

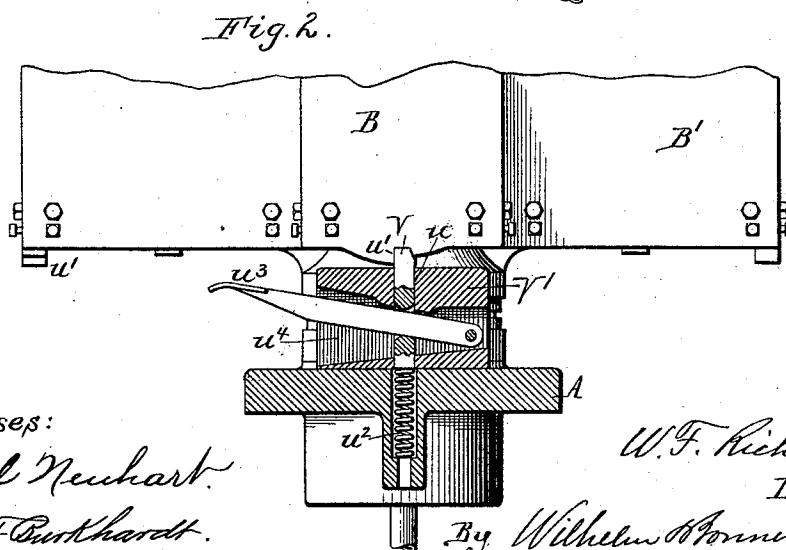
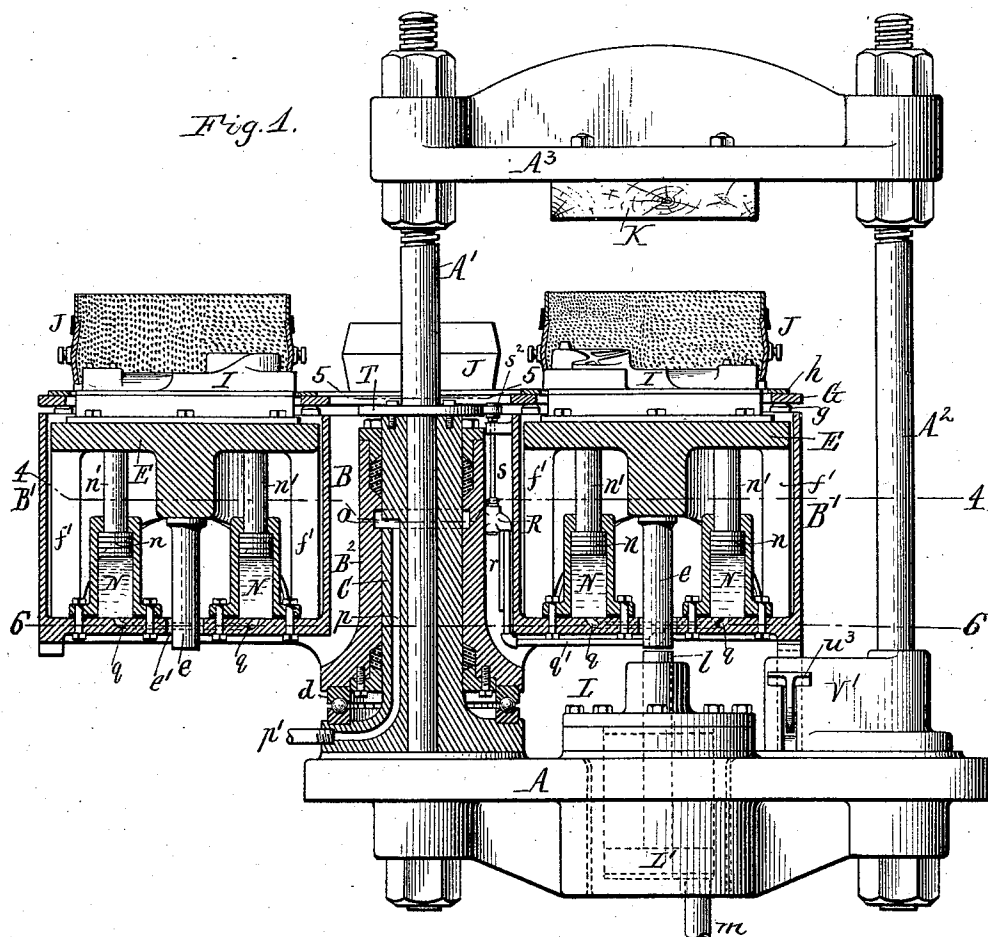
(No Model.)

