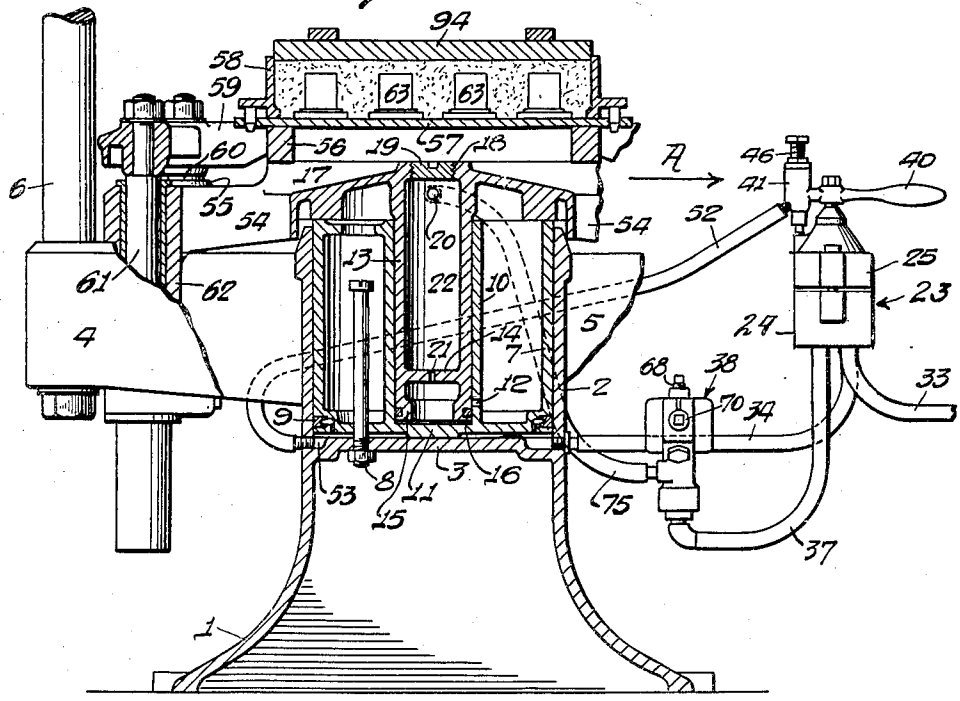
Dec. 14, 1937. W. H. NICHOLLS ET AL 2,102,377

JOLTING AND SQUEEZE CONTROL FOR MOLDING MACHINES

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Fig. 1.



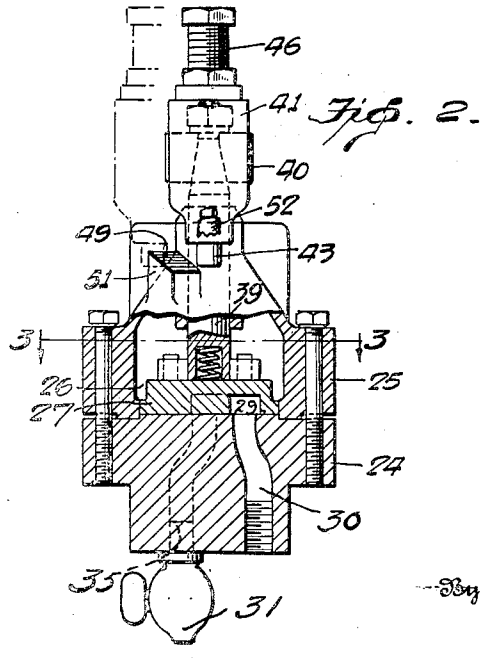


Fig. 2.

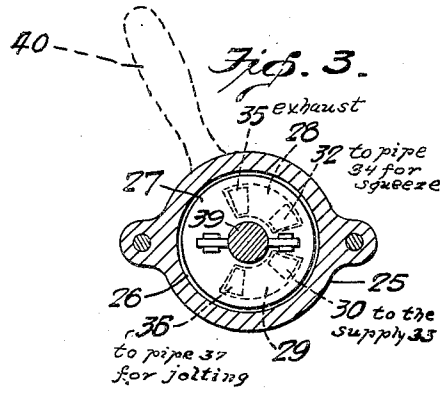


Fig. 3.

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Fig. 4.

