

July 28, 1964

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3,142,093

MOLDING PRESS WITH PRESS PLATES MOVABLE OUT OF THE PRESS

Filed July 12, 1962

6 Sheets-Sheet 1

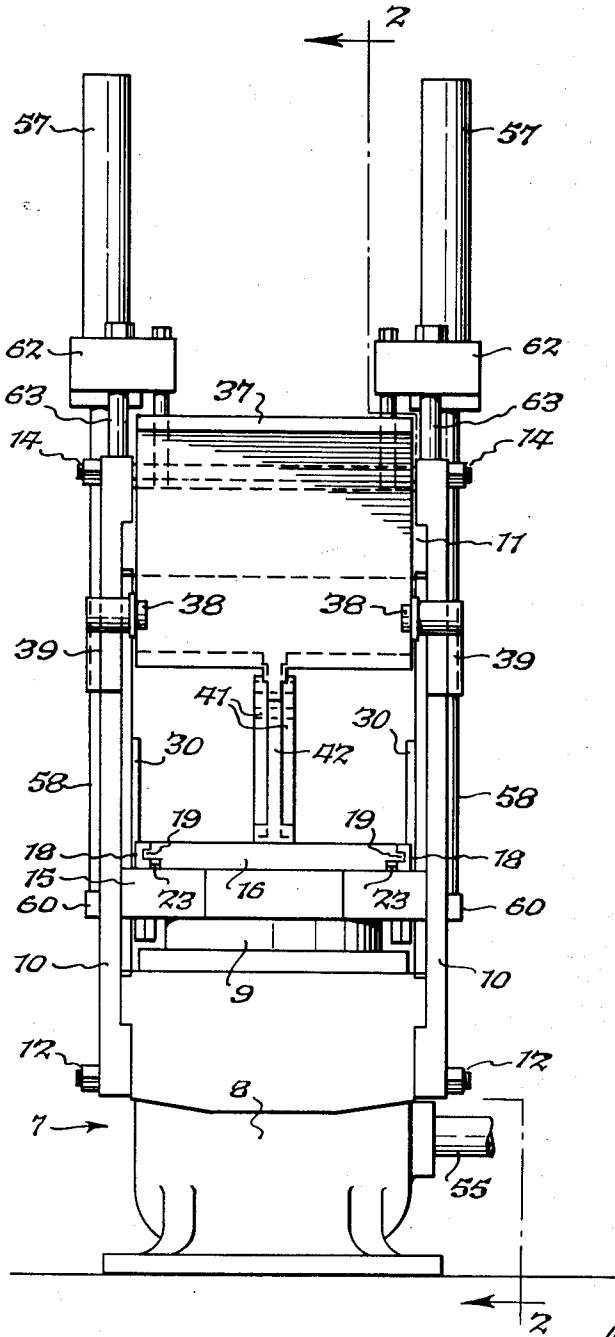


Fig. 1.

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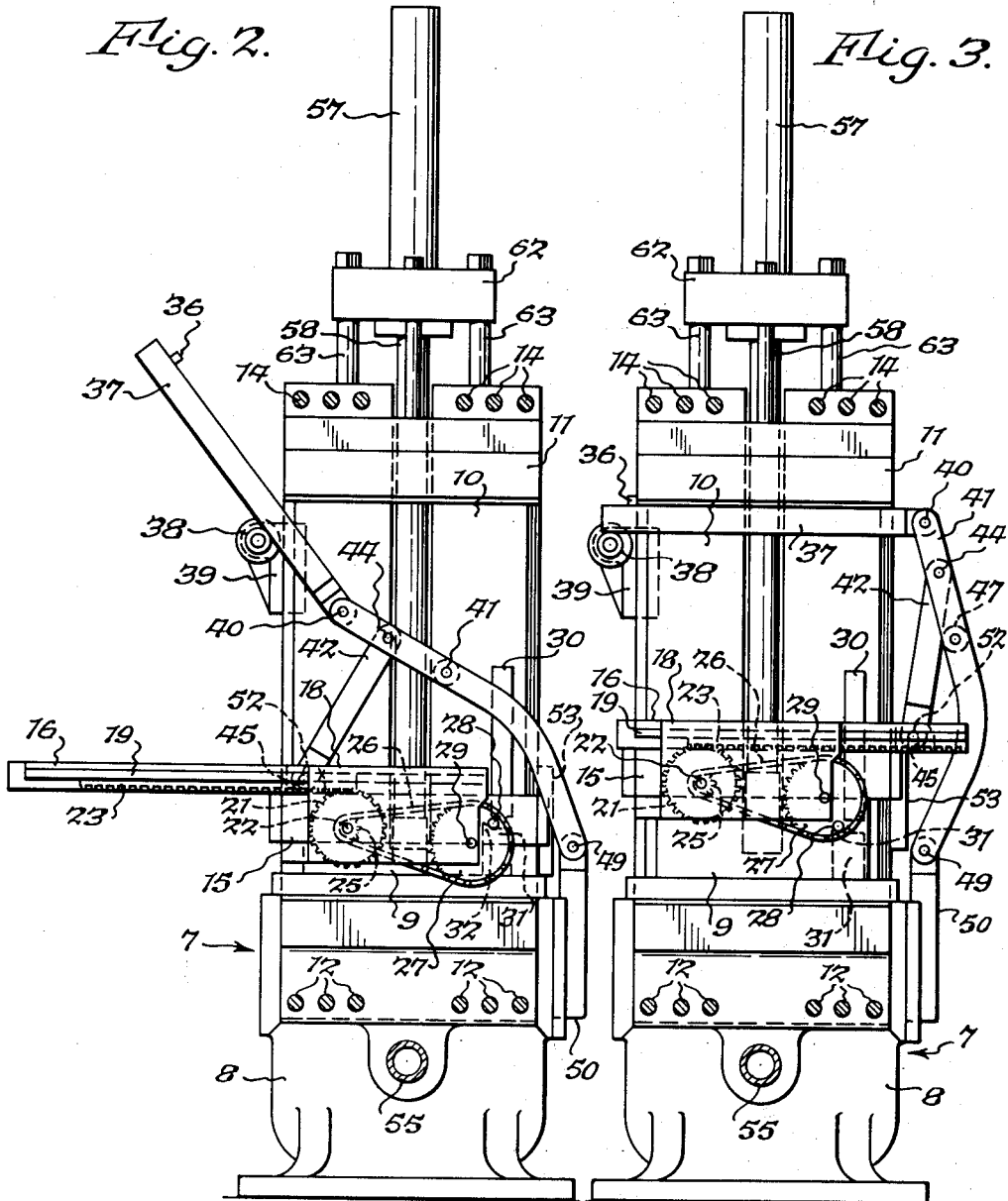
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6 Sheets-Sheet 2