4 Sheets—Sheet 1.

W. F. RICHARDS.
MOLDING MACHINE.

No. 532,214.

Patented Jan. 8, 1895.



Witnesses:

Emil Neuhart.

Chas. F. Burkhardt.

W. F. Richards
Inventor.

By Wilhelm H. H. H.
Attorneys.

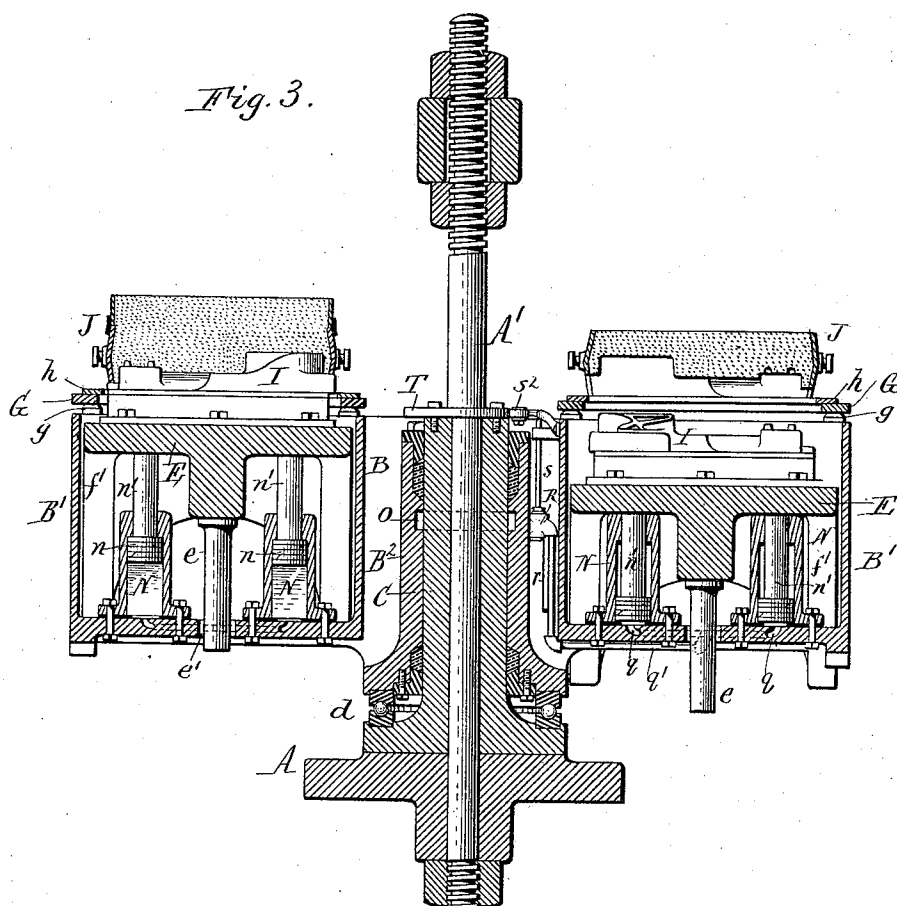
(No Model.)

4 Sheets—Sheet 2.

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4 Sheets—Sheet 3.

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Fig. 5.

