

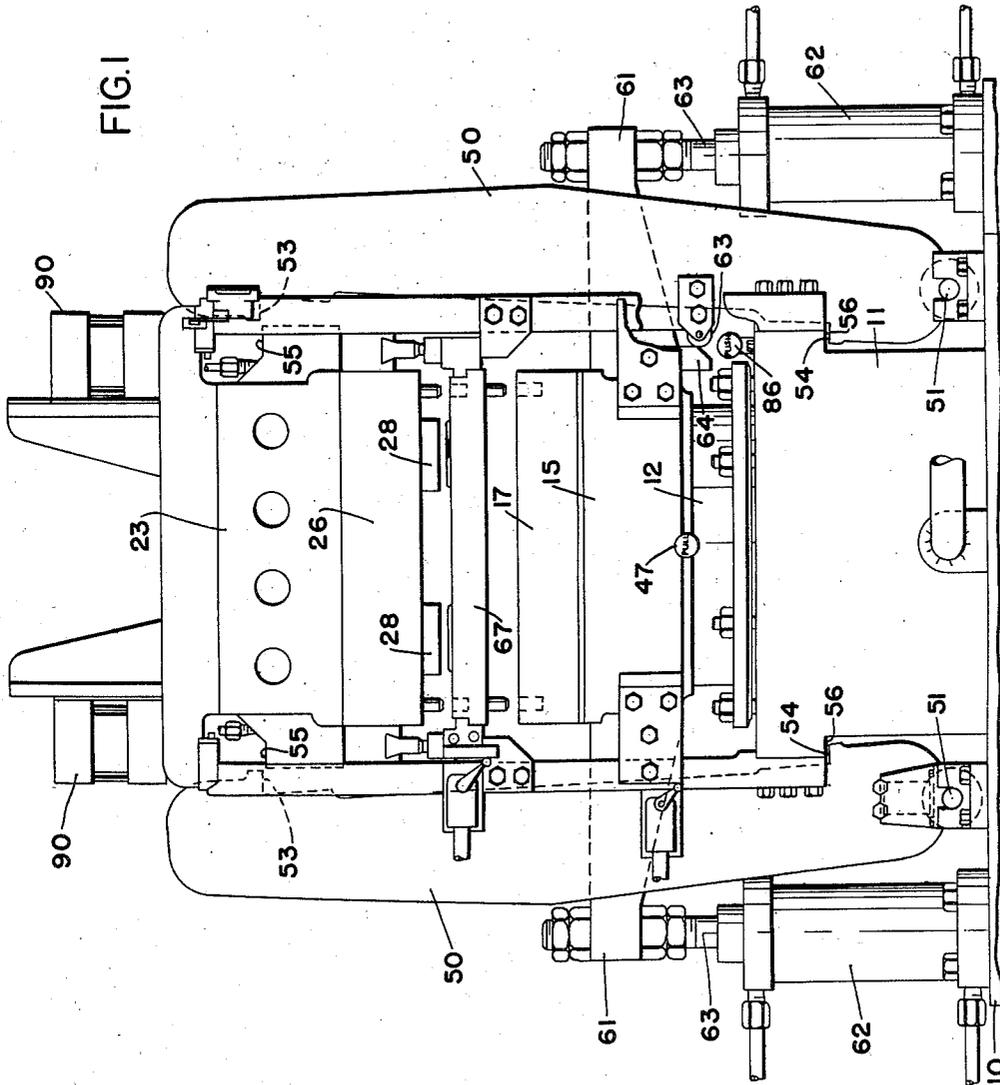
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P. H. ROSSITER  
MOLDING PRESS