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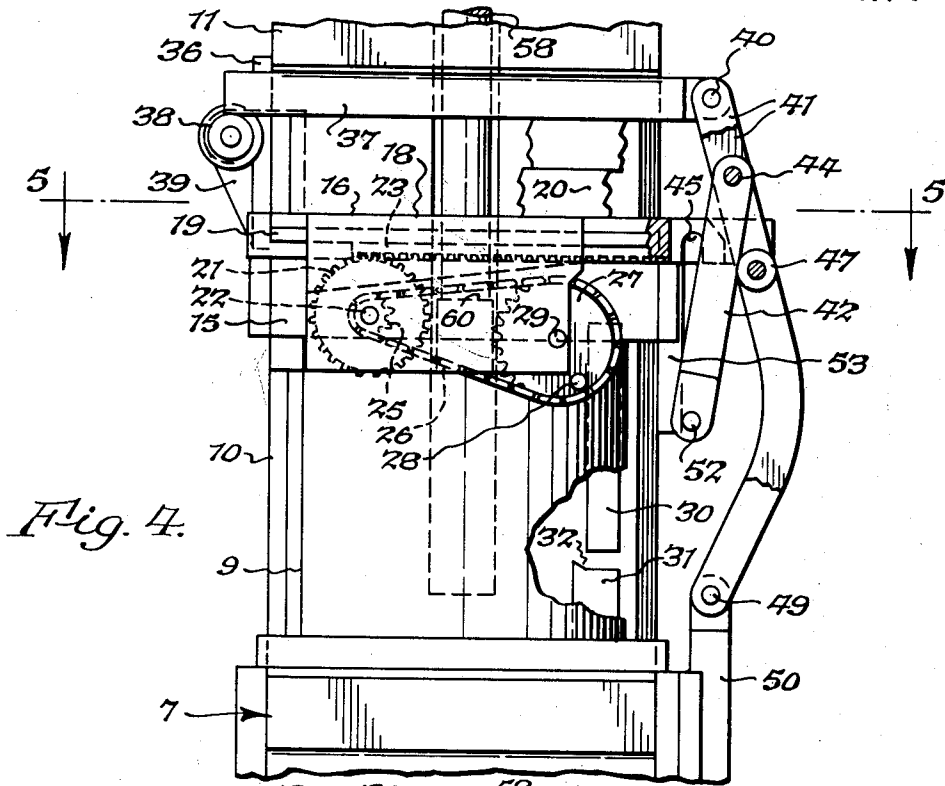


Fig. 4.

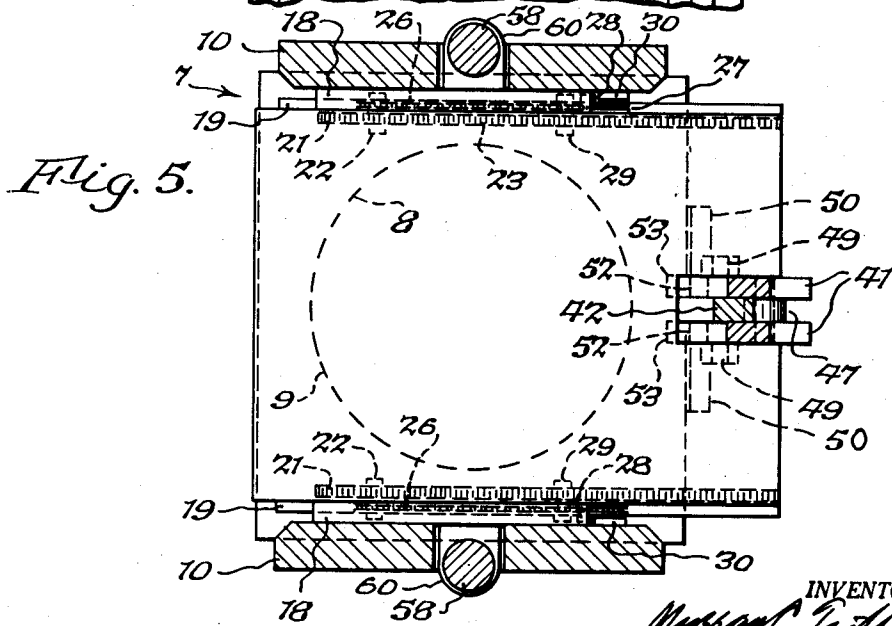


Fig. 5.