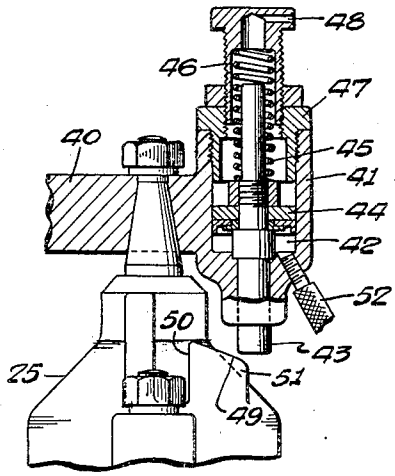


Fig. 5.

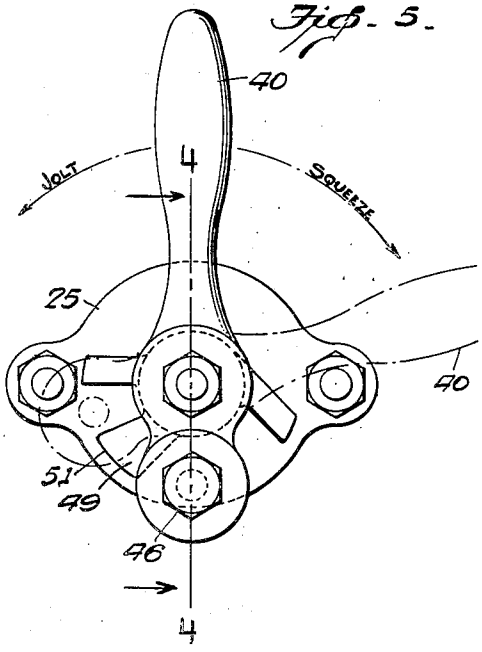


Fig. 6.

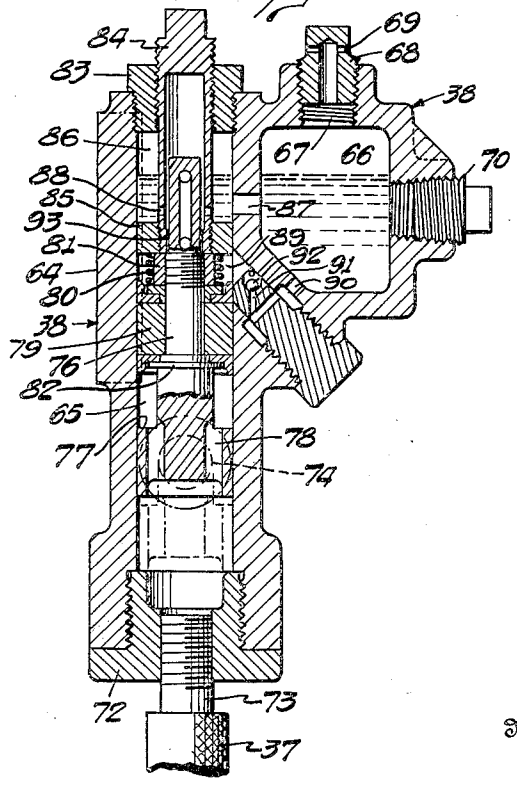
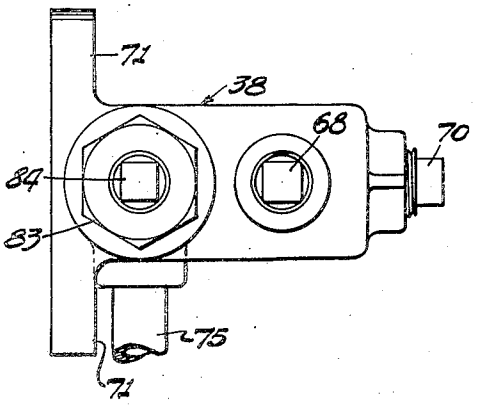


Fig. 7.



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2,102,377

UNITED STATES PATENT OFFICE

2,102,377

JOLTING AND SQUEEZE CONTROL FOR MOLDING MACHINES

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Application November 22, 1935, Serial No. 51,144

8 Claims. (Cl. 22—45)

The invention relates to molding machines of the type provided with fluid pressure operated jolting, squeezing and pattern drawing means.

