W. C. NORCROSS.

SAND MOLDING MACHINE.

APPLICATION FILED JULY 30, 1915.

1,194,059.

Patented Aug. 8, 1916.

2 SHEETS—SHEET 1.

Fig. 1.

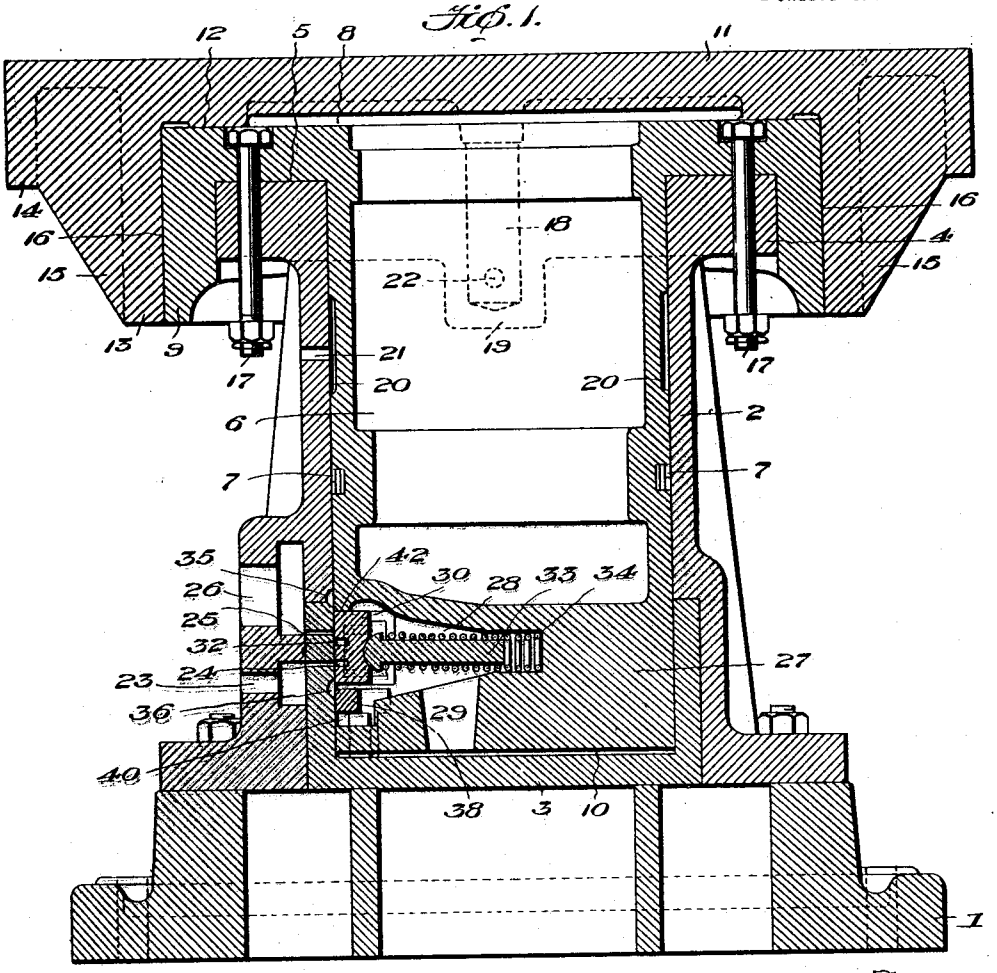


Fig. 2.

