

1,367,079.

Fig.1.



William H. Nicholls
BY *Daniel Davis*
ATTORNEYS.

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2 SHEETS—SHEET 2.

Fig. 2

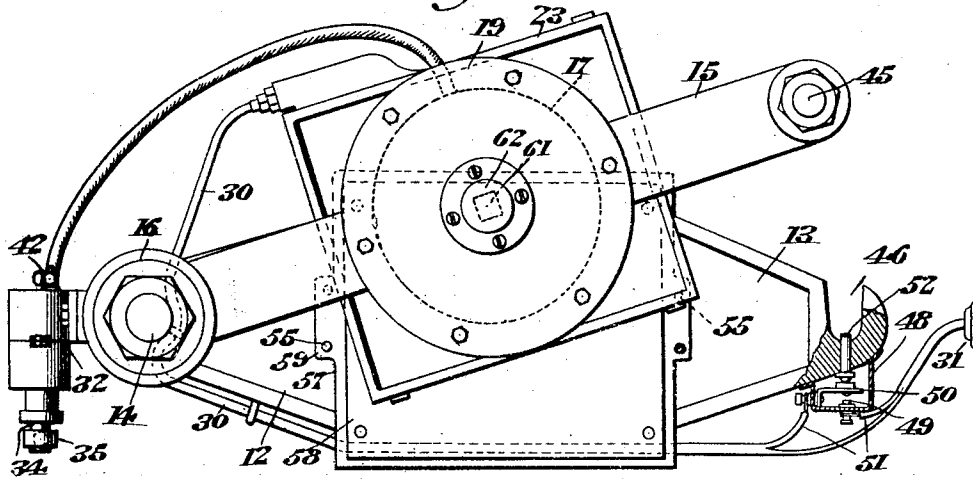


Fig. 3.

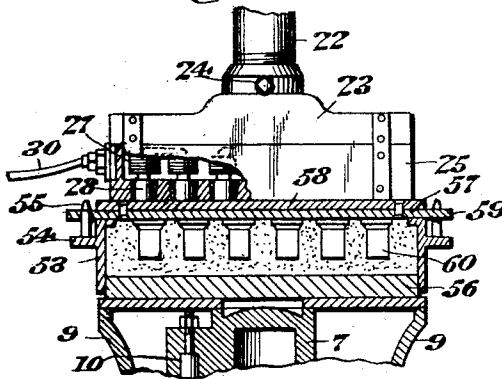


Fig. 4.

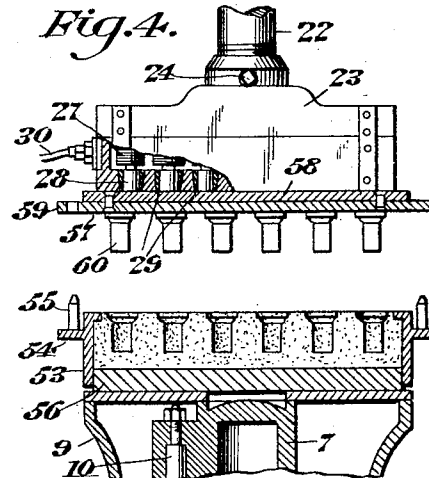


Fig. 5.

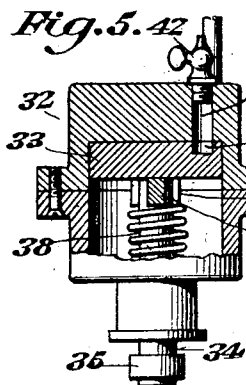


Fig. 6.

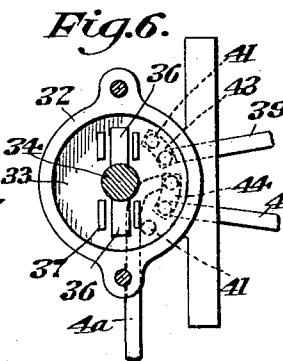
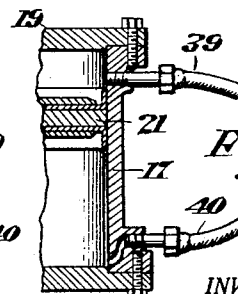


Fig. 7.