2,821,747

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4 Sheets-Sheet 1



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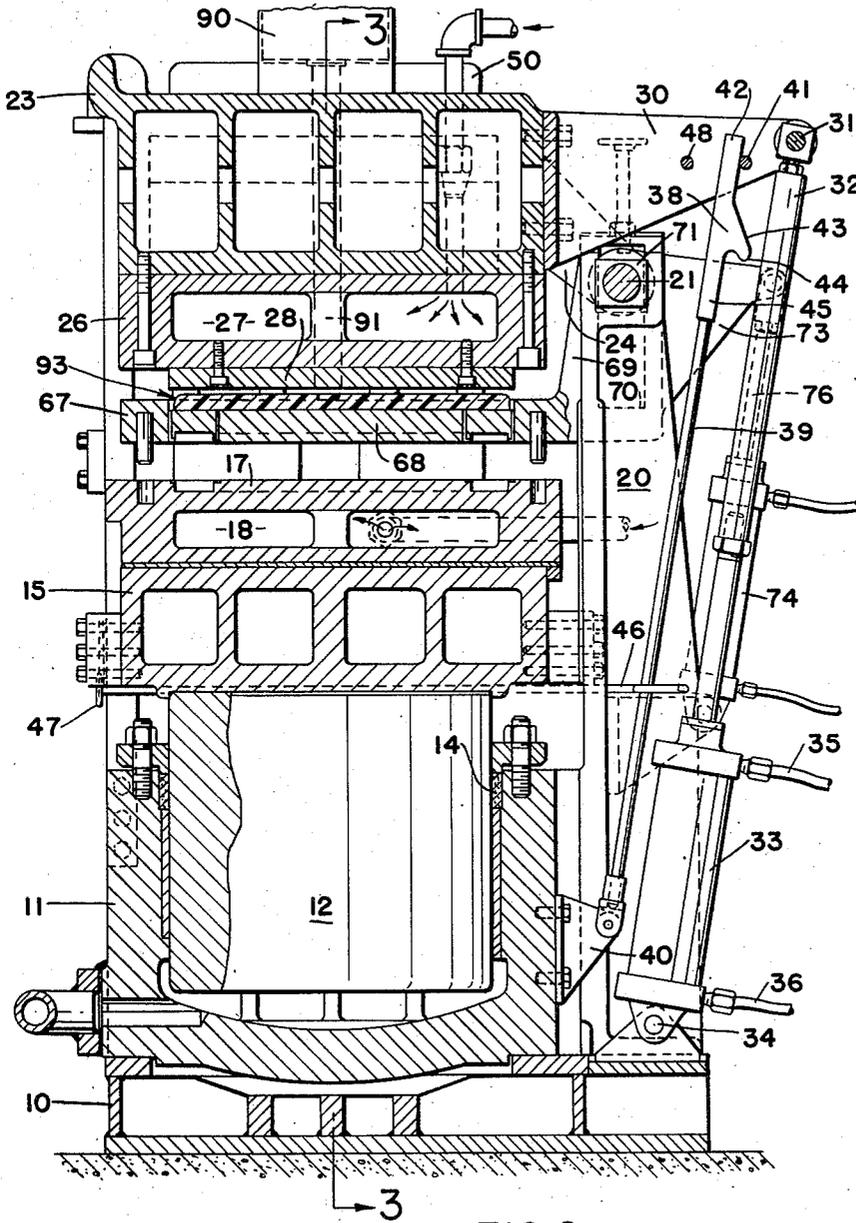