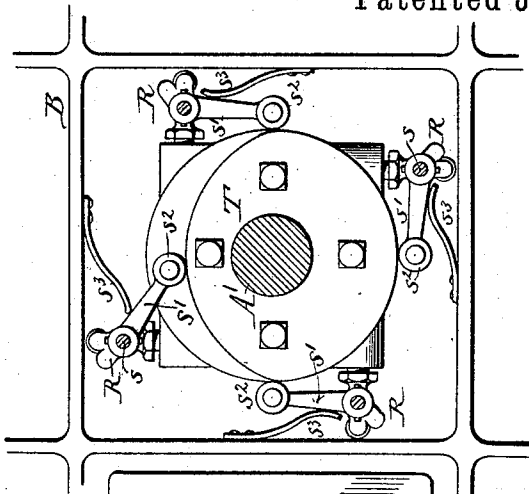
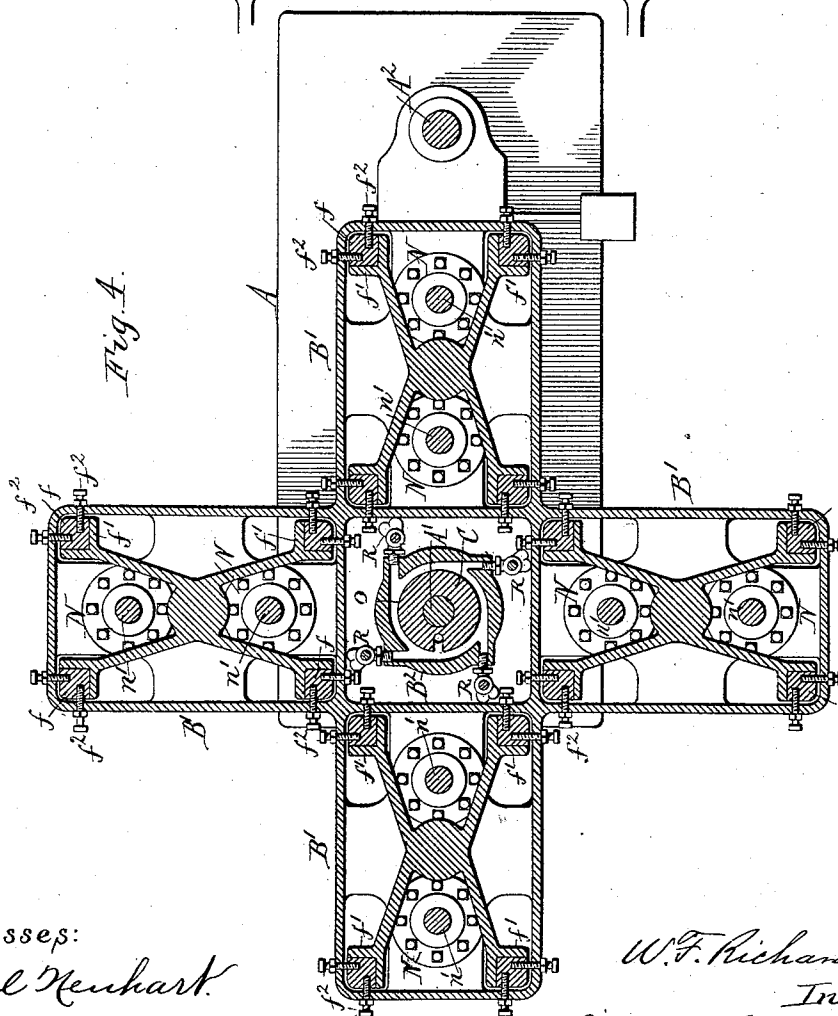


Fig. 4.