More particularly, the invention has special reference to the variety of molding machines disclosed in Patent No. 1,676,662 granted to W. H. Nicholls July 10th, 1928 which in turn is an improvement over the machine forming the basis of an earlier prior Patent No. 1,472,807 to W. H. Nicholls dated November 6th, 1923. In this type of device there is provided a manually controlled fluid pressure operated mechanism for imparting a series of jolts to the mold flask for packing the sand therein closely around the pattern. There is also provided a similarly operated squeeze means for applying a heavy pressure to the mold flask for compacting or densifying the sand therein in order to improve the quality of the molds. Moreover, the squeeze mechanism acts, when fluid pressure thereon is relieved, to draw the patterns from the mold. In the use of such machines it has been the practice to leave to the operator's judgment the question of the number of jolts to be applied and in some instances it may frequently occur that, through haste or carelessness, an insufficient number of jolts may be given the flask. Then again if the operator is in a hurry it is easily possible for him to release the fluid pressure operated squeeze means before the pressure therein has built up to the maximum. Either of these contingencies will naturally result in producing molds which are not uniform in density or compactness and this is naturally a serious drawback.

It is with the above facts and conditions in view that we have devised the present invention which has for its principal object the provision of a control means which may be set in advance and which will automatically govern the number of jolts applied to the flask so that as long as the initial setting remains the same all the molds of a series will be subjected to the same jolting action instead of this being left to the discretion or care of the operator.

A more specific object of the invention is to provide an automatic jolt control comprising a fluid pressure operated hydraulic type of valve for timing the duration of the supply of fluid pressure to the jolting mechanism, an adjustment being moreover provided whereby the time element may be regulated for varying the number of jolts applied to the flask.

Another important object of the invention is to provide an automatic means for preventing the release of the fluid pressure in the squeeze mechanism until the pressure therein has built up to the maximum whereupon a retaining latch on the control valve is released enabling the valve to be moved to neutral position, thereby insuring the application of the same squeeze pressure to all of the flasks in a series.

An additional object is to provide the above mentioned automatic control means which is well adapted to be built into and to form a part of molding machines embodying the same general principles as disclosed in said prior patents above referred to though it is to be understood that this is not limitative as the same mechanism can be applied to other molding machines incorporating fluid pressure jolt and squeeze means, it being moreover a feature that this automatic control could be installed as an adjunct to already existing machines without difficulty particularly as our control devices are simple and inexpensive to make and apply.

To the attainment of the foregoing and other objects and advantages, the invention preferably consists in the details of construction and the arrangement and combination of parts to be hereinafter more fully described and claimed, and illustrated in the accompanying drawings in which:

Figure 1 is a view mostly in vertical section through a molding machine of the type shown in said prior Patent No. 1,676,662, certain parts being broken away, and the automatic control means being shown in side elevation,

Figure 2 is a view partly in elevation and partly in section showing the manual control valve, and looking at it in the direction of the arrow A in Figure 1,

Figure 3 is a cross section therethrough taken on the line 3—3 of Figure 2,

Figure 4 is a fragmentary elevation of the manual valve with the automatic squeeze control means shown in section, the view being taken on the line 4—4 of Figure 5, with the valve body in section,

Figure 5 is a plan view of the manual valve,

Figure 6 is a vertical section through the automatic timing or jolt control valve,

Figure 7 is a plan view thereof.

Though said prior Patent No. 1,676,662 speaks for itself, yet, for the sake of clearness, following is a description of the general construction in order to explain more fully the functions and advantages of the automatic control means forming the subject matter of the present invention.

Referring more particularly to the drawings, the numeral 1 designates the base of the machine

which is formed at its upper end with a relatively large vertical cylinder 2 open at its upper end and closed at its lower end by a horizontal wall 3. Formed integrally with the cylinder 2 and base 1 are laterally extending horizontal arms 4 and 5, the latter being shown as broken away inasmuch as it is a duplicate of the former. The arm 4 carries an upstanding post 6 which serves as a support for a pressure head, not shown in the present instance. In the cylinder 2 is fitted a large squeeze piston 7 closed at its lower end and open at its upper end. This squeeze piston is movable within the cylinder 2 in a vertical direction and its upward movement is limited as by a headed bolt 8 rigidly mounted in the bottom wall 3 of the cylinder and extending through a hole in the bottom wall of the piston. To prevent leakage the squeeze piston is provided with a packing ring 9 located near its lower end and bearing against the inner wall of the cylinder 2.