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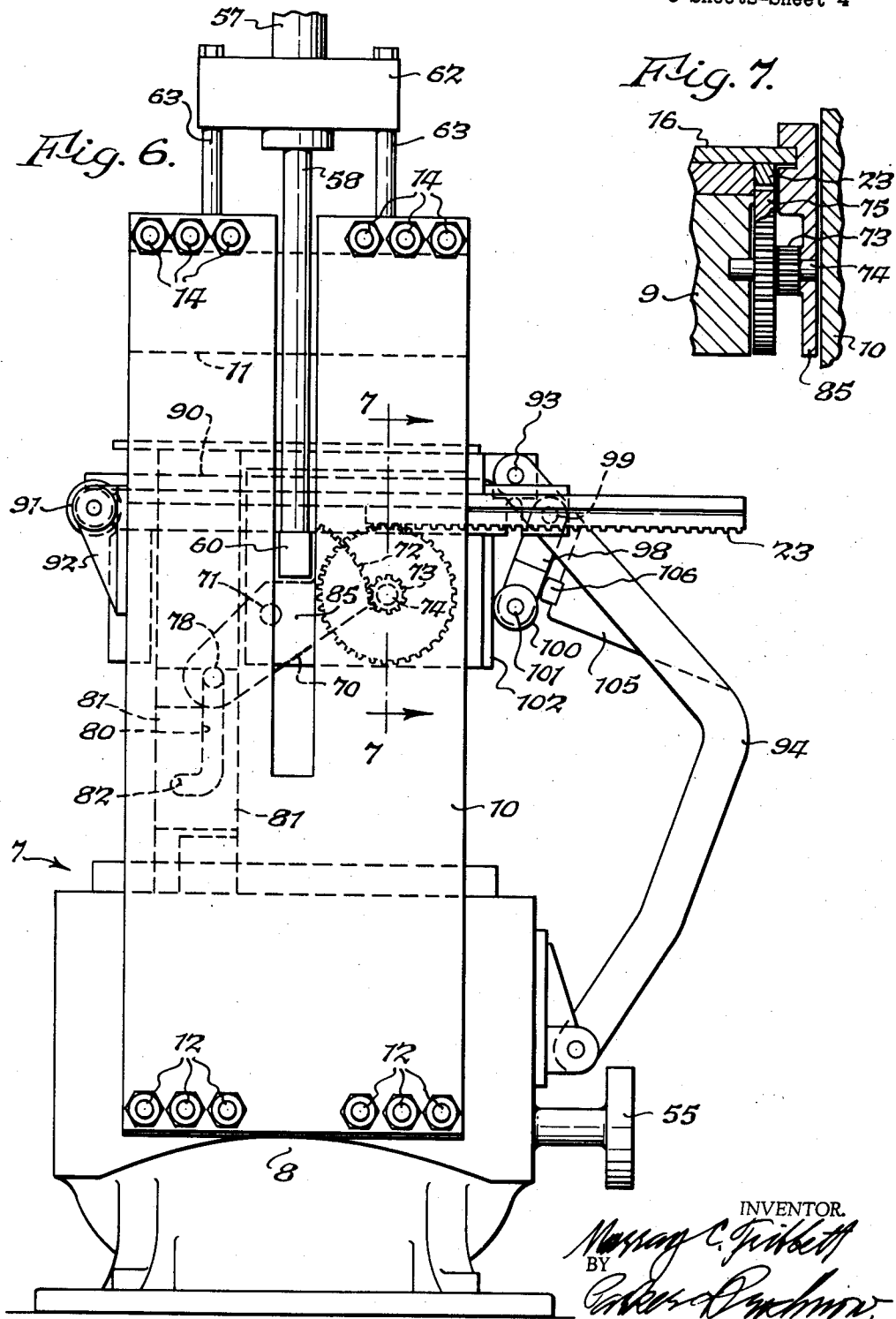
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MOLDING PRESS WITH PRESS PLATES MOVABLE OUT OF THE PRESS

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Fig. 9.