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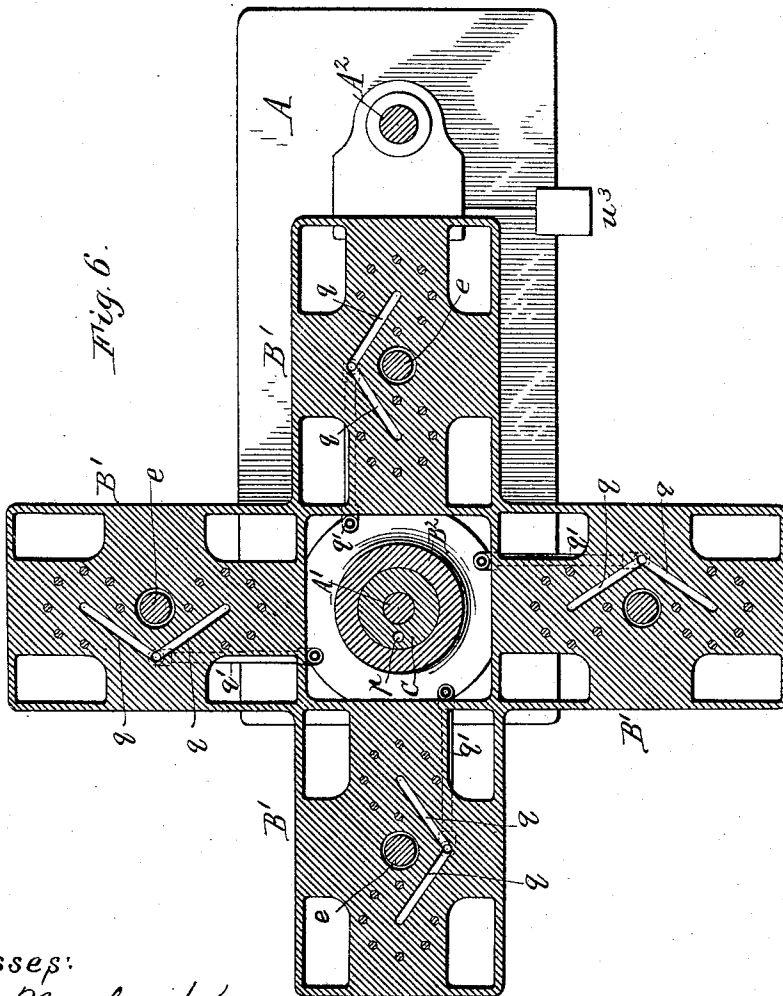
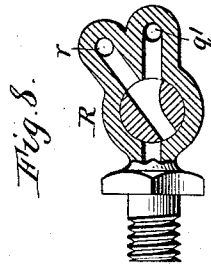
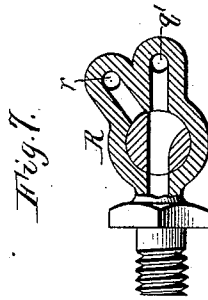
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4 Sheets—Sheet 4.

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UNITED STATES PATENT OFFICE.

WILLARD F. RICHARDS, OF BUFFALO, NEW YORK.

MOLDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 532,214, dated January 8, 1895.

Application filed January 16, 1894. Serial No. 497,074. (No model.)

To all whom it may concern:

Be it known that I, WILLARD F. RICHARDS, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Molding-Machines, of which the following is a specification.

This invention relates to that general class of molding machines which comprise a table or support for the flask containing the pattern, an abutment or stationary ramming block arranged abovesaid support, and a vertically movable follower whereby the flask is moved toward the ramming block and the sand in the same is rammed against the block. My improvements have more especial reference to machines of this class which contain a rotary table designed to support a number of flasks, so that while one flask is presented to the ramming block, the other flasks on the table may be filled with sand ready to pass under the ramming block as soon as the preceding flask is rammed, thus expediting this operation.

My invention has for its objects to provide reliable means for retarding the descent or return stroke of the follower, so as to prevent breakage of the mold in stripping the pattern therefrom, and to so organize the machine that the movement of the follower, whereby the pattern is withdrawn from the flask, is effected automatically in the act of turning the table for removing the rammed flask, and bringing a new flask under the ramming block.