Formed integrally at the center of the bottom wall of the squeeze piston 7 is a relatively small vertically arranged cylinder 10 which extends the entire height of the squeeze piston 7. The upper end of the small cylinder 10 is open and its lower end is closed by the bottom wall 11 of the squeeze piston and a short distance above its bottom this cylinder 10 is formed with an exhaust port 12, of liberal size, which places the lower portion of the cylinder 10 in communication with the interior of the surrounding portion of the squeeze piston and thence with the atmosphere. Fitting within the cylinder 10 is a hollow, cylindrical jolt plunger 13 which is vertically elongated, its length being greater than the height of the cylinder 10. Adjacent its lower end the plunger is formed with a transverse wall 14, the cylindrical wall of the plunger extending below said transverse wall in the form of an annular skirt or flange 15 which is provided near its lower end with a packing ring 16 bearing against the inner surface of the cylinder 10 to form a fluid-proof joint. Formed integrally with the upper end of the jolt piston is a jolt and squeeze head 17 which rests upon the upper end of and closes the squeeze piston and which also closes the upper end of the jolt piston except for a central threaded opening 18 which is closed by a plug 19 screwed thereinto.

The piston is formed adjacent its upper end with a charging port 20 of generous size and has its cross wall 14 formed with a port 21 of much less size than the ports 12 and 20. The plunger, with its end walls, defines an air reservoir 22 which extends throughout the greater portion of the length of the plunger and therefore has considerable volume. This reservoir is closed except for the ports 20 and 21. The port 21 admits air from the reservoir 22 into the expansion space at the lower end of the cylinder 10, below the plunger, and said port will be referred to as the admission port. The cross wall 14 of the plunger and the skirt or flange below the same will form a piston head for the plunger.

The supply of compressed air to the jolt and squeeze pistons is controlled by a manually operable valve 23 which is represented as mounted in the lateral arm 5, broken away in the drawing. In many respects this valve is of the same type as that shown in said Patent No. 1,472,807 though, for the sake of clearness, the description thereof is as follows. This valve is represented as consisting of a base 24 and a casing 25 mounted thereon and forming a valve chamber 26. In the valve chamber is mounted a rotatable flat valve or disk 27 having two arcuate concentric passages 28 and 29 in its undersurface. The base is formed with a supply port 30 connected to an air supply by means of a pipe 33. A pipe 34 connects the lower end of the squeeze cylinder 2 with a squeeze supply port 32 while connected with a port 36 is a pipe 37 for supplying air pressure to the port 20 of the jolting piston, there being, however, interposed the automatically hydraulically acting jolting control valve indicated as a whole by the numeral 38 and which will be hereinafter more fully described. The numeral 35 designates an exhaust port which may have connected therewith a small manual valve 31 which can be set to regulate the rate of exhaust.

The rotary valve 27 is connected to a stem 39 by any suitable means and said stem is provided at its upper end with an operating handle 40. By rotating the valve to the desired position, air or other fluid under pressure may be admitted to operate the jolt piston or the squeeze piston or to exhaust the air from beneath the squeeze piston. In the position shown in Figure 3 the ports are arranged to admit air from the supply port 30, passage 29, port 36 and pipe 37 to the automatic control valve 38 and thence to the jolt piston, this figure showing the squeeze piston cylinder as open to the atmosphere through the exhaust port 35. A partial rotation of the valve clockwise will connect the air supply from the port 30 through the passage 28 and port 32 to the squeeze piston. After the squeeze operation, partial rotation of the valve counterclockwise will bring it to its neutral position and connect the squeeze piston and port 32 through the passage 28 to the exhaust port 35 the supply and jolt piston ports being closed.

The respect in which the valve 23 differs from what is disclosed in said prior Patent No. 1,472,807 is the provision on the valve 23 of automatically acting means to prevent the exhausting of the air from beneath the squeeze piston before the pressure has reached the maximum. To accomplish this there is provided on the handle 40 a hollow extension formed as a casing 41 having a chamber 42 therein and containing a vertically slidable latch plunger 43 on the intermediate portion of which is secured a piston 44 located within the chamber 42 and urged downwardly by a coil spring 45 surrounding the upper portion of the latch plunger and abutting within a chambered plug 46 which is threadedly adjustably connected with a bushing 47 screwed into and closing the top of the chamber 42. The plug 46 has an outlet 48 to the atmosphere to prevent compression of air in the chamber above the piston 44. When the handle 40 is moved into the squeeze position the latch plunger 43 will ride up over the inclined surface 49 and catch behind the vertical shoulder 50 of a keeper 51 formed or secured upon the upper portion of the valve casing 25. The spring tension urging the plunger 43 downwardly may be regulated by rotating the plug 46. After the valve is thus latched it cannot be moved manually. To effect release we provide a pipe 52 communicating with the lower end of the chamber 42 and connected with a port 53 at the bottom of the squeeze cylinder 2. It will be seen that after the valve has been latched it will remain so until the air pressure in the squeeze cylinder builds up to the maximum whereupon this pressure passing through the pipe 52 into the chamber 42 will lift the piston 46 against the resistance of the spring 45 and retract the latch plunger 43 out of en-

gagement with the keeper 51 whereupon the valve handle may be turned to the proper position for exhausting the air from the squeeze cylinder.