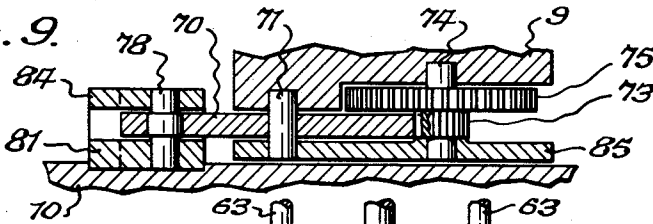
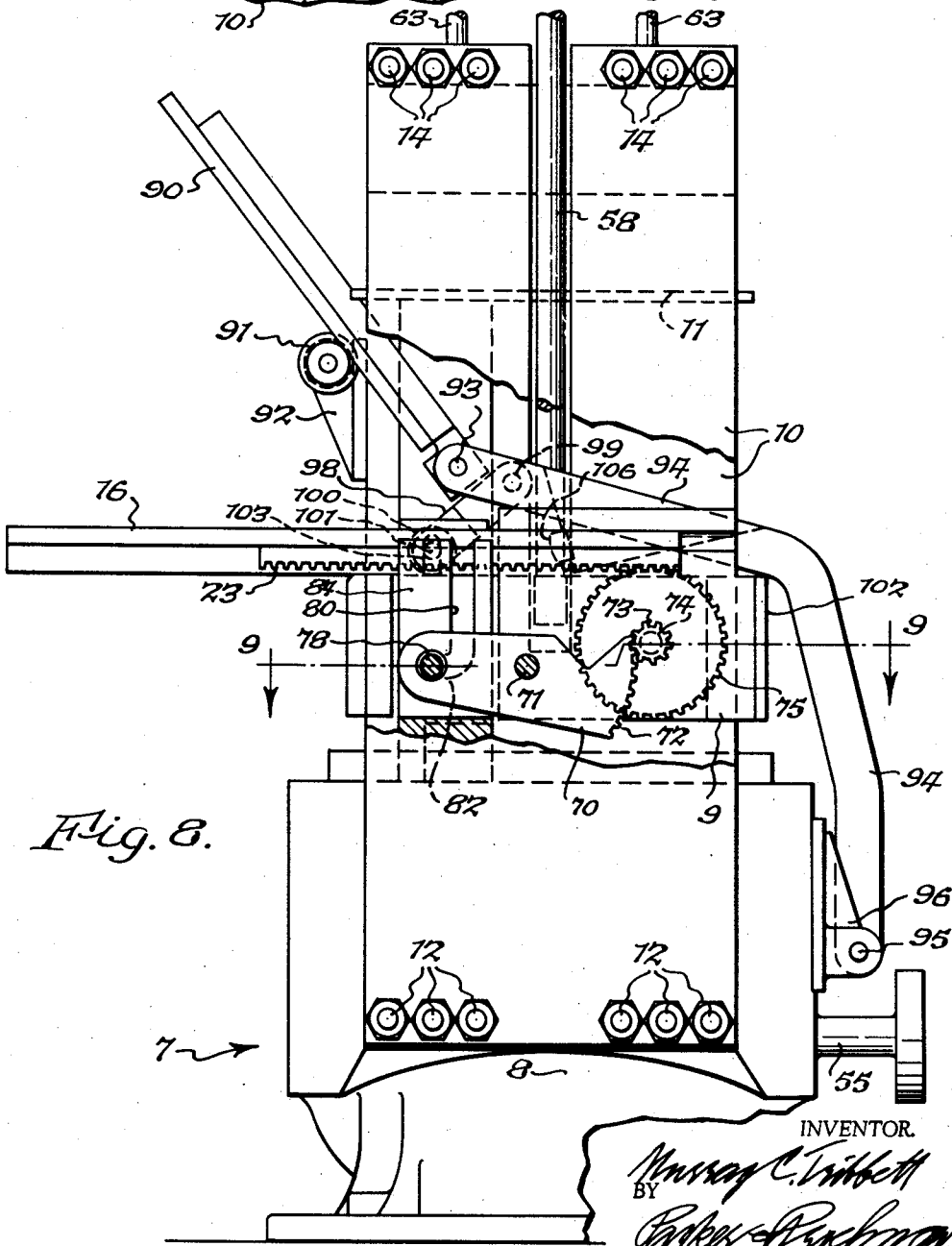


Fig. 8.



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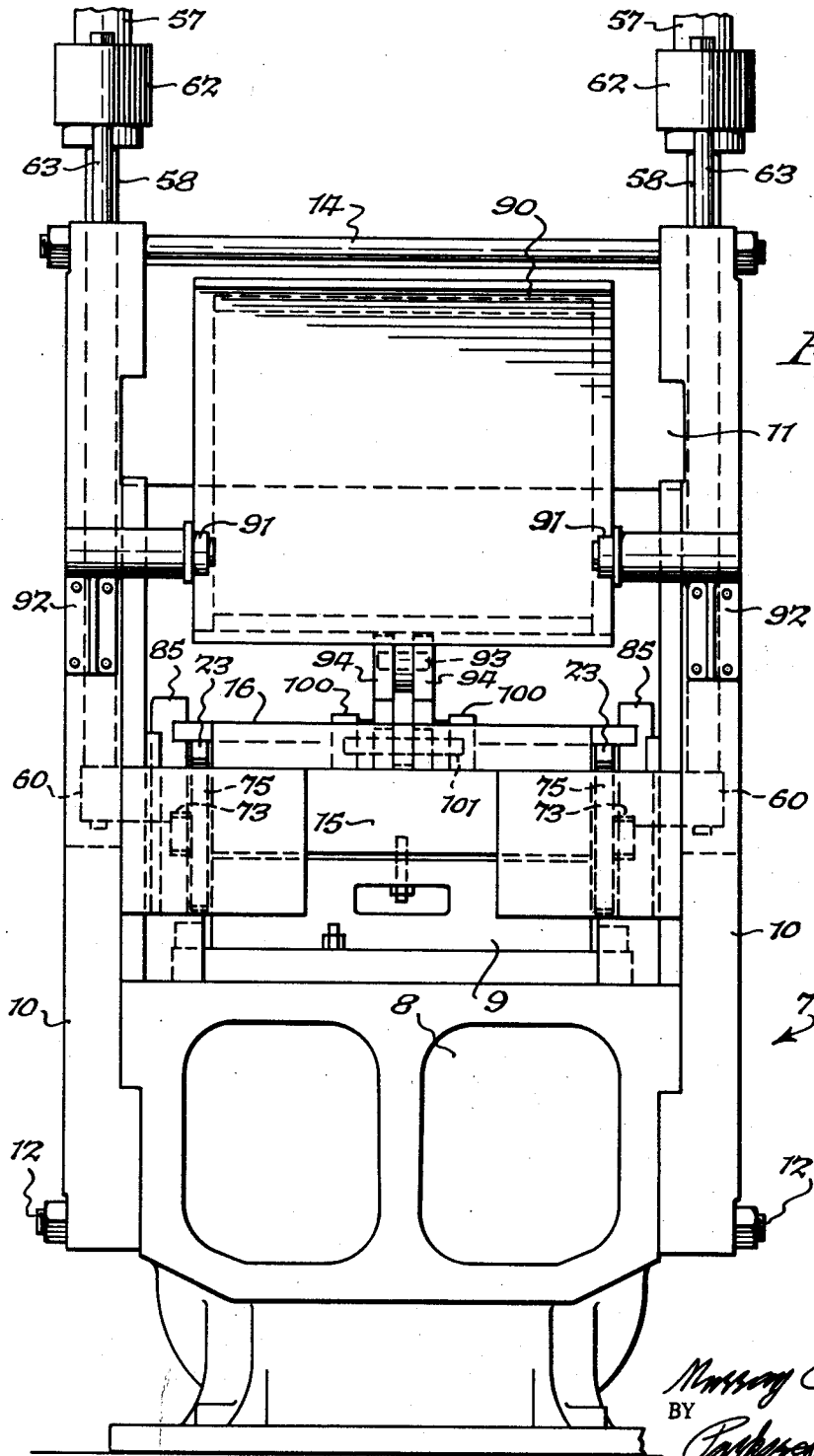