INVENTOR.
William H. Nicholls
BY *David Davis*
ATTORNEYS.

UNITED STATES PATENT OFFICE.

WILLIAM H. NICHOLLS, OF BROOKLYN, NEW YORK.

MOLDING-MACHINE.

1,367,079.

Specification of Letters Patent.

Patented Feb. 1, 1921.

Application filed December 15, 1919. Serial No. 344,880.

To all whom it may concern:

Be it known that I, WILLIAM H. NICHOLLS, a citizen of the United States, and resident of the borough of Brooklyn, in the county of Kings, city and State of New York, have invented certain new and useful Improvements in Molding-Machines, of which the following is a specification.

This invention relates to improvements in apparatus for forming molds and has for its general object the provision of means for jolting or jarring the sand in a flask, squeezing or compressing the sand about the pattern and then drawing the pattern from the mold by means of a reciprocable pressing head or plunger.

Another important object of the invention is to provide a molding machine with a reciprocable flask supporting and jolting member and a reciprocable pressing head adapted to be swung into and out of the path of the flask supporting member, electro-magnetic pattern drawing means being carried by said pressing head and adapted to engage the pattern plate during the pressing operation, and to draw the pattern plate and patterns from the mold as the pressing head is moved upwardly away from the flask.

Another object of the invention is to provide means for vertically guiding the flask supporting and jolting member, and additional means for guiding the pressing head, whereby said members will move toward and away from each other in direct vertical lines and without rotation. The result of this arrangement is that the patterns will be forced into the molding sand and withdrawn therefrom along the same vertical lines, and all tendency to break the mold during the pattern withdrawing operation is avoided.

There are other important objects and advantages of the invention which will appear hereinafter.

In the accompanying drawings—

Figure 1 is a side elevation of the apparatus partly shown in central vertical section;

Fig. 2 a plan view of the apparatus, the pressing head and its supporting means being swung laterally, and a part of the apparatus being shown in horizontal sectional view;

Fig. 3 a detail view partly in section showing the pressing head in engagement with the pattern plate;

Fig. 4 a similar view showing the pattern plate and patterns attached to the electro-magnetic device and withdrawn from the flask;

Fig. 5 a detail sectional view of the valve for controlling the movements of the pressing head;

Fig. 6 a detail view of the valve and valve seat shown in Fig. 5; and

Fig. 7 a detail vertical sectional view of the cylinder and piston of the pressing head.

Referring to the various parts by numerals, 1 designates the base of the machine which is formed with a central vertical cylinder 2 open at the top of the base, the lower end of said cylinder being closed and connected by pipe 3 with a main air supply pipe 4. A valve 5 controls admission of air to the lower end of the cylinder 2. The cylinder 2 is provided with an exhaust port 6 slightly above the lower end thereof and through which air may escape to atmosphere through the base of the machine. In the cylinder 2 is fitted a vertically reciprocable piston 7 which is formed at its lower end with a chamber 8 said chamber being open at its lower end and in free communication with the interior of the cylinder 2. The lower end of this piston is provided with a piston ring of any suitable form and normally extends below the port 6. The piston 7 depends centrally from a large horizontal head 9 which is adapted to rest on the upper end of the base. The head 9 is a support for a mold flask, and constitutes a jolting and supporting member. This jolting member is guided in its vertical movements by a depending pin 10 carried by said head and extending downwardly through an opening in the top of the base. A head 11 is formed on the lower end of this pin to limit the upward movement of the jolting member. The pin 10 fits snugly within the opening of the base and serves as a means to guide the jolting member in a true vertical line and prevents rotation thereof.