FIG. 2

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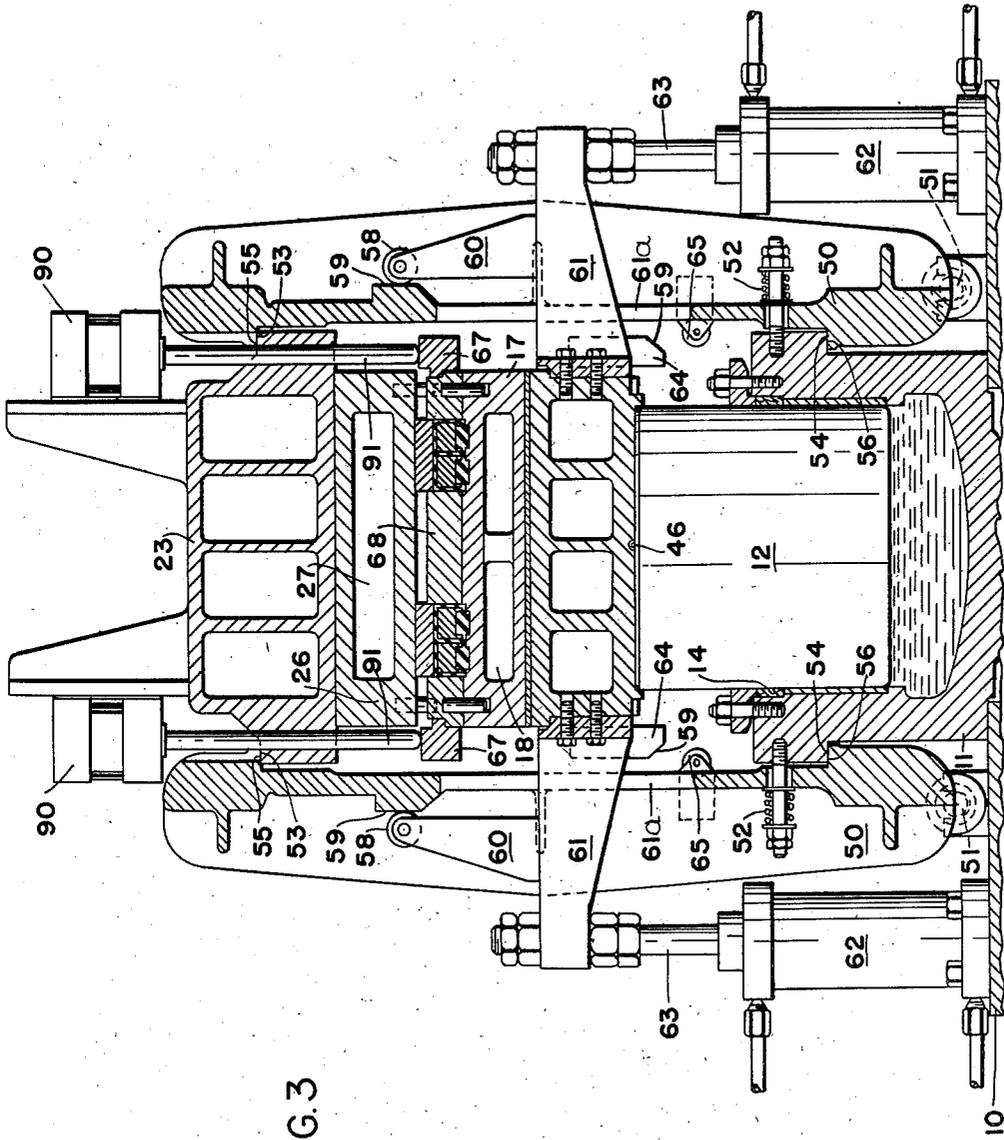


FIG. 3

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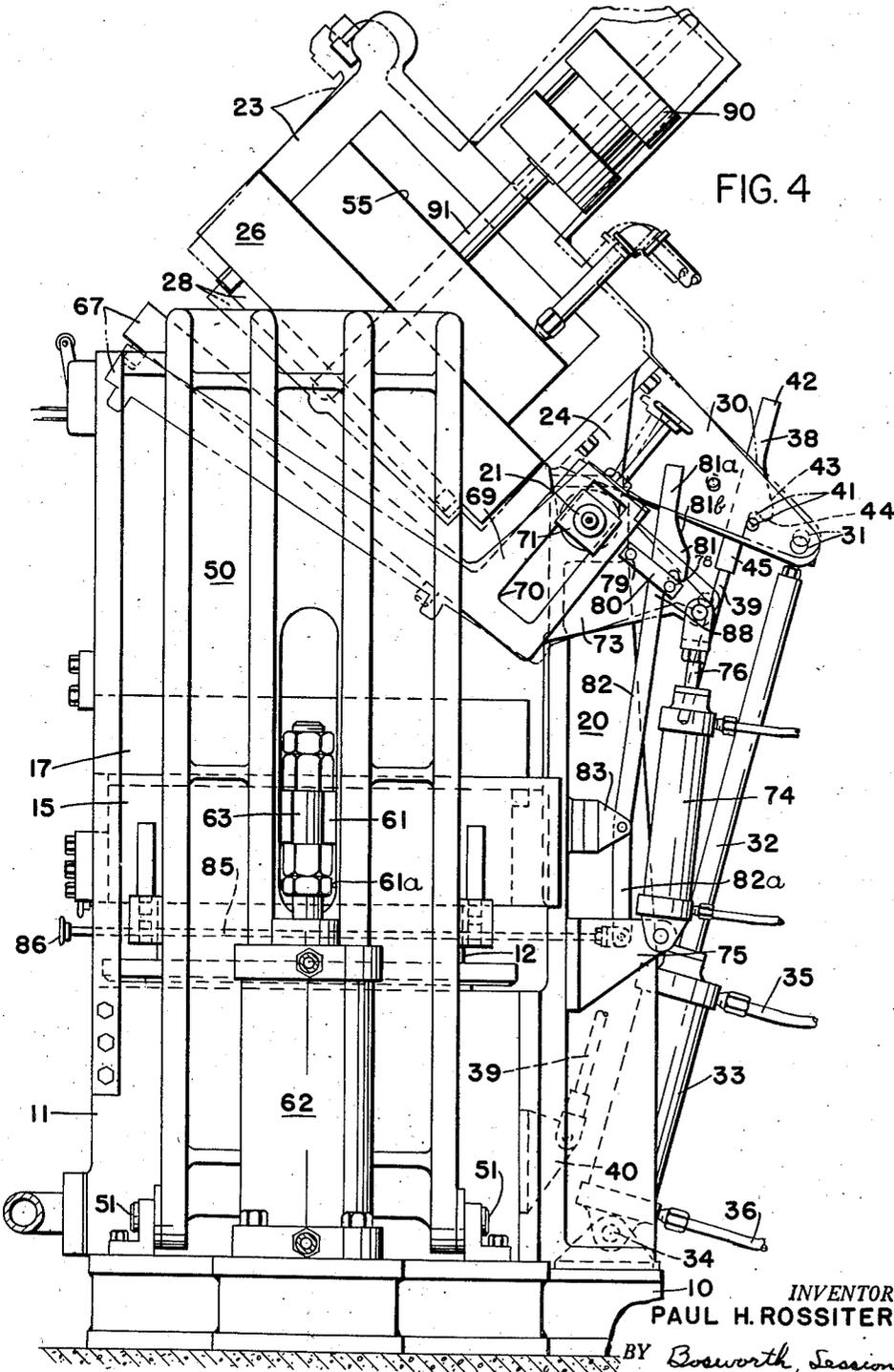
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2,821,747