Fig. 10.

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MOLDING PRESS WITH PRESS PLATES MOVABLE OUT OF THE PRESS

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14 Claims. (Cl. 18—16)

This invention relates to molding presses and particularly to those of the type having a lower die or press plate movable out of the press and a tilting top die or press plate also movable out of the press into an inclined position for ready inspection and access.

One object of this invention is to improve and simplify the construction and operation of molding presses of this type by providing mechanism of improved construction for moving the press plates into and out of the press in such a manner that the press plates will be completely out of the press as soon as the press is fully open.

It is also an object to provide mechanism whereby the movement of the press plates into the press is effected by the movement of the press into closing position.

Another object is to provide means for moving a press plate into and out of a press, which comprises gearing connecting a press plate with a part actuated by the ram of the press, so that no auxiliary mechanisms are required for this purpose.

In the accompanying drawings:

FIG. 1 is a front elevation of a press embodying my invention.

FIG. 2 is a sectional elevation thereof on line 2—2, FIG. 1, showing the press plates extending out of the press.

FIG. 3 is a similar view showing the press plate within the press.

FIG. 4 is a similar, fragmentary sectional elevation thereof on an enlarged scale showing the parts of the press in pressing positions.

FIG. 5 is a sectional plan view thereof on line 5—5, FIG. 4.

FIG. 6 is a sectional elevation of a press of modified construction, the section being taken approximately on line 6—6, FIG. 10.

FIG. 7 is a fragmentary, sectional elevation thereof on line 7—7, FIG. 6.

FIG. 8 is a sectional elevation similar to that shown in FIG. 6 except that the press plates have been moved out of the press.

FIG. 9 is a fragmentary, sectional plan view thereof on line 9—9, FIG. 8.

FIG. 10 is a front face view of a press with the press plates in their outer positions.

In the particular embodiment of my invention shown in the drawings, 7 represents the base of the press having incorporated therein a large hydraulic ram cylinder 8 in which a ram or piston 9 is mounted to reciprocate. Heavy metal plates 10 are secured to the opposite sides of the base 7 and extend upwardly in parallel relation and are connected at their upper ends by a cross member or head 11 so that the cross member 11, side plates 10 and the base 7 together form a basic frame for the press. The side plates may be secured to the base in any suitable manner such, for example, as screw fasteners 12, and the cross member or head 11 is secured to the upper ends of the side plates 10 by tie rods 14.

A platen 15 is mounted on the ram or piston 9 and is disposed between the side plates 10 and guided thereby in its vertical movement. A lower press plate 16 is slidingly supported on the platen for horizontal movement by a suitable trackway comprising, for example, guide rails 18 having grooves or recesses into which tongues 19 of the

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plate extend. The plate serves as a support for the lower mold 20, FIG. 4.

The movement of the lower press plate 16 into and out of the press is effected by the movement of the platen and ram into and out of opening and closing positions in the press. In the particular construction shown for this purpose in FIGS. 1 to 5, I provide rack bars 23 at opposite sides of the press plate 16 which mesh with gears 21 secured on pins 22 journaled on the platen 15. The pins also have secured thereon sprocket gears 25 which cooperate with a sprocket chain 26 driven by a sprocket gear 27, having a shaft 29 so that by rotation of the gear 27 in opposite directions, the press plate 16 is moved into or out of the press.