The base of the machine is provided with horizontal brackets 12 and 13 which extend laterally in opposite directions, as shown clearly in Fig. 1. The bracket 12 carries an upwardly extending vertical post 14 on the upper end of which is mounted a horizontally swinging arm 15 said arm being suitably supported on the post between collars 16, a nut being screwed on the upper end of the post to hold

the upper collar 16 in place against the upper end of the swinging arm. The arm 15 carries a vertically arranged cylinder 17 which is closed at its upper and lower ends by suitable heads 18 and 19, the lower head 18 carrying a stuffing box 20. Mounted in the cylinder 17 is a piston 21 which carries a piston rod 22. This piston rod extends downwardly through the stuffing box 20 and has threaded on its lower end a pressing head 23 said head being vertically adjustable on the piston rod by means of its threaded connection. A screw 24 serves to lock the pressing head to the piston rod and to hold it against accidental rotation. Secured to the lower side of the pressing head is an electro-magnetic chuck 25 said chuck forming the lower part of the pressing head, its lower surface being adapted to contact with the pattern plate, as will be more fully hereinafter described. The electro-magnetic chuck may be of any suitable form. As shown said chuck comprises a box-like cast-iron casing 26 in which a plurality of electro-magnets 27 are mounted. A plurality of soft steel pole pieces 28 extend through the under side of the casing and are insulated therefrom by sleeves 29 of non-magnetic metal. The lower ends of the pole pieces are flush with the under surface of the chuck and their upper ends engage the ends of the magnetic cores, or they may be extensions of the magnetic cores, as may be desired. Electric current is supplied to the magnetic coils through suitable wires incased in a cable 30 which lead into the casing 26 at any suitable point, the ends of said wires being connected to a suitable attaching plug 31 adapted to be engaged in a conveniently located socket. It is of course obvious that the electric circuit wires may be connected to the magnets of the electro-magnetic chuck in any suitable way. The pressing head 23 with its chuck 25 constitutes, for all practical purposes, a squeezing element, the face of the chuck being the lower face of the squeezing element.

Mounted on the swinging arm 15 is a valve casing 32 in which is arranged a rotary valve 33. A valve operating rod 34 is mounted in the valve casing and is provided with a depending handle 35. The inner end of this valve operating rod is provided with oppositely extending arms 36 which are adapted to engage lugs 37 on the valve so that by rotating the operating rod in either direction the valve will be correspondingly moved. A spring 38 holds the valve to its seat. An air supply pipe 39 is connected to the upper end of the cylinder 17, and an air supply pipe 40 is connected to the lower end of the cylinder, as clearly indicated in Fig. 1. These supply pipes are connected to the valve casing, as shown clearly in Fig. 6. A pipe 4^a connects the

main air supply pipe 4 with the valve casing at a point between the pipe 39 and 40. The valve casing is provided with two exhaust ports 41 controlled by valves 42. The rotary valve is formed with two grooves 43 and 44 which are adapted, upon the rotation of the valve, to place the supply pipe 4^a in communication with pipes 39 and 40; and to place said pipes 40 into communication with the exhaust ports 41 depending upon the position of the valve. As shown in Fig. 6 the supply pipe is in communication with pipe 40 and pipe 39 is in communication with its exhaust port 41. By manipulating the valve it is manifest that the squeezing or pressing piston 21 may be moved up or down in its cylinder for the squeezing or the pattern withdrawing operations.

The outer end of the swinging arm 15 is provided with a depending rigid rod 45 the lower part of which is adapted to engage in a recess or slot 46 formed in the outer end of the arm 13 of the base. On the lower end of this rod is threaded a nut 47 which is adapted to engage the under side of the arm 13 to accurately center the pressing head over the jolting member. Said nut also rigidly locks the swinging arm 15 to the base and resists the upward thrust brought thereon through the operation of the pressing head.