MOLDING PRESS

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7 Claims. (Cl. 18—16)

This invention relates to molding presses, and more particularly to hydraulic molding presses of the tilting head type.

Hydraulic molding presses of the type embodying a lower press plate or platen supported by a ram carried by a large hydraulic cylinder, and an upper press plate or platen supported by a tilting head, with the cylinder and head secured in opposed relation by movable side clamps or plates are well known. They are widely used in molding plastics, rubber and the like, and are advantageous from the standpoint of efficient operation because the tilting head gives the operator easy access to both the upper and lower platens and makes the upper platen completely visible to the operator. The general object of the present invention is to provide an improved tilting head press embodying a tilting intermediate press plate or platen, making possible greater flexibility in operation such as the carrying out of transfer molding operations while maintaining accessibility and visibility to the operator of the upper, lower and intermediate platens. Other objects include the provision of an improved tilting head press with hydraulic operation for the intermediate platen or press plate; the provision of such a press with controls arranged for safe and efficient operation; the provision of such a press with efficient means for separating the intermediate platen from the upper platen; the provision of such a press in which the intermediate tilting platen is permitted to float vertically so that it can center itself properly between the upper and lower platens; and the provision of a sturdy, troublefree and long-lived press embodying the above characteristics.

Further objects and advantages of the invention will become apparent from the following description of a preferred form thereof, reference being made to the accompanying drawings. The essential characteristics are summarized in the appended claims.

In the drawings, Figure 1 is a front elevational view of a preferred form of press embodying the invention, showing the press in closed, but not locked, position.

Figure 2 is a side elevational view, partially in central section, of the press of Figure 1, showing the press in closed position.

Figure 3 is a vertical sectional view taken substantially as indicated by line 3—3 of Figure 2, showing the press closed and locked, and

Figure 4 is a side elevational view showing the press in open position in full lines and latched open in dotted lines.

As shown in Figures 1, 2 and 3 of the drawings, a press embodying the invention preferably includes a base 10, which may be of welded construction as shown and which supports the remaining elements of the press. The massive ram cylinder 11 is mounted centrally of the base 10 and carries the ram 12, suitable packing being provided as at 14 between the ram and the cylinder. The ram supports the movable lower platen 15. Platen 15 in turn supports the lower die 17, which is chambered

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as at 18 so that it may be heated, if desired, by steam or other fluid or electrically.

The base 10 and/or ram cylinder 11 support, at the rear of the press, a pair of uprights 20, the right hand one of which appears in Figures 2 and 4, there being an identical upright on the left hand side of the press. Uprights 20 support a horizontal shaft 21 upon which the head 23 is supported for tilting movement by means of a pair of brackets 24, only the right hand bracket being shown in the drawings. The brackets 24 project downwardly and rearwardly from either side of the head, and are supported by appropriate bearings on the shaft 21 immediately outside the uprights 20. Head 23 carries the upper platen 26 which is chambered as at 27 so that it can be heated by steam or other fluid or electrically and to which the upper die members 28 are secured.