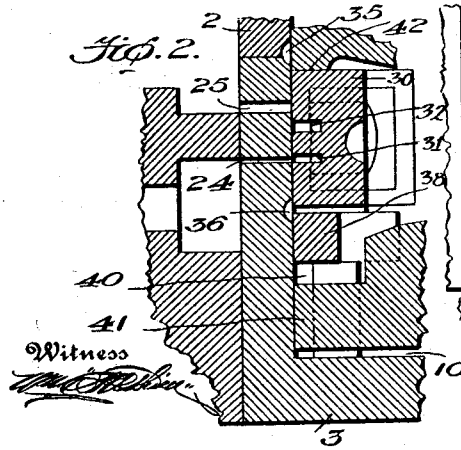
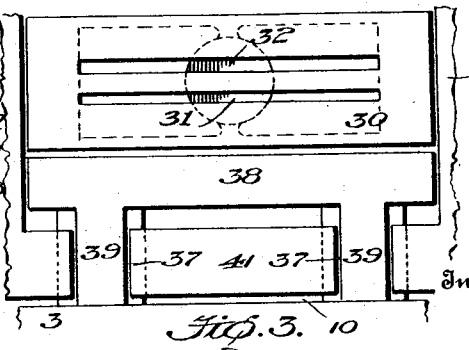


Fig. 3.



Witness

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William C. Norcross

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2 SHEETS—SHEET 2.

Fig. 4.

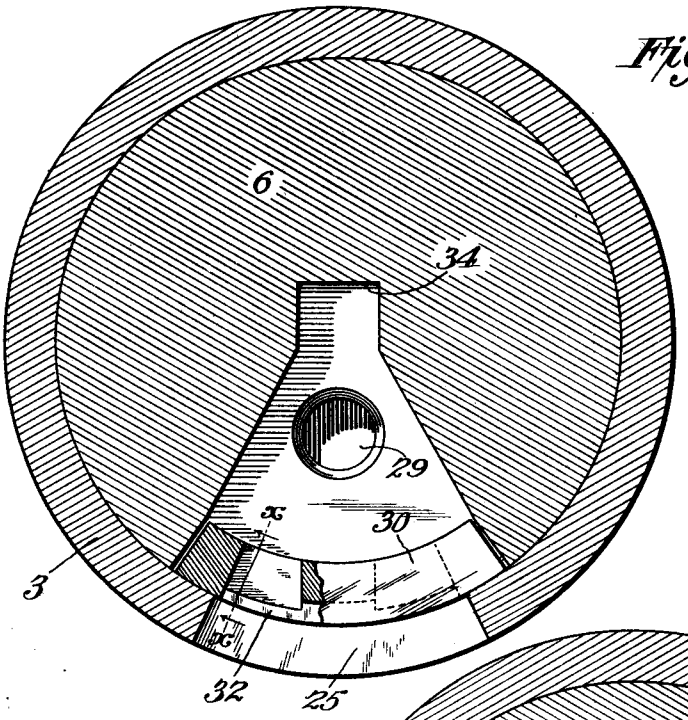


Fig. 5.

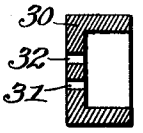


Fig. 6.

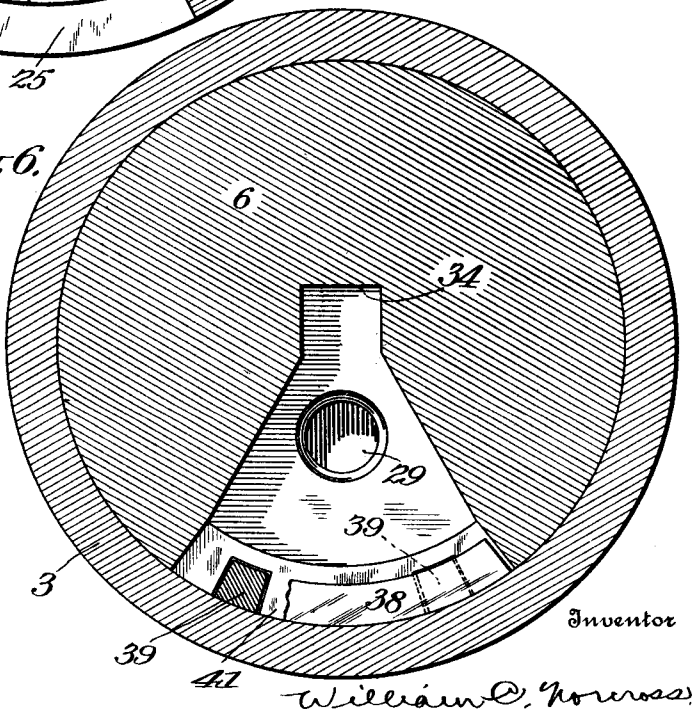
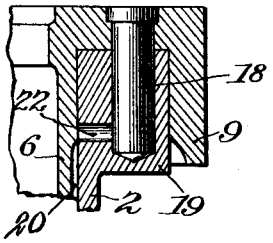


Fig. 7.