It is desirable to provide means adapted to be operated by a movable part of the machine for automatically making and breaking the circuit through the coils on the magnets of the chuck at the proper times during the operation of the machine in forming a mold. For this purpose a circuit-making-and-breaking device or switch is interposed in the circuit wires between the plug 31 and the pressing head. This circuit-making-and-breaking device comprises a box or casing 48 in which is mounted a stationary terminal or contact 49 and a movable resilient terminal or contact 50 to each of which contacts one end of one of the circuit wires is connected, as indicated at 51 in Fig. 2. The resilient contact 50 is normally out of engagement with the contact 49, and is adapted to be forced into engagement with the said contact 49 by a fiber pin or actuating device 52. The pin 52 slides in an aperture in the arm 13 and is normally projected into the slot 46 by the resilient contact 50. The outer end of this pin 52 is adapted to be engaged by the rod 45 when said rod is swung into the slot 46 and thereby to be forced outwardly to bring the contact 50 into engagement with the contact 49. This completes the circuit through the coils of the magnets so that said magnets will be energized when the pressing or squeezing element is swung over and is directly in alinement with the flask support or jolting member.

The mold frame 53 may be of any suitable construction. As shown it comprises one section of the well-known interchangeable cope and drag divided metallic flask 5 having the usual lateral projections or handles 54 each of which is provided with rigid upwardly extending pins 55. The usual bottom board 56 fits within the lower end of the mold frame 53. The pattern plate 10 shown is of special construction but it will be obvious that various forms of pattern plates may be employed, it being essential only that the pattern plate be formed wholly or in part of magnetizable metal or that the 15 pattern plate have secured thereto a magnetizable portion adapted to be engaged by the magnetic drawing means. As shown the pattern plate comprises a lower plate 57 formed of aluminum or other non-magnetizable metal and an upper plate 58 of 20 soft steel or other magnetizable metal rigidly secured to plate 57. The plate 57 is formed with the usual handle portions 59 each of which is provided with the usual pair of apertures to receive the pins 55 carried 25 by the handles 54. The pattern or patterns 60 are secured in the usual or any suitable manner to the under side of the pattern plate.

To form a mold the flask and pattern are 30 placed on the head 9 and the flask is then filled with sand. The valve 5 is then opened to permit air to flow into the chamber 8 of the jolting piston. The piston 7, and of 35 course the attached head 9, will be elevated slightly until the exhaust port 6 is uncovered, whereupon the piston and head will drop, this operation being repeated in rapid succession as long as the valve 5 remains 40 open. The sand in the mold frame is thus jarred or jolted and evenly distributed and compacted. The surplus sand is then struck off level with the top of the flask and board 56 put in place at the top of the flask. The 45 flask with the board 56 therein is then inverted or rolled over and placed upon the head 9 with the bottom board 56 resting upon the head and the pattern plate resting on the upper end of the flask, as shown 50 in Fig. 1. The arm 15 is then swung horizontally until the rod 45 engages in slot 46 of the bracket 13. This movement of the arm 15 carries the pressing head 23 directly over the jolting and supporting head 9 and 55 automatically closes the circuit through the cores of the magnets 27 through the operation of the switch pin 52. The valve operating handle 25 is then operated toward the left hand, as viewed in Fig. 1, to connect the air supply to pipe 39. This delivers 60 air to the top of piston 21 and forces the pressing head downwardly to cause it to engage the pattern plate and force the flask down over the bottom board and firmly pack 65 or ram the sand about the patterns. The

valve handle 35, after the pressing or squeezing operation, will be turned back to its vertical position, as shown in Fig. 1, thereby connecting the air supply to pipe 40, and pipe 39 to atmosphere through its connected exhaust port. The piston 21 will be 70 thereby forced upwardly, withdrawing the pressing head from the flask. The pattern plate will be held to the under surface of the chuck by the electro-magnetic device and 75 the patterns will be drawn upwardly from the mold. The operator will then remove the flask from the head 9, and after said removal will grasp the pattern plate by the handles 59 and push the same laterally or 80 rearwardly to carry the pressing head out of alinement with the jolting member, the arm 15 swinging rearwardly. This movement of the arm 15 carries the rod 45 out of the slot 46 and automatically breaks the 85 circuit through the magnetic holding means. The operator may then place the released pattern plate on the jolting and supporting member and proceed again with the making of a new mold. 90

