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APPARATUS FOR BUMPING PLATEN PRESSES

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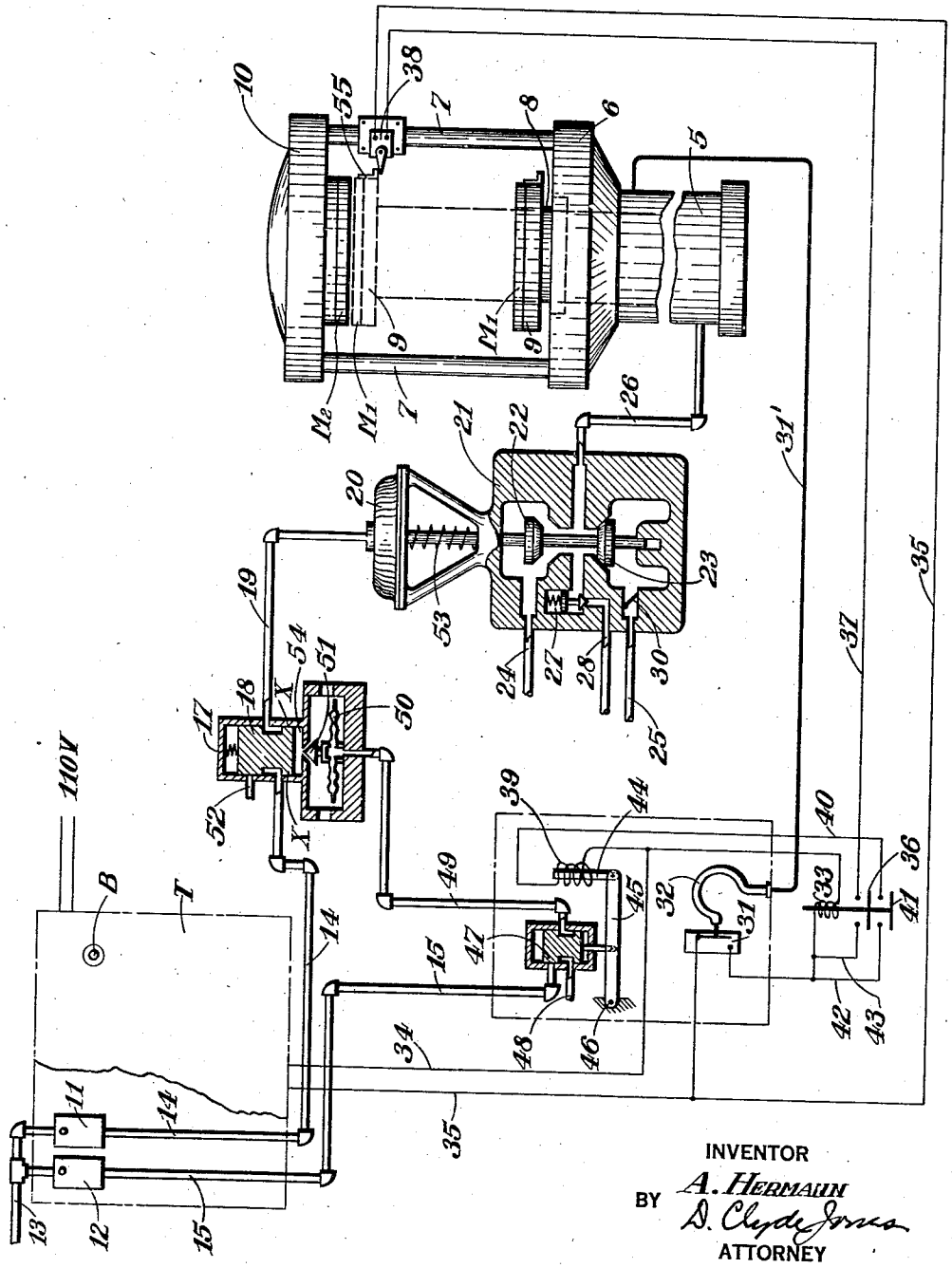

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APPARATUS FOR BUMPING PLATEN PRESSES

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2 Claims. (Cl. 18—16)

This invention relates to an arrangement for controlling the operation of a press utilized in molding or treating rubber or other plastic materials.

In the operation of such a press, it has been found desirable after initially closing the mold sections thereof to "bump" the press, that is, to open these sections slightly for one or more short intervals of time in order to permit the escape of entrapped air or to permit a rearrangement of the stock in the mold, as generally disclosed in the patent to Winegar 2,222,732, patented November 26, 1940.