The jolt and squeeze head 17 is formed with laterally extending arms 54, one of which is here represented as broken away, and these arms carry vertically extending tubular sockets 55 at their outer ends. Secured upon the head is a pattern plate supporting frame 56 and upon this is secured the pattern plate 57 over which is placed the mold flask 58. Surrounding the frame 56 is a substantially rectangular flask supporting frame 59 upon which the marginal front and rear edges of the flask are adapted to rest. The frame 59 is provided at its corners with depending guide pins 60 which slidably fit within the sockets 55. The ends of the frame 59 are provided centrally with depending plunger rods 61 which are slidably fitted within sockets 62 carried by the ends of the arms 4 and 5. Within the sockets the rods 61 are adapted to be engaged by lock-up means, not shown, to hold the frame 59 and the flask in an elevated position after the squeezing operation. The jolt and squeeze head 17 is not locked up but is free to return after a squeezing operation and to carry the pattern plate down with it. The patterns 63 are thus drawn from the mold.

The automatic control valve which is indicated as a whole at 38 in Figure 1 and which is provided for the purpose of regulating the number of jolts to be applied to the molding flask is illustrated in detail in Figure 6 wherein it is shown in closed position. This valve mechanism comprises a casing or body 64 formed with a bore 65 and a chamber or reservoir 66, the latter having a filling opening 67 normally closed by a plug 68 vented at 69 to prevent the development of pressure. This chamber or reservoir also has a clean-out opening normally closed by a plug 70. The casing itself may have any preferred means whereby it may be mounted upon the molding machine, as for example it may be provided with lateral ears 71 which provide accommodation for securing bolts.

The lower end of the bore 65 is closed by a screw plug 72 through which extends a nipple 73 connected with the compressed air conducting pipe 37 which leads from the manual control valve 23. The intermediate portion of the casing or body 65 is formed with an outlet port 74 with which is connected a pipe 75 leading to the port 20 of the jolting cylinder. Slidable axially within the bore 65 is a valve device including a stem 76 provided at its lower end with a valve head 77 which rests on top of the plug 72 as shown by dot and dash lines when this automatic valve is open but which obstructs the outlet port 74 for cutting off flow of compressed air to the jolting cylinder when the automatic valve is closed. This valve head 77 is formed with passages 78 which permit compressed air to pass above the head. At its intermediate portion the stem 76 is equipped with a suitably packed piston 79 urged downwardly by a coil spring 80 within the confines of which is a nut 81 screwed onto a threaded portion of the stem 76 for holding the piston assembled and in proper position in abutting engagement with a flange or collar 82 on the stem.

The upper end of the bore 65 is closed by a screw plug 83 through which extends an exteriorly threaded sleeve 84 carrying, at its lower end, an abutment 85 engageable by the nut 81 for the purpose of limiting the upward movement of the piston 79 and hence the stem 76 and valve head 77. The space above the abutment 85 constitutes an oil chamber 86 which communicates with the reservoir 66 through a port 87 and which also communicates with the interior of the sleeve 84 through ports 88. The space between the piston 79 and the abutment 85 likewise constitutes an oil chamber 89 which communicates with the reservoir 66 through a port 90 and a passage 91, the latter being normally closed by an upwardly unseating ball check valve 92. In order that oil may be enabled to pass, under proper conditions of operation, from the chamber 89 into the chamber 86 and thence into the reservoir 66, the upper end of the stem 76, where it is adapted to enter the sleeve 84, may be slightly reduced in size or may have longitudinal grooves to provide a slight clearance space 93 between its periphery and the interior of the sleeve.