In accordance with my invention the gearing described is actuated by the movement of the platen into and out of preclosing positions, and also this movement in either direction is completed during the part of the movement of the platen when it is some distance below the press head. In the construction shown in FIGS. 1-5 for effecting this movement, the sprocket gear 27 is provided on one of its sides with an outwardly extending crank pin 28. The movement of this pin is controlled by means of a pair of stationary stops or restraining members 30 and 31 suitably secured to one of the side frames 10 of the press. The gearing which controls the movement of the lower press plate is consequently actuated by the turning of the sprocket gear through the crank pin 28. The stop or restraining member 30 is so located that when the platen is in the position shown in FIG. 3 and is about to be raised, the crank pin 28 will move along an edge of the stop member 30 so that no turning of the gear 27 results during the closing of the press, and furthermore the gearing is held against movement by engagement of the crank pin on the side of the member 30. FIG. 4 shows the position of the crank pin when the press is in fully closed position, in which the crank pin is near the upper portion of the stop or restraining member 30. When the press is opened, the crank pin 28 will again move along the side of the stop member 30 so that no movement of the lower press plate will result until the crank pin engages the inclined face 32 of an upwardly extending projection of the lower restraining member 31. This inclined face will urge the crank pin 28 to the right in FIG. 3, and upon further downward movement of the platen, the crank pin will enter into the space between the lower edge of the stop or restraining member 30 and the upper edge of the member 31. The latter part of the downward movement of the platen consequently effects movement of the crank pin from the position shown in FIG. 3 to that shown in FIG. 2, and this changing position of the crank pin causes a limited rotation of the sprocket wheel 27 and the gear 21 which engages the rack 20 so that the rack bar and the lower press plate will be moved outwardly into the position shown in FIG. 2. Upon reverse movement of the platen upwardly toward press-closing position, the crank pin 28 in engagement with the lower edge of the restraining member 30 as shown in FIG. 2, will cause the sprocket gear 27 to be turned in the reverse direction, namely clockwise in FIGS. 2 and 3, thus moving the lower press plate back into the position shown in FIG. 3. When the press plate is thus returned to the press, the crank pin 28 will have arrived in the position shown in FIG. 3, whereupon further movement upwardly of the platen will then cause the crank pin 28 to move upwardly along the stop member 30, as has been described. It will be noted that during the greater part of the movement of the platen, the crank pin 28 will move along the edge of the stop or restraining member 30 so that no movement of the lower press plate results. Consequently all of the movement of the press plate into and out of its position

in the press is effected during the movement of the platen while near its lower position.

It is of course necessary to apply force to both sides of the press plate 16 at the same time and this may be accomplished in any suitable manner. By way of example I have shown duplicate gearing and stop or restraining members at both sides of the press so that force will be applied at the same time to opposite sides of the lower press plate to move the same into and out of the press, but other connections to the two sides of the press plate may be employed if desired.

In the event that it is desired to move the upper press plate out of the press simultaneously with the movement of the lower press plate, the following mechanism may be employed as shown in FIGS. 1-5. The upper press plate 37 is guided in its movement by means of guide rollers 38 mounted on brackets 39 secured to the two side plates 10 of the press. The upper press plate is pivotally connected at its inner end at 40 to a pair of links 41 having the lower ends pivoted at 49 to an upwardly extending bracket or part 50 secured on the base of the press. These links have connected thereto near their upper ends an arm 42 by means of a pivot 44. The lower end of the arm 42 has a pin 52 which is formed to enter into notches or recesses 45 in the lower press plate 16. The links 41 have a roller 47 pivotally mounted between them in position to engage the arm 42.

The parts which have been described for moving the upper press plate 37 into an out of the press are so proportioned that when this press plate is within the press in correct position to cooperate with the lower press plate 16 when the press is closed, that it will be noted, FIG. 4, that the upper press plate 37 is supported at one end by the rollers 38 and at the other end thereof by means of the links 41. When in this position the roller 47 on the links 41 engages the arm 42 and holds the same in position in which the pin 52 at the lower end of the arm 42 is urged against slide bars 53 mounted in fixed relation to the platen. A stop 36 on the press plate 37 also limits movement of this plate to the right in FIG. 4 in closed position.

When the platen moves downwardly for opening the press, the arm 42 will be held with the pin 52 in engagement with the slide bar 53 until the recesses 45 in the lower edges of the lower press plate will move into position to receive the pin 52 of the arm 42 and when the pin is thus located during a further short downward movement of the platen the upper press plate will be moved downwardly to a slight extent to move the upper press plate out of engagement with the head of the press.

When movement of the lower press plate 16 out of the press is begun, the arm 42 swings the links 41 about the lower pivotal connection 49 with the base of the press into the position shown in FIG. 2, in which the upper press plate 37 is moved along the guide rollers 38 into a position in which the lower face of the press plate and the mold mounted thereon are readily accessible, as is also the mold or die mounted on the lower plate. It will thus be seen that the movements of the upper and lower press plates are actuated by the final movement of the platen into its lower position.

In order to facilitate the lowering of the ram when pressure fluid is discharged through the pipe 55, a pair of push back rams 57 are preferably provided which have piston rods 58 reciprocable within the pistons of the push back rams and connected at their lower ends to the platen as indicated at 60. Consequently the movement of the press plates into their outer positions is actuated by the push back rams 57 in moving the platen downwardly against any residual pressure which may be contained in the main cylinder 8. The push back rams may be mounted on the frame of the press in any suitable manner, for example, by means of a crosshead 62 secured to the upper cross member or head 11 of the press frame, by means of upwardly extending rods 63 rigidly secured to

the crosshead and to the press head in any desired manner.