The present invention has for its purpose an improvement in the arrangement disclosed in that patent whereby the bumping operation will be insured even under extremely adverse conditions.

In the drawing, there is illustrated a conventional form of hydraulic press comprising a base 5 having a deck 6 and a top plate 10 held in rigid spaced relation by means of pillars 7. Within the base there is mounted the plunger 8 of an hydraulic ram provided with a suitable head 9, the plunger with its head being movable hydraulically from its full line position to its dotted line position. As herein illustrated, the plunger is elevated first by a low pressure liquid of the order of 80 to 150 lbs. sq. in. pressure to substantially its final position wherein high pressure liquid of the order of 1000 to 2000 lbs. sq. in. pressure is applied to the plunger 8 to insure closure of the molds. The application of this low pressure liquid followed by the application of the high pressure liquid is controlled by a pneumatically operated valve, the construction of which will best be understood from the description of the operation of the system.

In the operation of such a press, it is customary to employ a time cycle device T which automatically controls the sequence as well as the duration of the several operations of the press, namely, the closure of the press, the duration of the bumping cycle, the duration of the closure of the press.

With this brief description of the apparatus, the present invention will best be understood by describing a portion of the operation of the system. The operator depresses a push button B provided on the timer T to initiate the operation of the timer including the opening of the air relay valve 11 which extends the air supply in the pipe 13 to the pipe 14. The depression of the push button B also completes a circuit (not shown) for the timing motor (not disclosed) which measures the various time periods in the cycle of operations controlled by the motor. The timer during its "bumping" period opens the valve 12 to extend the air supply pipe to the pipe 15. However, at the conclusion of this "bumping" period, the timer will close the valve 12 to cut off the air supply from the pipe 15. As soon as the air supply is opened into the pipe 14, this air pressure is extended through the relay valve 17 since its plunger 18 is normally in a position to permit the compressed air to pass to the pipe 19 and thence to the diaphragm motor top 20 of the valve 21. The application of this compressed air to the diaphragm motor 20 moves the valve discs 22 and 23 to their alternate position from that shown. The valve disc 22 thus engages its seat to prevent the fluid within the ram from draining away through the pipe 24 while valve disc 23 is unseated so that the low pressure source of liquid 25 flows from pipe 25 through the pipe 26 into the ram. This elevates the plunger 8 and its head 9 until the head closes mold sections M1, M2. The pressure then builds up in the pipe 26 until the valve 27 is opened to connect high pressure liquid in the pipe 28 to the pipe 26 leading to the ram. The application of this high pressure causes the ram head to apply high pressure to the mold sections. It will be noted that the check valve 30 in the main valve 21 prevents high pressure fluid from flowing back into the low pressure pipe 25. When the high pressure fluid is applied to the ram, as just described, this pressure is communicated through the conduit 31' to the C spring 32. This spring tends to unwind and by so doing closes the switch 31. As soon as this switch is closed, the solenoid 33 is operated in a circuit extending from the power lead 34, winding of the solenoid 33, contacts of the switch 31, now closed by the C spring 32, to the other conductor 35 of the power line. The solenoid 33 when thus operated closes a locking circuit for itself traceable from the power lead conductor 34, winding of the solenoid 33, the armature 36 and front contacts of this solenoid, conductor 37 through the contacts of a limit switch 38, now closed, to the power conductor 35. It should be mentioned that the switch 38 is normally closed and is opened only when the ram head moves downward from its position shown in dotted lines. It should be understood that the limit switch 38 is adjustable to various vertical positions so that the amount of opening of the press during the bumping cycle can be adjusted at will. Also when the relay 33 is operated, it closes a circuit for operating the solenoid 39 of the solenoid-actuated valve, which circuit extends from