In order to tilt the head 23 of the press from the working position shown in Figure 2 to the open position shown in Figure 4 and to return it to working position, I provide a bifurcated bracket 30 that projects rearwardly from the central portion of the head as shown in Figures 2 and 4. Bracket 30 carries a pin 31 to which the piston rod 32 of the hydraulic cylinder and piston mechanism 33 is connected; the cylinder is pivotally mounted on the base 10 as shown at 34. The cylinder and piston mechanism is double acting to insure proper control in both directions. When fluid is supplied to the cylinder through conduit 35, the piston rod is drawn downwardly, thus raising the head 23 from the closed position shown in Figure 2 to the open position shown in Figure 4. When fluid is discharged through conduit 35 and admitted through conduit 36, the head is returned to the working position shown in Figure 2.

In order to permit the loading and unloading of the press, cleaning or changing of the dies and similar operations the head 23 must be held in the open position. This is normally accomplished by maintaining the hydraulic pressure in the cylinder 33 after the head is lifted. Alternatively the head may be positively secured in the open position by a latching mechanism which also functions as a safety device to prevent the premature closing of the head 23. The latch includes a hook 38 carried on the upper end of a rod 39 which is pivoted at its lower end to a bracket 40 mounted on the ram cylinder 11. The hook 38 is adapted to engage a pin 41 mounted on the bifurcated bracket 30 and to hold the head in an open position when so engaged. The hook 38 is formed with an upwardly projecting portion 42 against which the pin 41 rests when the head is closed and a camming surface 43 upon which the pin 41 rides while the head is being opened or closed. When the head has been completely opened or tilted the pin 41 is below the lower end 44 of the hook 38 and as the camming surface 43 no longer engages the pin the rod 39 falls, to the right in the embodiment shown, so that the shank 45 of the hook rests upon the pin 41. The hook 38 may then be engaged by the pin 41, if desired, by releasing the pressure in the cylinder 33 to permit the head 23 to move downwardly a slight distance thereby raising the bracket 30 until the pin 41 is latched by the hook 38, as shown in Figure 4. When it is desired to lower the head to working position and the latch has been engaged, the hydraulic mechanism is actuated to raise the head until the pin 41 is lowered sufficiently to clear the end 44 of the hook. The rod 39 is then swung to the left by pulling control rod 46 leftwardly by means of knob 47 at the front of the press, see Figures 1 and 2. A pin 48 on bracket 30 limits the leftward movement of rod 39. The head is then lowered, the rod 39 being held to the left until pin 41 clears the end 44 of the hook, whereupon the knob 47 and rod may be released. When the head is retained in the tilted position by hydraulic pres-

sure alone the pin 41 is not engaged by the hook 38 and to lower the head it is only necessary first to move the rod 39 to the left, as viewed in the drawings, by pulling on knob 47 and hold it in that position until the pin 41 clears the end 44 of the hook.

In order to lock the head in working or closed position against the large forces exerted by the ram 12, a massive side clamp 50 is provided on each side of the press as shown in Figures 1 and 3. These are pivotally supported on the base 10 as at 51 and are resiliently urged toward the center of the press by springs 52. In order to enable the side clamps to take the forces exerted by the press, each side clamp has a downwardly facing shoulder 53 near the upper end thereof and an upwardly facing shoulder 54 near the lower end thereof. When the head 23 is locked in closed position as shown in Figure 3, shoulders 53 each engage an upwardly facing shoulder 55 on the head and shoulders 54 engage downwardly facing shoulders 56 on the ram cylinder 11, thus holding the head against the forces exerted by the ram.

The side clamps 50 are urged inwardly to locking position by means of rollers 58 that engage cam surfaces 59 on the side clamps. Rollers 58 are carried by brackets 60 projecting upwardly from laterally extending arms 61 that are secured to the lower platen 15 and project through openings 61a in the side plates (see Figure 4). Thus, as the ram 12 and lower platen are raised, the side clamps are cammed inwardly to lock the press in closed position.