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UNITED STATES PATENT OFFICE

WILLIAM C. NORCROSS, OF TERRE HAUTE, INDIANA, ASSIGNOR TO AMERICAN MOLDING MACHINE CO., OF TERRE HAUTE, INDIANA, A CORPORATION OF INDIANA.

SAND-MOLDING MACHINE.

1,194,059. Specification of Letters Patent. **Patented Aug. 8, 1916.**

Application filed July 30, 1915. Serial No. 42,761.

To all whom it may concern:

Be it known that I, WILLIAM C. NORCROSS, a citizen of the United States, residing at Terre Haute, in the county of Vigo and State of Indiana, have invented certain new and useful Improvements in Sand-Molding Machines, of which the following is a specification.

This invention relates to sand molding machines and is an improvement on the machine set forth in Letters Patent No. 1,031,084, granted to me July 2, 1912.

The objects of the present invention are the provision of a double top piston guide, an improved joint between the table and piston, a top striking or jarring surface, an improved arrangement of guide pins and safety bolts, an improved valve, valve seat, and port arrangement, valve stool or striker and combination of valve, stool and seat, whereby the play of the valve is over the entire valve seat and uneven wear is prevented as also provision made for change of travel of the piston, and other features appearing more in detail hereinafter.

The embodiment of the invention which is set forth hereinafter is but one of several forms the invention may assume and is to be considered as illustrative, rather than restrictive, of the scope thereof. Nor is the invention restricted to the use of a single cylinder and piston as shown, as a plurality of cylinders and pistons connected to different points of the table, may be employed; also, more than one valve may be used on a single piston, if desired.

In the accompanying drawings: Figure 1 is a vertical section; Fig. 2, a detail section of the valve, stool and adjacent parts; and Fig. 3, a detail front elevation of the valve and stool; Fig. 4 is a transverse section of the cylinder and piston, taken just above the valve, which is partly broken away to show the exhaust port; Fig. 5 is a transverse section of the valve on the line x—x, Fig. 4; Fig. 6 is a transverse section of the cylinder and piston taken just above the stool, which is shown partly broken away, and Fig. 7 is a vertical section of the guide lug and the adjacent parts, the guide pin being shown in elevation.

To the base 1 is bolted the upright cylinder 2. To prevent air leakage due to continued use of the machine, the bottom of the cylinder 2 consists of a cup 3 tightly pressed thereinto, forming a closed bottom for the cylinder. The upper end of the cylinder is extended laterally as an annular striking head 4 whose striking surface is shown at 5.

The piston 6 which has packing rings 7, is provided with an annular striking head 8 and annular depending guide 9. The striking head 8 is adapted to strike the head 4 on the full descent of the piston in the cylinder and when the piston is fully down, there remains the clearance space 10 for the admission of air below the piston.

The table 11 rests on the upper end of the piston at 12 and is provided with depending annular concentric flanges 13 and 14 which are connected at intervals by strengthening brackets 15. The inner flange 13 has a driving or force fit with the circular exterior of guide 9 at 16. The double top piston guide provided by the piston body and the guide 9 enables a maximum size of table 11 to be used with a minimum of vibration, the table and piston being nearly as rigid as though formed in one piece. The provision of the flanges 13, 14, with connecting brackets 15, afford the requisite size or diameter of table without undue heaviness.

One or more safety bolts 17 pass loosely through the striking head 4 and are tightly fitted in the striking head 8 and held by the abutment of the table thereof at 12. These bolts should be of sufficient length to permit slightly more than the normal play of the piston.

One or more guide pins 18 tightly driven in guide 9 work in lugs 19 on the cylinder and prevent turning of the piston in said cylinder.