the power lead 34, winding of the solenoid 33, conductor 40, armature 41, and front contacts of the solenoid 33, conductors 42 and 43, front contacts and armature 36 of solenoid 32, conductor 37 through the contacts of the limit switch 38, still closed, to the power lead 35. The solenoid 39 is thus energized and attracts its core 44 upward. This swings the lever 45 about its pivot 46. As a result of this movement, the plunger 47 of the valve is moved to the position wherein it closes the opening to the drain pipe 48 and extends the pipe 15 to the pipe 49 leading to the capsular chamber 50 of a pilot valve. Consequently, when the timer opens valve 12 during the "bumping" period, compressed air will be applied to chamber 50. As a result of this application of compressed air, the chamber 50 expands and elevates the valve disc 51 against its seat. Compressed air from pipe 14 leaks past the plunger 18 at X into space 54 where it forces this plunger upward into a position wherein it closes the opening from the pipe 14 cutting off the air supply to main valve 21 and connects the pipe 19 to the vent 52. Compressed air is thus drained away from the diaphragm motor 20 of the main valve 21. The spring 53 of this valve elevates the valve discs 22 and 23 to the position illustrated. The hydraulic liquid thereupon starts to flow away from the ram so that the ram head starts to descend from its dotted line position. This head as it descends moves its lug 55 to open the switch 38. The opening of this switch interrupts the locking circuit of the solenoid 33 so that it deenergizes. On the deenergization of the solenoid 33, solenoid 39 has its operating circuit interrupted so that its core 44 and the lever 45 descend moving the valve plug 47 to the position shown. The compressed air which previously had been applied through pipes 15 and 49 to the capsular chamber 50 leaks away through the vent 48. The chamber 50 contacts to withdraw the valve disc 51 away from its seat. This causes the valve plug 18 to move to its position wherein compressed air is again applied through the pipes 14 and 19 to the motor diaphragm 20 of the valve 21. This valve will move its valve discs 22 and 23 to their alternate positions from that shown, all as previously described. Low pressure hydraulic fluid through the pipe 25 will be applied to the ram to elevate the ram head as before. Then when the ram head is in engagement with the mold sections high pressure hydraulic fluid in the pipe 28 will be applied to the ram. As soon as this high pressure hydraulic fluid is applied to the ram, this high pressure will be communicated through the conduit 31 to the C spring 32. Spring 32 closes the switch 31 which causes the operating mechanism to repeat the bumping operation, all as previously described. The number of times that the press is closed and then opened to constitute each bumping operation can be determined at will by the operation of the timer. The duration of this bumping period, as previously mentioned, is governed by the length of the interval during which the timer maintains the relay valve 12 open to connect compressed air from the supply pipe 13 to the pipe 15. It will be understood that at the conclusion of the bumping interval, the relay 12 will close to shut off the supply of compressed air from the pipe 15 whereby the bumping means is disabled. The remainder of the operation of the press will be the same as described in the mentioned Winegar patent and need not be repeated here.

What I claim is:

1. In a press, the combination of a pair of opposed press parts relatively movable toward and away from each other, a motor operated by the application of pressure fluid thereto for closing said parts and operated by the exhausting of pressure fluid therefrom for opening said parts, means including a main valve operable to alternate positions for applying to and for exhausting pressure fluid from said motor, a limit switch operated by the opening of said press parts to a predetermined position, a fluid pressure operated switch closed in response to a predetermined value of the pressure fluid in said motor and opened in response to a lower pressure of the fluid in said motor, mechanism including a solenoid valve for moving said first valve to its exhaust position, an operating circuit for the solenoid of said valve completed in response to the closure of both of said switches, said limit switch on operation serving to interrupt said circuit whereby said solenoid valve and the mechanism of which it is a part, operate the main valve to the position in which it reapplies pressure fluid to said motor, and means for rendering said mechanism inoperative and thus maintain the press closed.

2. In a press, the combination of a pair of opposed press parts relatively movable toward and away from each other, a motor operated by the application of pressure fluid thereto for closing said parts and operated by the exhausting of pressure fluid therefrom for opening said parts, means including a main valve operable to alternate positions for applying to and for exhausting pressure fluid from said motor, a normally closed limit switch opened by the opening of said press parts to a predetermined position, a fluid pressure operated switch closed in response to a predetermined pressure of the pressure fluid in said motor and opened in response to a pressure of the fluid in said motor below said predetermined pressure, mechanism including a solenoid valve for moving said first valve to its exhaust position, an actuating circuit for the solenoid of said valve, a relay operating to complete said actuating circuit, a primary circuit for said relay completed by the closure of said pressure fluid operated switch and a maintaining circuit for said relay completed at said limit switch, said limit switch on operation serving to interrupt said maintaining circuit whereby said solenoid valve and the mechanism of which it is a part, operate the main valve to the position in which it reapplies pressure fluid to said motor, and means for rendering said mechanism inoperative and thus maintain the press closed.

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