In the operation of the machine, after the flask has been placed in position over the pattern plate and filled with sand, the valve 23 is manipulated to direct air under high pressure through the pipe 37 into the automatic jolt timing valve 38 and thence through the charging port 20 of the plunger reservoir 22. Air entering the valve 38 through the pipe 37 passes through the nipple 73 and enters the lower portion of the bore 65. Normally the piston 79, stem 76 and valve head 77 are at the lower limit of their movement. Air entering the lower portion of the bore 65 passes through the passages 78 in the valve head 77 and flows through the outlet pipe 75 to the jolting reservoir. When air enters this reservoir 22 it passes through the admission port 21 into the cylinder space below the plunger. The plunger is forced upwardly a short distance, carrying with it the head 17, the frame 59, the pattern plate 57 and the flask. A short upward movement of the plunger causes the flange 15 to uncover the exhaust port 12 to vent the cylinder 10 to the atmosphere and permit the plunger and the various parts which it supports to drop back until the head 17 strikes the upper end of the squeeze piston 7. The port 12 then becomes covered whereupon air pressure in the reservoir 22 will again pass through the port 21 and build up beneath the transverse wall 14 so that the plunger 22 will again be forced upwardly for another jolt. These jolt movements continue in rapid succession as long as air under pressure is permitted, by the automatic valve 38, to enter the plunger reservoir 22. By the provision of the relatively large air reservoir 22 closely adjacent to the expansion space below the plunger, a very rapid jolt operation is effected. It has been found desirable in practice to reduce the extent of the flask lift and to cause the jolts to occur with great frequency. The present arrangement accomplishes this. The volume of space below the plunger is small in comparison with the volume of the reservoir 22 even in the elevated position of the plunger. It is obvious, therefore, that in equalizing with the small expansion space the pressure in the reservoir 22 is reduced only slightly. A large volume of air at high pressure is therefore constantly maintained during the jolting operation almost at the immediate point where it is needed. The admission port 21 is made much smaller than the exhaust port 12 in order that very little air shall be lost when the

cylinder space below the plunger is vented to the atmosphere.

In prior constructions, even in said former Patent No. 1,676,662, the number of jolts applied to the flask was a matter which was not definitely controlled in that reliance was placed simply upon the operator and under such circumstances it naturally occurs that a series of molds would not necessarily be subjected to the same number of jolts, this resulting in lack of uniformity in the molds. However, with the automatic valve **38** interposed in the compressed air supply line from the manual valve **23** to the plunger reservoir **22**, the number of jolts is governed automatically. The manner in which this is accomplished is that when the manual valve is opened for supplying air to the valve **38** and thence out through the port **74** and pipe **75** to the plunger reservoir, a portion of the air passing through the passages **78** in the valve head **77** causes pressure to build up beneath the piston **79** which is then urged upwardly against the resistance of the spring **80**. This causes pressure to be applied by the piston to the oil within the chamber **89** and this oil is slowly forced out through the space **93** into the sleeve **84** from which it passes through the ports **88** into the chamber **86** from which it flows through the port **87** into the reservoir **66**. When the stem **76** and piston **79** have reached the upper limit of their movement, with the nut **81** engaging against the abutment **85** as a stop, the valve head **77** is in obstructing relation to the outlet port **74** so that flow of compressed air to the jolting plunger is cut off. An appreciable time is required for the oil to pass up through the small space **93** and as a consequence the time interval during which the compressed air is supplied to the plunger reservoir **22** will be considerable so that a series of jolts will be applied to the flask. By screwing the sleeve **84** in or out and thereby changing the vertical location of the abutment **85** the extent of movement of the piston **79**, stem **76** and valve head **77** may be varied so that a greater or less time will be required for the automatic valve to close. A feature of importance is that after such an adjustment is made every time the valve **23** is opened for jolting purposes identically the same number of jolts will be applied, thereby insuring uniformity in the packing of the sand about the patterns.

After the jolting operation is completed the valve handle **40** should of course be returned to its neutral or intermediate position to close the supply port **30** whereupon the pressure of the spring **80** will force the piston **79**, stem **76** and valve head **77** downwardly so that the outlet port **74** will again be unobstructed, the parts being then ready for the next desired jolting operation. When the piston and associated parts thus moves downwardly, suction is produced in the chamber **89** whereupon oil will be drawn from the reservoir **66** through the port **90** and passage **91**, unseating the ball **92** and again filling the chamber **89**.

After the jolting operation, the manual valve **23** is opened by swinging the handle **40** to the squeeze position whereupon air is admitted through the pipe **34** into the large squeeze cylinder **2** to raise the piston **7**. The piston **7** carries upwardly with it the plunger **13**, the head **17**, the flask supporting frame **59**, the flask **58** and the pattern plate until the presser board **94** is forced against the pressure head to compress the sand about the patterns. When the valve handle **40** is thus moved, the automatic latch **43** engaging behind the shoulder **50**, as previously described, will prevent manual movement of the valve to its exhausting position until the pressure within the squeeze cylinder has reached the maximum, whereupon the air pressure in the squeeze cylinder passing through the port **53** and pipe **52** into the chamber **42** beneath the piston **44** will release the latch and permit the operator to move the valve into its exhaust position so that the air pressure in the squeeze cylinder **2** may pass back through the pipe **34** back to the valve body or casing **25** and out through the exhaust port **35** to the atmosphere.