To prevent rotation of the pressing head the piston rod 22 is extended upwardly through the head 19, as shown at 61, said upwardly extending portion being angular 95 in cross section and sliding through a correspondingly shaped aperture in the head. The upwardly extending portion 61 of the piston rod moves in a cap 62 secured to the head 19 and making an air tight closure 100 therewith. By providing means for accurately guiding the pressing head in its vertical movement, and thereby preventing any rotation of the pressing head said head will move in a direct vertical line and there will be no tendency to shift or twist the pattern 105 in a mold during the operation of withdrawing them. This also insures that the patterns will be forced into the mold and withdrawn therefrom on the same vertical lines thereby preventing any tendency to 110 disrupt the molds by any tilting or twisting of the patterns.

What I claim is:

1. In a molding apparatus, the combination of a vertically reciprocable mold frame 115 support, means for reciprocating said support rapidly for jolting the sand in the mold frame, a vertically reciprocable squeezing and pattern-drawing pressing head, a support for said head, means for reciprocating 120 said head in one direction to press the pattern into the mold and for moving said head in the opposite direction to withdraw the pattern from the mold, and magnetic means carried by the pressing head for holding a 125 pattern to said head when it is moved away from the mold frame.

2. In a molding apparatus, the combination of a mold frame support, means for reciprocating said support rapidly for jolting 130

the sand in the mold frame, a vertically reciprocable squeezing and pattern-drawing pressing head, a laterally shiftable support for said head, means for moving said head 5 in one direction to press the pattern into the mold and for moving said head in the opposite direction to withdraw the pattern from the mold, magnetic means carried by the pressing head for holding a pattern to said 10 head, and means for automatically magnetizing and de-magnetizing said magnetic means when the pressing head is moved respectively into and out of register with the mold frame support.

15 3. In a molding apparatus, the combination of a mold frame support, a vertically reciprocable squeezing and pattern-drawing pressing head, means to hold said head against rotation, means for moving said 20 head in one direction to press the pattern into the mold and for moving said head in the opposite direction to withdraw the pattern from the mold, and magnetic means carried by the pressing head for holding a pattern to said head when it is moved away from 25 the mold frame.

4. In a molding apparatus, the combination of a mold frame support, a vertically reciprocable squeezing and pattern-drawing 30 pressing head, a laterally shiftable support for said head adapted to be swung horizontally to move the head into and out of register with the mold frame support, means for reciprocating said head in one direction 35 to press the pattern into the mold and for moving said head in the opposite direction to withdraw the pattern from the mold, and

magnetic means carried by the pressing head for holding a pattern to said head when it is moved away from the mold frame. 40

5. In a molding apparatus, the combination of a mold frame support, means for reciprocating said support rapidly for jolting the sand in the mold frame, means for preventing the rotation of said support, a vertically reciprocable squeezing and pattern-drawing pressing head, a laterally shiftable support for said head, means for moving said head in one direction to press the pattern into the mold and for moving said head 50 in the opposite direction to withdraw the pattern from the mold, means to prevent the rotation of said head, magnetic means carried by the pressing head for holding a pattern to said head, and means for automatically magnetizing and de-magnetizing 55 said magnetic means when the pressing head is moved respectively into and out of register with the mold frame support.

6. In a molding apparatus, the combination of a mold frame support, a vertically reciprocable squeezing and pattern-drawing pressing head, means for moving said head in one direction to press the pattern into the mold and for moving said head in the 60 opposite direction to withdraw the pattern from the mold, and magnetic means carried by the pressing head for holding a pattern to said head when it is moved away from the mold frame. 65

In testimony whereof I hereunto affix my signature. 70

WILLIAM H. NICHOLLS.