In order to open the press and lower the ram rapidly after the completion of molding operation, hydraulic cylinder and piston mechanism 62 are mounted on the base 10 on opposite sides of the ram cylinder 11. The piston rods 63 of these mechanisms are secured to the arms 61, and may be actuated to pull the arms, and thus the lower platen 15 and ram 12, downwardly. Downward movement of the arms 61 disengages rollers 58 from cam surfaces 59 and continued downward movement causes cams 64, which are carried by and project downwardly below arms 61, to engage rollers 65 mounted on the side clamps 50. This engagement swings the side clamps outwardly about the pivots 51 against the action of the springs 52 and disengages the shoulders 53 from the shoulders 55 as shown in Figure 1, thus unlocking the press and permitting the head 23 to be raised to open position.

Tilting head presses embodying elements of the general type and mode of operation heretofore described are well known. The press of the present invention constitutes an improvement on the presses of the prior art in that a tiltable intermediate press plate or platen is provided between the head and the ram. The intermediate press plate is shown at 67 in the drawings and may support a stock carried die 68 for transfer molding operations as in the embodiment shown in the drawings, or may carry a die or plate of another type, depending on the nature of the operation to be performed.

In order to provide for tilting the intermediate press plate 67 while also allowing vertical movement thereof, the rear portion of the intermediate press plate is provided at each side thereof with an upwardly extending slotted bracket 69. The brackets 69 are slotted as at 70 (see Figures 2 and 4); the slots 70 slidably support bearing blocks 71 which are mounted on the horizontal shaft 21 immediately outside of the brackets 24 that support the head 23. With this arrangement the intermediate press plate can pivot about the axis of the shaft 21 while vertical movement is permitted by the sliding mounting of the bearing blocks 71 in the slots 70.

The intermediate press plate is tilted and locked in tilted position by mechanism generally similar to the tilting and locking mechanism provided for the head 23. The tilting mechanism thus includes arms 73 projecting rearwardly from the brackets 69, and a hydraulic cylinder and piston mechanism 74 associated with each arm.

The cylinders of the mechanisms 74 are pivotally mounted on brackets 75 secured to the upright 20, and their piston rods 76 are pivotally connected to the arms 73.

As with the head 23, the intermediate press plate 67 is normally held in its tilted or opened position by hydraulic pressure acting within the cylinders 74. However a latching mechanism is provided which functions both to secure positively the intermediate plate in the open position when desired and as a safety device to prevent the premature lowering thereof. The latching mechanism and safety device for the intermediate press plate includes pins 78 and 79 which are carried by arm 73 on the right hand side of the press (see Figure 4) and which support a strap 80 in spaced relationship with the arm. A hook 81, having an upward extension 81a and camming surface 81b and otherwise similar in shape and function to the hook 38, is carried by rod 82 which is pivotally mounted on one of the uprights 20 as at 83 and has a depending portion 82a extending downwardly from the mounting 83. The hook 81 is disposed in the space between the strap 80 and arm 73 and is adapted to engage the pin 78 to secure the intermediate press plate in an open position. A push rod 85 is pivotally connected to the depending portion 82a of the rod 82 and extends forwardly therefrom. A knob 86 is secured to the exposed end of the rod 85, at the front of the press, and when the knob is pressed the hook 81 is moved in a counter clockwise or leftward direction as viewed in the drawings. The operation of the intermediate press plate latch is similar in all respects to the latch for the head 23 except that whereas the head is freed for lowering by pulling on the knob 47, the intermediate press plate is freed by pushing on the knob 86. Accordingly the intermediate press plate is not latched in the open positions unless the press plate is first lowered slightly after the pin 78 has traveled below the end 87 of the hook 81 and the shank 88 thereof has fallen against the pin.

To lower the intermediate plate when it is latched open it is first necessary to actuate the cylinder mechanism to raise the intermediate plate to lower the pin out of engagement with the hook 81, after which the knob 86 is pushed in to move the hook to the left and the cylinder mechanism is then actuated to lower the intermediate plate. When the intermediate plate is held open by hydraulic pressure it may be lowered simply by pushing the knob 86 to displace the hook 81 leftward and then actuating the cylinder mechanism 74 to lower the plate. The pin 79 also limits the leftward movement of the hook 81.