From the foregoing description and a study of the drawings it will be apparent that there has thus been provided a molding machine having positive and efficient means for governing, automatically, the number of jolts and for preventing premature release of the squeeze mechanism, thereby insuring uniform packing and density of the sand about the pattern. The mechanism is simple and may be applied to already existing mold machines of the type disclosed and even of different varieties as there is no definite limitation in this respect. It is thought from the above that the construction, operation and advantages will be readily apparent to one skilled in the art without further explanation.

While there has been shown and described the preferred embodiment of the invention, it should be understood that the disclosure is merely an exemplification of the principles involved as the right is reserved to make all such changes in the details of construction as will widen the field of utility and increase the adaptability of the device provided such changes constitute no departure from the spirit of the invention or the scope of the claims hereunto appended.

Having thus described the invention, we claim:

1. In a molding machine, the combination of a squeeze cylinder and a piston operating therein, a jolting cylinder, a jolting plunger operating within the jolting cylinder, and supporting means for a flask to be jolted by said jolting plunger and subsequently pressed by said squeeze piston, a manually operable control valve for selectively supplying fluid pressure to the jolting plunger or to the squeeze cylinder and for subsequently exhausting fluid pressure from the latter, means for preventing operation of the valve to exhaust fluid pressure from the squeeze cylinder until the pressure therein has reached the maximum, and a normally open and retardedly closed automatic fluid pressure operated valve remote and separate from the manual valve interposed between the connection from the manual valve to said jolting cylinder for controlling the number of jolts given said jolt cylinder.

2. In a molding machine, the combination of a squeeze cylinder and a piston operating therein, a jolting cylinder, a jolting plunger operating within the jolting cylinder, and supporting means for a flask to be jolted by said jolting plunger and subsequently pressed by said squeeze piston, a manually operable control valve for selectively supplying fluid pressure to the jolting plunger or to the squeeze cylinder and for subsequently exhausting fluid pressure from the latter, means for preventing operation of the valve to exhaust fluid pressure from the squeeze cylinder until the pressure therein has reached the maximum, a normally open and retardedly closed automatic fluid

pressure operated valve interposed between the fluid pressure connection from the manual valve to said jolting cylinder, and means for adjusting said automatic valve for varying the duration of the flow of fluid pressure therethrough and thereby controlling the number of impacts of the jolting plunger imparted to the flask support.

3. A molding machine comprising, in combination, a squeeze cylinder having a squeeze piston therein, a jolting cylinder within the squeeze piston, a jolting plunger within the jolting cylinder, a support for a flask above both of said cylinders to be repeatedly jolted and then squeezed, differential ported communication between the jolting cylinder and the atmosphere for effecting reciprocation of the jolting plunger as long as the fluid pressure is supplied within the jolting cylinder, a manual control valve selectively operable to supply fluid pressure to the jolting cylinder, to the squeeze cylinder or to exhaust fluid pressure from the latter to the atmosphere, an automatic valve interposed in the fluid pressure connection between said manual valve and the jolting cylinder for varying the duration of the flow of fluid pressure to the latter and means for automatically locking said manual control valve in squeeze cylinder operating position until the pressure therein has reached a maximum.

4. A molding machine comprising, in combination, a squeeze cylinder having a squeeze piston therein, a jolting cylinder within the squeeze piston, a jolting plunger within the jolting cylinder, a support for a flask above both of said cylinders to be repeatedly jolted and then squeezed, differential ported communication between the jolting cylinder and the atmosphere for effecting reciprocation of the jolting plunger as long as the fluid pressure is supplied within the jolting cylinder, a manual control valve selectively operable to supply fluid pressure to the jolting cylinder, to the squeeze cylinder or to exhaust fluid pressure from the latter to the atmosphere, an automatic valve interposed in the fluid pressure connection between said manual valve and the jolting cylinder for varying the duration of the flow of fluid pressure to the latter, said automatic valve having an inlet and an outlet, a longitudinally movable valve head within the automatic valve normally in non-obstructing relation to the outlet therefrom, means responsive to fluid pressure entering the inlet for moving said valve head to outlet closing position and means for automatically locking said manual control valve in squeeze cylinder operating position until said squeeze cylinder pressure has attained a maximum.