In the accompanying drawings consisting of three sheets, Figure 1 is a sectional elevation of my improved molding machine. Fig. 2 is a fragmentary sectional elevation, showing the means for locking the rotary table in position. Fig. 3 is a vertical section of the machine at right angles to Fig. 1. Fig. 4 is a horizontal section of the machine in line 4—4, Fig. 1. Fig. 5 is a fragmentary horizontal section in line 5—5, Fig. 1, on an enlarged scale, showing the devices for opening and closing the cocks of the water pipes. Fig. 6 is a horizontal section in line 6—6, Fig. 1. Figs. 7 and 8 are horizontal sections, on an enlarged scale, of the stop cock of one of the water pipes, showing the plug of the same in different positions.

Like letters of reference refer to like parts in the several figures.

A is the fixed bed or base of the machine, and A', A², are two upright rods or standards secured at their lower ends to the bed and connected at their upper ends by a cross piece A³.

B is the horizontal flask-supporting table which is arranged to turn on the rod A', and which consists of a number of upright rectangular chambers B' arranged equidistant. Four of such chambers are shown in the drawings, but a greater or less number may be employed, if desired. These chambers are carried by a central sleeve or hub B² which is journaled upon a fixed column C, surrounding the rod A', as shown in Fig. 1. The hub B² is supported upon the base of the column C, preferably by a ball bearing *d* to reduce friction.

In each of the chambers B' is arranged a horizontal follower E which is capable of moving vertically in the chamber and provided on its under side with an actuating rod *e*. Each chamber is open at its upper end and closed at its lower end, and the bottom of the chamber is provided with a central opening *e'* for the passage of the follower rod *e*. The follower of each chamber is guided on upright bars or rails *f* arranged in the corners of the chamber and fitting into upright angular guides *f'*, depending from the four corners of the follower, as shown in Fig. 4. These guide rails are secured within the chamber by horizontal adjusting screws or bolts *f*², arranged in the side and end walls of the chamber and engaging in screw threaded openings in the rails, whereby the latter may be readily adjusted to accurately fit the guides of the follower.

G represents open rectangular supporting plates or frames resting upon pins *g*, projecting above the upper edges of the chamber, and *h* are the stripping plates secured to the upper sides of said supporting plates, whereby displacement or breakage of the sand in withdrawing the pattern is prevented.

I is one of the patterns which is secured to the upper side of the follower E by any suitable means, and J is a half flask resting upon the supporting plate G and secured to the stripping plate. Each stripping plate *h* has the usual opening conforming in outline to the contour of the pattern.

K is the abutment or stationary ramming block secured to the under side of the cross piece A³, and arranged directly over the cir-

cular path traversed by the chambers B', so that the several flask-supports may be successively brought under the ramming block by turning the rotary table B.

5 L represents an upright actuating cylinder arranged below the rotary table B. L' is its piston, and l the piston rod which passes upward through the stuffing box of the cylinder and has its upper end located in the circular path of travel of the actuating rods of
10 the several followers E, so that the lower end of the rod of any one of the followers may be brought directly opposite or in line with the upper end of said piston rod, as shown in Fig. 1, in which position the upward movement of
15 the piston rod is imparted to the actuating rod of the follower. The piston of the actuating cylinder may be operated by steam or compressed air which is supplied to the cylinder by a pipe m.

In each of the chambers B' are arranged a pair of upright hydraulic cylinders N N, for retarding the descent of the follower after ramming the sand in the flask. These hydraulic cylinders are located on opposite sides
25 of the follower rod and in each cylinder is arranged a plunger or piston n, the rod n' of which extends through the upper head of the cylinder, and is adapted to bear loosely with its upper end against the under side of the
30 follower, so as to resist the downward movement of the latter, but permit it to move upward out of contact with the rods of said plungers.