In many rubber and plastic molding operations there is a tendency for the die parts to stick together after the molding operation. In presses made according to the present invention, lowering the lower platen by means of cylinders 62 separates the lower die 17 from the die 68 carried by the intermediate press plate when the intermediate press plate reaches the lower limit of the vertical movement permitted by the slots 70. In order to disengage the die 68 from the die members 28 carried by the upper platen, double acting fluid pressure cylinders 90 are mounted on the top of the head 23. Cylinders 90 have pistons which actuate piston rods 91 that project through suitable openings in the head 23 and engage the intermediate press plate 67 as shown in Figure 3. Actuation of the cylinders to move the piston rods downwardly separates the die 68 from the die members 28. The piston rods 91 are then retracted so that the press can be closed for the next operation.

To summarize the operation of the press in a transfer molding operation, assuming the press to be in the open position, the knob 86 is pushed to move the rod 82 to the left and the cylinders 74 are actuated to bring the intermediate press plate into a substantially horizontal position. Then the so-called biscuit stock is positioned on the stock carrier die 68 as indicated at 93 in Figure 2. Following this, the knob 47 is pulled to move the

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rod 39 leftward and release the head 23 and the piston rod 32 of the cylinder 33 is moved upwardly to lower the head 23 to the horizontal position shown in Figure 2.

When the head is in horizontal position, the dual cylinders 62 are moved upwardly and the ram cylinder 11 is supplied with fluid under pressure to push the ram 12 and the lower platen 15 upwardly and to swing the side clamps 50 inwardly by means of the rollers 58 and the cams 59. Continued upward movement of the ram 12 results in the forming of the product, the die members 28 on the upward platen forcing the stock through appropriate apertures in the die member 68 and into the die cavities in which the product is molded. The die sections are caused to register properly in conventional fashion by means of appropriate pins and recesses.

The stock is then cured according to the requirements of the compound, steam or other heating media being ordinarily supplied to the die members. After the compound has cured for the specified length of time, the pressure in the ram cylinder 11 is released and the side cylinders 62 are actuated to move the lower platen downwardly and to swing the side clamps 50 outwardly to release the head 23, this action being accomplished by the cams 64 and rollers 65. This motion separates the lower platen from the intermediate press plate, inasmuch as the vertical motion of the intermediate press plate is limited by the length of the slots 70. Thereafter, the head is moved to open position by means of cylinder 33. If necessary, the cylinders 90 are actuated to force the intermediate press plate 67 away from the upper platen, preferably as the head is being tilted to open position. The intermediate press plate is then raised to the open position shown in Figure 4 by means of the cylinders 74 whereupon the molded products can be removed, and residue of the biscuit remaining in the upper portion of the die member 28 may be removed and the die cavities cleaned. The press is then ready for another cycle of operation. The head and intermediate press plate may be locked in the open position, as shown in dotted lines in Figure 4, when and if desired, and when so locked the respective hooks 81 and 38 must be disengaged by first raising the intermediate plate or head before the same can be lowered, all as hereinbefore described.

The operation of the hydraulic cylinders is preferably controlled by push button controls, appropriate limit switches being provided to stop the movement of the parts in the proper locations.

It will be understood by those skilled in the art that the press of the present invention may be adapted to molding operations of various types other than that described herein. The press is advantageous because of the flexibility of its operation, the ready accessibility of the die members, and the safety and convenience of operation. The press is substantially foolproof in operation and is of sturdy and durable construction.

Those skilled in the art will appreciate that various changes and modifications in the preferred form of the invention described herein may be made without departing from the spirit and scope of the invention.

I claim:

1. A tilting head press comprising a base, a ram cylinder supported by the base, a ram in the cylinder, a lower platen carried by the ram, hydraulic cylinders for lowering said lower platen, an upright extending upwardly from the base, a head supported for tilting movement on said upright, side clamps for releasably securing the head in operative position, fluid pressure cylinder means for controlling the tilting of said head, an intermediate press plate disposed between said lower platen and said tilting head and supported for limited vertical and tilting movement on said upright, fluid pressure cylinder means for controlling the tilting of said intermediate press plate, and power means carried by said head for separating said intermediate press plate from said head and said lower platen.

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2. A tilting head press comprising a base, a ram cylinder supported by the base, a ram in the cylinder, a lower platen carried by the ram, an upright extending upwardly from the base, a horizontal shaft carried by said upright, a head supported for tilting movement on said upright, side clamps for releasably securing the head in operative position, fluid pressure cylinder means for controlling the tilting of said head, latch means for securing said head in an open position, an intermediate press plate disposed between said lower platen and said tilting head and supported for limited vertical and tilting movement on said upright, fluid pressure cylinder means for controlling the tilting of said intermediate press plate, and latch means for securing said intermediate press plate in open position.