5. A molding machine comprising, in combination, a squeeze cylinder having a squeeze piston therein, a jolting cylinder within the squeeze piston, a jolting plunger within the jolting cylinder, a support for a flask above both of said cylinders to be repeatedly jolted and then squeezed, differential ported communication between the jolting cylinder and the atmosphere for effecting reciprocation of the jolting plunger as long as the fluid pressure is supplied within the jolting cylinder, a manual control valve selectively operable to supply fluid pressure to the jolting cylinder, to the squeeze cylinder or to exhaust fluid pressure from the latter to the atmosphere, an automatic valve interposed in the fluid pressure connection between said manual valve and the jolting cylinder for varying the duration of the flow of fluid pressure to the latter, said automatic valve having an inlet and an outlet, a longitudinally movable valve head within the automatic valve normally in non-obstructing relation to the outlet therefrom, means responsive to fluid pressure entering the inlet for moving said valve head to outlet closing position, means opposing movement of said valve head and thereby retarding closing of said outlet and means for automatically locking said manual control valve in squeeze cylinder operating position until said squeeze cylinder pressure has attained a maximum.

6. A molding machine comprising, in combination, a squeeze cylinder having a squeeze piston therein, a jolting cylinder within the squeeze piston, a jolting plunger within the jolting cylinder, a support for a flask above both of said cylinders to be repeatedly jolted and then squeezed, differential ported communication between the jolting cylinder and the atmosphere for effecting reciprocation of the jolting plunger as long as the fluid pressure is supplied within the jolting cylinder, a manual control valve selectively operable to supply fluid pressure to the jolting cylinder, to the squeeze cylinder or to exhaust fluid pressure from the latter to the atmosphere, a fully automatic valve interposed in the fluid pressure connection between said manual valve and the jolting cylinder for varying the duration of the flow of fluid pressure to the latter, said automatic valve comprising a casing having an inlet and an outlet, a longitudinally movable stem within said casing carrying a head normally in non-obstructing relation to the outlet but adapted to close the same, said head having passages to permit fluid pressure entering the casing to pass through the head, a piston on the stem adapted to be moved by fluid pressure passing through the head, circulatory fluid means in advance of said last named piston for opposing movement thereof and thereby retarding closing movement of said valve head, fluid pressure means for locking said manual control valve in squeeze cylinder operating position, and means for releasing said locking means after said squeeze cylinder pressure has attained a maximum.

7. In a molding machine, a jolting mechanism comprising a vertically disposed cylinder; a plunger in said cylinder; a mold flask support adapted to be raised and lowered by the reciprocation of the plunger; a compressed air reservoir carried by the plunger and provided with a charging port to receive air from a compressor; an admission port leading from the reservoir to the cylinder below the plunger, an exhaust port leading from the cylinder adjacent the lower end thereof; the plunger being adapted to close the exhaust port in its lowermost position and to open said port when it raises to a certain height, a manual valve for supplying fluid pressure to the cylinder, an automatic valve interposed between the manual valve and said cylinder, said automatic valve being operated entirely by fluid pressure supplied thereto by said manual valve but being separate therefrom, and embodying means for cutting off passage of fluid pressure to the cylinder after a predetermined length of time, fluid pressure means for locking said manual control valve in squeeze cylinder operating position, and means for releasing said locking means after said squeeze cylinder pressure has attained a maximum.

8. In a molding machine, a jolting mechanism comprising a vertically disposed cylinder; a plunger in said cylinder; a mold flask support adapted to be raised and lowered by the reciprocation of

the plunger; a compressed air reservoir carried by the plunger and provided with a charging port to receive air from a compressor; an admission port leading from the reservoir to the cylinder below the plunger, an exhaust port leading from the cylinder adjacent the lower end thereof; the plunger being adapted to close the exhaust port in its lowermost position and to open said port when it raises to a certain height, a manually operable valve for supplying fluid pressure to said cylinder, and an automatic valve interposed in the fluid pressure connection between the manual valve and said cylinder, said automatic valve comprising a casing having an inlet and an outlet, a single stem slidable axially of said casing, an apertured head on said stem normally in non-obstructing relation to said outlet but movable to close the same, a piston carried by said stem and subjected to fluid pressure entering the inlet and passing through said apertured head, hydraulic means preventing rapid movement of said last named piston and thereby retarding the closing movement of said valve head, fluid pressure means for locking said manual control valve in squeeze cylinder operating position, and means for releasing said locking means after said squeeze cylinder pressure has attained a maximum.

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