O is an annular inlet chamber formed in the hub of the rotary table B, around the column C; and p is an upright supply passage formed in the column C and communicating at its upper end with said inlet chamber, in all positions of the rotary table. The lower
35 horizontal portion of this supply passage extends radially through the base of the column C and its lower end is connected with a supply pipe p'. Each hydraulic cylinder is provided at its lower end with a combined induction and eduction pipe q, and the pipes
40 of the two cylinders of the same chamber communicate with a main pipe q' which is connected with the annular inlet chamber O. Each of the main pipes q' is provided with a three-way valve or stop cock R, for controlling
45 the passage of the water to and from the hydraulic cylinders. To each of these three-way cocks is connected an outlet or waste pipe r, leading to a sewer or other place of discharge. The ways of each cock are so arranged that upon turning its plug in one direction, the main pipe q' is placed in communication with the annular inlet chamber O and the waste pipe r is closed as shown in
50 Fig. 7, while upon turning the plug in the opposite direction, communication is established between the main pipe and the waste pipe and cut off between the main pipe and the inlet chamber, as shown in Fig. 8.

65 s represents the stems of the stop cocks, which extend upward from the latter, and s'

are the actuating arms, or levers secured to the upper ends of these stems.

T is a stationary cam secured horizontally to the standard A' above the stop cocks, 70 whereby the latter are automatically controlled by the rotation of the table B. The actuating arms of the several stop cocks engage against the face of this cam, and are preferably provided at their outer ends with
75 anti-friction rollers s², which bear against the cam. s³ are springs whereby said actuating arms are pressed against the cam and which tend to turn the arms in the proper direction to establish communication between
80 the hydraulic cylinders and the waste pipes r. These springs are secured to the adjacent portion of the table and bear with their free ends against the arms of the stop cocks.

The smallest radius of the cam T is arranged 85 toward the rear side of the machine, as shown in Fig. 4, so that when the arm of a stop cock rides over such narrow portion of the cam, it is caused to move inward under the pressure of its spring and turn the plug of such stop
90 cock in the proper direction to place the corresponding hydraulic cylinders in communication with the waste pipe r of the cock, thereby allowing the water to escape from said cylinders and permitting their plungers and
95 the follower and superposed parts to descend by gravity. The portions of the cam, which face the front and sides of the machine, are concentric with the axis of the rotary table, and their radius is sufficiently large to retain
100 the actuating arms of the opposing stop cocks in the proper position to cut off communication between the waste pipes, of such cocks and the corresponding hydraulic cylinders, and establish communication between the latter
105 and the inlet chamber O. By this arrangement, only the stop cock of the chamber standing on the rear side of the machine is opened, so as to allow the follower to descend while the cocks of the remaining three
110 chambers are kept closed, so as to prevent the descent of their followers.

The rotary table is locked in position after bringing one of the followers under the ramming block, by any suitable locking device. 115 In the construction shown in the drawings, this locking device consists of an upright spring bolt V, sliding in a vertical opening u formed in a raised portion V' of the bed plate A, and adapted to engage with its upper
120 end in one of four notches or recesses u' formed in the under side of the chambers, respectively. This locking bolt is held in its elevated position by a spring u², and is depressed to retract the same from said locking
125 notches, by a foot lever u³ pivoted in an upright recess u⁴ in the raised portion V', and passing through an upright slot in the spring bolt. The outer portion of the foot lever projects forwardly beyond said raised portion,
130 and terminates in a foot plate. The locking notches u' are so arranged that when the ta-

ble is locked in position, one of the followers stands directly under the ramming block, and the actuating rod of such follower stands directly in line with the rod of the actuating piston.