3. A tilting head press comprising a base, a ram cylinder supported by the base, a ram in the cylinder, a lower platen carried by the ram, an upright extending upwardly from the base, a horizontal shaft carried by said upright, a head supported for tilting movement by said shaft, side clamps for releasably securing the head in operative position, fluid pressure cylinder means for controlling the tilting of said head, latch means for securing said head in an open position, an intermediate press plate disposed between said lower platen and said tilting head and supported for limited vertical and tilting movement on said horizontal shaft, fluid pressure cylinder means for controlling the tilting of said intermediate press plate, latch means for securing said intermediate press plate in an open position, and power means for separating said intermediate press plate from said head and said lower platen, said power means comprising a pair of fluid pressure cylinders mounted on top of said tilting head and having piston rods extending through said head into engagement with said intermediate press plate.

4. A tilting head press comprising a base, a ram cylinder supported by the base, a ram in the cylinder, a lower platen carried by the ram, an upright, a tilting head supported by the upright, side clamps for releasably securing the head in operative position, fluid pressure cylinder means for controlling the tilting of said head, an intermediate press plate disposed between said lower platen and said tilting head, means for mounting said intermediate press plate for limited vertical and tilting movement, means for controlling the tilting of said intermediate press plate, power means for separating said intermediate press plate from said lower platen and power means for separating said intermediate press plate from said head.

5. A tilting head press comprising a base, a ram cylinder supported by the base, a ram in the cylinder, a lower platen carried by the ram, a hydraulic cylinder for lowering said lower platen, an upright, a tilting head supported by the upright, side clamps for releasably securing the head in operative position, fluid pressure cylinder means for controlling the tilting of said head, an intermediate press plate disposed between said lower platen and said tilting head, means for mounting said intermediate press plate for limited vertical and tilting movement, said means comprising a horizontal shaft supported by said upright, brackets at the rear end of said intermediate press plate having slots therein, and bearing blocks slidably mounted in said slots and on said shaft, said slots limiting downward movement of said intermediate press plate so that downward movement of said lower platen by said cylinders separates said lower platen from said intermediate press plate, means for controlling the tilting of said intermediate press plate, and power means for separating said intermediate press plate from said head.

6. A tilting head press comprising a base, a ram cylinder supported by the base, a ram in the cylinder, a lower platen carried by the ram, hydraulic cylinders for lowering said lower platen, an upright, a tilting head supported by the upright, side clamps for releasably securing the head in operative position, fluid pressure cylinder means

for controlling the tilting of said head, latch means for securing said head in an open position, an intermediate press plate disposed between said lower platen and said tilting head, means for mounting said intermediate press plate for limited vertical and tilting movement, said means comprising a horizontal shaft supported by said upright, brackets at the rear end of said intermediate press plate having slots therein, and bearing blocks slidably mounted in said slots and on said shaft, said slots limiting downward movement of said intermediate press plate so that downward movement of said lower platen by said cylinders separates said lower platen from said intermediate press plate, means for controlling the tilting of said intermediate press plate, latch means for securing said intermediate press plate in an open position, and power means carried by said tilting head for separating said intermediate press plate from said head.

7. A tilting head press comprising a base, a ram cylinder supported by the base, a ram in the cylinder, a lower platen carried by the ram, hydraulic cylinders for lowering said lower platen, an upright, a tilting head supported by the upright, side clamps for releasably securing the head in operative position, fluid pressure cylinder means for controlling the tilting of the head, latch means for securing said head in an open position, an intermedi-

ate press plate disposed between said lower platen and said tilting head, means for mounting said intermediate press plate for limited vertical and tilting movement, said means comprising a horizontal shaft supported by said upright, brackets at the rear end of said intermediate press plate having slots therein, and bearing blocks slidably mounted in said slots and on said shaft, said slots limiting downward movement of said intermediate press plate so that downward movement of said lower platen by said cylinders separates said lower platen from said intermediate press plate, means for controlling the tilting of said intermediate press plate, latch means for securing said intermediate press plate in an open position, and power means for separating said intermediate press plate from said head, said means comprising a pair of fluid pressure cylinders mounted on top of said tilting head and having piston rods extending through said head into engagement with said intermediate press plate.

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