In the modified construction for moving the lower press plate into and out of the press, as shown in FIGS. 6-10, I provide gear segments or levers 70 which are pivoted intermediate of their ends at 71 on the ram 9 of the press. These gear segments may be operatively connected with the lower press plate in any suitable manner and in the construction shown by way of example, the levers or gear segments have teeth 72 meshing with pinions 73 mounted on shafts or pivots 74 on which larger gears 75 are mounted, the pinions 73 and larger gears 75 being rigidly connected with each other. The gears 75 mesh with the racks 23 of the press plate.

The supplying of intermittent movement to the gears 75 is effected by actuating the gear segments 70, and this is done by means of a pin 78 on each gear segment 70 which extends into a slot 80 formed in a plate 81 secured to a stationary part of the press, such for example as a side plate 10. The slots 80 extend mainly upwardly but have lower, horizontally extending parts 82.

Bearing in mind that the gear segments 70 are connected by their pivots 71 to a vertically movable part of the press such, for example, as the ram, the up and down movement of the gear segments 70 while the pins or extensions 78 are in the vertical portions of the slots 80, will cause these pins to move up and down without turning the gear segments on their pivots 71. When the ram, during downward movement, causes the pin to move to the lower end of the upright part of the groove 80 and thus pass into the horizontal portion 82 of the slot and move therein into the position shown in FIG. 8, this causes the gear segments 70 to swing about their pivots 71 and through the pinions 73, will turn the gears 75 and move the racks 23 with which they mesh outwardly into the position shown in FIG. 8, thus causing the lower press plate to move outwardly into the position shown in FIG. 8. Upon reverse movement of the ram, each pivot 71 on which the gear segment 70 is mounted will move upwardly, and since the pin 78 is held against upward movement by the horizontal portion 82 of the slot, the gear segment 70 will be rotated in a direction to cause the press plate 16 to be moved into the press through the medium of the pinion 73, gear 75 and rack 23. After the press plate has been moved into the press during the initial, upward movement of the ram, the pin 78 will enter the vertical part of the slot 80, so that no further movement of the press plate will result.

In order to ensure accurate operation of the mechanism, the metal plate 81, which is secured to a side plate 10 of the press, has secured thereto a second plate 84, FIG. 9, with a slot identical with the slot 80, and the pin 78 extends into both of these slots. Similarly, the pivot pin 71 of the gear segment 70 extends to opposite sides of the segment, and in addition to being supported at one side of the ram 9, it is also supported on a plate 85 secured to the ram. Also the pivot 74 for the gear 75 and the pinion 73 extend into the ram 9 and the plate 85 secured thereto. Any other means for mounting the gear segment 70 and the parts associated therewith may be provided.

In cases where it is also desired to mount the upper press plate so that it also will move out of the press when the same opens, the following mechanism shown in FIGS. 6-10 may be employed. The upper press plate 90 in this construction is guided for movement on rollers 91 mounted on brackets 92 secured to the two side plates 10 of the press. The upper press plate is pivotally connected at its inner end at 93 to a link 94 which may be in the form of two links spaced apart slightly. This two piece link has its lower end pivoted at 95 on an outwardly extending bracket or part 96 secured to the base of the press. The link 94 also has pivotally connected thereto an arm 98 by means of a pivot 99. This arm 98 has pivotally secured to the lower end thereof a pair of rollers 100 mount-

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ed on a shaft or pivot pin 101. The rollers 100 roll up and down along a plate 102 mounted on the ram of the press during the time that the lower press plate is in the press. During movement of the lower press plate into and out of the press, the pivot pin 101 is in a slot or recess 103 formed in the lower press plate in which it is initially placed by the downward movement of the lower press plate and ram.

In order to hold the upper press plate in its correct relation to the lower press plate during the pressing operation, the arm 98 must move along the plate 102 in such a manner as not to shift the upper press plate. For this purpose I have provided the link 94 with a bracket 105 which has a knob or projection 106 positioned to engage the arm 98 when the same engages the plate 102. The outer end of the knob 106 may be of suitable cam shape so as to hold the arm in correct relation to the plate 102.

The operation of the mechanism shown in FIGS. 6-10 is very similar to that shown in FIGS. 1-5.

It will be understood that various changes in the details, materials and arrangements of parts which have been herein described and illustrated in order to explain the nature of the invention may be made by those skilled in the art within the principle and scope of the invention as expressed in the appended claims.

I claim:

1. In a press of the type having a platen movable toward and from a press head, that improvement which includes a frame having spaced side members, said head disposed between and connected to said side members at one end of said frame, a ram at the other end of said frame on which said platen is mounted, a pair of press plates in said frame between said platen and said press head, the lower of said press plates being horizontally slidable into and out of the press on said platen, a rack on said lower press plate, gearing mounted on said platen and cooperating with said rack to move said press plate into and out of the press, and means actuated by the movement of said platen relatively to said frame for actuating said gearing in one direction when said platen moves toward said press head and in the reverse direction when said platen moves away from said press head, said means effecting the movement of said gearing only during the lower part of the movement of said platen from said press head.

2. In a press of the type having a platen movable toward and from a press head, that improvement which includes a frame having spaced side members, said head disposed between and connected to said side members at one end of said frame, a ram at the other end of said frame on which said platen is mounted, a pair of press plates in said frame between said platen and said press head, the lower of said press plates being horizontally slidable into and out of the press on said platen, a rack on said lower press plate, gearing mounted on said platen and cooperating with said rack and including a gear having a crank arm secured thereto, and a stop member on said frame cooperating with said crank arm during portions only of the vertical movement of said platen for turning said gearing in one direction to move said lower press plate out of said press and in the opposite direction to move said press plate into the press.