When the rotary table B is turned so that one of the followers E stands under the ramming block, the stop cock controlling the passage of the water to the hydraulic cylinders N of such follower, allows the water to enter said cylinders, and the plungers of the latter are therefore raised and caused to support the follower in the position shown in Fig. 1. In this position, the follower is nearly flush with the upper edge of its chamber, the pattern secured thereto projects through the opening in the stripping plate and the supporting frame G of the latter, and the half flask rests upon the stripping plate, the flask having been previously filled with sand, in the usual manner. Upon admitting steam to the actuating cylinder, the piston in the latter rises, and, striking the lower end of the follower rod, moves the follower, together with the superposed supporting frame, the stripping plate, the pattern and the flask toward the ramming block, thereby forcing the sand in the flask against the ramming block and compacting it around the pattern. Upon allowing the steam to exhaust from the actuating cylinder, the follower, with the superposed parts, descends to the position shown in Fig. 1, when its further descent is arrested by the rods of the elevated plungers *n*. In this position of the parts, the frame which supports the stripping plate and half flask, rests upon the pins of the chamber B. The table is now unlocked by depressing its foot lever *w*³ and is given a quarter turn in the direction of the arrow in Fig. 4, so as to bring the partially lowered follower on the rear side of the machine and the next follower under the ramming block. This quarter turn of the table causes the stop cock R of the first mentioned follower to be turned in the proper direction to allow the water to escape from the hydraulic cylinders of said follower, and the latter now descends slowly by gravity to the position shown on the right hand side of Fig. 3, thereby withdrawing the pattern from the half-flask and completing the half-mold. The depressed follower remains in this position until the rotary table is again shifted to bring another unrammed flask under the ramming block, when its stop cock is again opened by its actuating arm riding over the wide portion of the cam and the follower is raised to the position shown in Fig. 1, by the water entering its hydraulic cylinders N and elevating the plungers in the latter. The several followers are thus successively brought under the ramming block and raised for ramming the superposed flask.

By the use of my improvements, the movements of the followers required for stripping the pattern from the flask, and for again raising the follower to receive a new flask, are effected automatically, so that these opera-

tions require no attention on the part of the operator.

I claim as my invention—

1. In a molding machine the combination with a ramming block, of a rotary table arranged below said block and carrying a vertically movable follower, an actuating device for moving said follower arranged below the rotary table, a hydraulic cylinder arranged on the table underneath the follower and having supply and discharge pipes, a valve controlling the passage of the liquid through said pipes, and having a shifting arm, and a cam against which said shifting arm engages, substantially as set forth.

2. In a molding machine, the combination with an abutment or ramming block, of a rotary table arranged below said block and having a number of upright chambers adapted to be moved successively under said ramming block, followers arranged in said chambers, hydraulic cylinders arranged under said followers, induction and eduction pipes or passages connected with each of said hydraulic cylinders, a common supply chamber connected with all of said inlet pipes, valves controlling the passage of the liquid through said pipes, and a fixed cam against which the arms of said actuating valves engage, substantially as set forth.

3. In a molding machine, the combination with an abutment or ramming block, of a rotary table arranged below said block and having a number of upright chambers adapted to be moved successively under said ramming block, followers arranged in said chambers, hydraulic cylinders arranged under said followers and adapted to bear against the same for retarding their descent, induction and eduction pipes connected with each of said cylinders, a common supply chamber connected with all of said inlet pipes, valves applied to said pipes, a fixed cam against which the arms of said actuating valves engage, and springs whereby said actuating arms are held against said cam, substantially as set forth.

4. In a molding machine, the combination with the main frame having a standard or upright pivot, of a rotary table having a hub turning upon said pivot and provided with an annular inlet chamber, upright chambers carried by said table, followers guided in said chambers, hydraulic cylinders arranged in said chambers and having induction pipes or passages communicating with said inlet-chamber, three-way cocks controlling said pipes and each having a waste or discharge pipe, and a cam secured to the pivot of the table, with which the actuating arms of said cocks engage, substantially as set forth.

Witness my hand this 27th day of May, 1893.

WILLARD F. RICHARDS.

Witnesses:

CARL F. GEYER,
JNO. J. BONNER.