike projections arranged on the opposed inner sides of said two side webs and the two outwardly facing front surfaces of said closing block to define an opening, a core mounted in said opening to thereby define an H- or U-shaped recess, a mold having several of the aforesaid arrangements therein for the simultaneous forming of several form blocks, comprising the improvement wherein in each one of said H- or U-shaped recesses a partition wall is provided and consists of one plate on the inner side of both of the legs of said H- or U-shaped recess, one side edge of both of said plates engaging a sidewall

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of said mold and on the other side edge the core, said plates including means corresponding in its inner contour to the contour of said outwardly facing front surfaces of said closing block and in its outer contour to the contour of said opposed inner sides of said side webs of said form block and extends approximately over the entire height of said mold whereby an inner wall of said mold, an opposed wall of said core extending parallel thereto and said pair of plates form the sidewalls of said closing block, a clearance at the lower end of said riblike projection on said closing block, a bar and support means adapted to swingably support said bar for movement beneath said mold into and out of said clearance, said bar having a supporting lever mounted thereto and is swingably supported for movement about a horizontal axis, said horizontal axis being

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at a right angle to the longitudinal axes of said side webs of said form block.

5. The improvement according to claim 4 wherein said supporting lever and said supporting means consisting of an actuating lever cooperating with a downwardly projecting push rod and at least one return lever are connected to a swing shaft rotatably mounted on the outside of a sidewall of said mold so that when the mold is raised, said return lever swings said bar out of said clearance through the return lever and when the mold is lowered on to a mold board, said push rod engages said mold board and effects a swinging of the supporting lever and said bar into said clearance about the axis of the swing shaft.

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