3. In a press of the type having a platen movable toward and from a press head, that improvement which includes a frame having spaced side members, said head disposed between and connected to said side members at one end of said frame, a ram at the other end of said frame on which said platen is mounted, a pair of press plates in said frame between said platen and said press head, the lower of said press plates being horizontally slidable into and out of the press on said platen, gearing means on said platen and having a part extending into contact with a part on said frame for actuating said gearing in one direction to move said press plate out of the press when said platen is moving downwardly and for

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movement of said press plate into the press when said platen moves in the opposite direction.

4. In a press of the type having a platen movable toward and from a press head, that improvement which includes a frame having spaced side members, said head disposed between and connected to said side members at one end of said frame, a ram at the other end of said frame on which said platen is mounted, a pair of press plates in said frame between said platen and said press head, the lower of said press plates being horizontally slidable into and out of the press on said platen, gearing means on said platen and connected with said lower press plate to move the same into and out of said press, said gearing including a gear mounted on said platen and having a crank pin secured thereto, and a restraining member mounted on said frame and cooperating with said crank pin during a part of the movement thereof, said restraining member having a face which cooperates with said crank pin for turning said gearing, and another face which engages said crank pin for holding the same against turning said gearing during the vertical movement of said platen.

5. A press according to claim 4 and including another restraining member mounted below said first mentioned restraining member and forming therewith a slot into which said crank pin enters for imparting rotation of said gearing.

6. A press including a frame and a press head, a platen movable toward and from said press head, a ram in said frame on which said platen is mounted, a pair of press plates in said frame between said platen and said press head, the lower of said press plates being horizontally slidable into and out of the press on said platen, means for moving said lower press plate into and out of said press, the upper of said press plates being movable on said frame into and out of said press, rollers mounted on said frame for guiding the movement of said upper press plate into and out of the frame, one end of said upper press plate resting on said rollers and linkage connecting the lower press plate and supporting the other end of the upper press plate for imparting movements to the upper press plate to move the same into and out of said press in accordance with the movements of the lower press plate, said linkage swinging said upper press plate into and out of said press about said rollers.

7. A press according to claim 6 in which said linkage includes a link pivotally connected with said upper press plate in spaced relation to said rollers and pivoted on said frame, and an arm pivotally connected at its upper end to said link and having its lower end movable into engagement with said lower press plate when said lower press plate moves into and out of said press for swinging said link in a direction to move said upper press plate into and out of the press, said arm being disconnected from said lower press plate when the same is in said press.

8. A press according to claim 7, in which said link has a part engaging said arm to permit said arm to swing out of engagement with said lower press plate during movement of said lower press plate toward said upper press plate, said link also holding the lower end of said arm in position to engage said lower press plate for horizontal movement therewith.

9. A press according to claim 8, in which said lower press plate is provided in its lower face with an upwardly extending recess and said arm is provided with a pin for engagement with said recess when said lower press plate moves relatively to said platen, said pin being out of said recess when said lower press plate moves toward said upper press plate.

10. A press according to claim 6, in which said linkage comprises a link connected to said upper press plate in spaced relation to said rollers, the lower end of said link being pivotally mounted on said frame, an arm mounted on said link below its pivotal connection with said press

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plate, said lower press plate being provided with a recess adapted to receive a projection of the lower end of said arm when said lower press plate is below its upper position, said arm being movable by the horizontal movement of the lower press plate to exert pull on said link to move the same in a direction to urge said upper press plate to move along said rollers out of said press, said projection on the lower end of said arm moving out of engagement with the recess in said lower press plate when the lower press plate moves vertically for cooperation with the upper press plate.

11. A press according to claim 10 in which said link supports said arm in position to engage in said recess of said lower press plate when said lower press plate moves into a lower position.

12. In a press of the type having a platen movable toward and from a press head, that improvement which includes a frame having spaced side members, said press head being disposed between and connected to said side members at one end of said frame, a ram at the other end of said frame on which said platen is mounted, a pair of press plates in said frame between said platen and said press head, the lower of said press plates being horizontally slidable into and out of the press on said platen, gearing means on said platen and having a part extending into contact with a part on said frame for actuating said gearing in one direction to move said press plate out of the press when said platen is moving downwardly and for movement of said press plate into the press when said platen moves in the opposite direction, the upper of said press plates being movable on said frame into and out of said press, rollers mounted on said frame for guiding the movement of said upper press plate into and out of the frame, and linkage connecting the lower press plate and the upper press plate for imparting movements to

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the upper press plate to move the same in accordance with the movements of the lower press plate.

13. In a press of the type having a platen movable toward and from a press head, that improvement which includes a frame having spaced side members, said head disposed between and connected to said side members at one end of said frame, a ram at the other end of said frame on which said platen is mounted, a pair of press plates in said frame between said platen and said press head, the lower of said press plates being horizontally slidable into and out of the press on said platen, levers pivotally mounted on said ram, a stationary member having a groove in which one end of said lever engages and which is of L-shape having a vertical part in which said end of said lever may move without moving said lever about its axis, and a laterally extending part into which said end of said lever extends to swing said lever about its pivot, and means connecting the other end of said lever with said lower press plate to move the same into and out of said press, said moving means including a gear turned by said lever, and a connection between said gear and said lower press plate.

14. A press according to claim 13, in which said connection includes a rack mounted on said lower press plate and with which said gear meshes for moving said press plate into and out of said press.

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