The exterior of the piston has an annular oil groove 20 which can be fed in any manner through hole 21. A hole or holes 22 extending through the side wall of the cylinder conduct oil from the interior of the cylinder to the guide pins 18 for their lubrication. The travel of the oil film is up and down in the cylinder and also between the striking heads 4 and 8 and down inside the guide 9, keeping all parts adequately lubricated and preventing access of dirt or grit to the working parts.

In the side of the cylinder is an air intake 23 to admit the air through port 24 for elevating the piston; the exhaust port 25 and exhaust outlet 26 let out the exhaust air. Suitable pipes may be entered at 23 and 26.

In the solid base 27 of the piston is a radial frusto-conical chamber or socket 28 and communicating therewith and opening out through the lower face of the base is a port 29 through which the air is delivered to the clearance space 10 below the piston. Communication between the socket 28 and ports 24 and 25 is controlled by a segment valve 30 having an intake port 31 and an exhaust port 32 adapted to register, respectively, with ports 24 and 25 when the piston is down and up. The valve is held against the valve seat by a pin 33 and spring 34 disposed in the chamber or socket 28, the action of the spring and pin on the valve being substantially the same as that of the spring in my Patent No. 1,031,084. The pin, while preventing the spring from buckling, does not interfere with the flexing of the spring as the piston rises and falls. Clearance grooves 35 and 36 at the ends of the valve seat prevent the valve from forming shoulders at the ends of its travel.

The two ports 31, 32 are provided, instead of the single port of my Patent No. 1,031,084, because a single port is of greater width than the valve travel which leaves a portion of the valve seat untouched by the valve at any point of travel and results in uneven wear of the valve seat, resulting in leakage. It is necessary that the surface of the valve travel over the entire valve seat to prevent uneven wear. Were it possible to make the division wall between the intake and exhaust ports 24 and 25 so narrow that the short valve travel of the machine would cover the entire valve seat, one port in the valve would be sufficient.

At one side of the bottom of the piston there are guides 37, above which the mouth of the socket 28 opens out through the side of the piston. The valve 30 is disposed in the upper portion of said mouth. In the lower part of the mouth is a loose stool 38 whose legs 39 are adapted to slide in the guides 37 and whose top serves as an abutment or stop to arrest the valve 30 on the descent of the piston. The lower ends of the legs 39 rest on the bottom of the cup 3. The clearance 40 between the bottom of the stool top and the portion 41 of the piston determines the extent of upward play or movement of the piston. The striking of the valve on the stool, on the descent of the piston, causes its promp arrest and prevents overthrow of the valve. By changing the depth of the clearance 40, the play of the piston can be changed, as desired, without changing the valve. This may be accomplished by the use of stools having different sizes of clearance space 40, by the substitution of one stool for another. The shoulder 42 on the piston serves to kick the valve downwardly on the descent of the piston.

A suitable controlling valve is provided on the air intake pipe. Any desired lubricators may be provided on the air intake line to deliver oil to the valve by the air pressure.

The mold to be jolted or "rammed" having been placed on the table 11, air is admitted to the intake 23, thence passing via ports 24, 31, space 28 and opening 29 to clearance 10, causing elevation of the piston. The flexing of spring 34 holds the valve stationary until the piston rises to an extent equal the clearance space 40, whereupon the piston lifts stool 38 bodily, carrying valve 30 with the latter and putting ports 25 and 32 into communication and ports 24, 31 out of communication. The air supply is thus cut off and the air under piston allowed to exhaust. The descent of the piston then occurs by gravity, the stool 38 falling with it and the valve remaining in the position set until shoulder 42 strikes the valve and knocks it down again, for a repetition of the operation.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a machine of the class described, the combination with a cylinder, of a piston having a depending guide arranged exteriorly of the cylinder and coöperating therewith, and a table carried by the piston and telescoping over said guide and extending laterally beyond said guide.

2. In a machine of the class described, the combination with a cylinder having an annular head, of a piston having a depending annular guide telescoping around and bearing on the annular piston head, and a table telescoping over and fitting the depending annular guide and extending laterally beyond said guide.

3. In a machine of the class described, the combination with a cylinder having a striking head at its mouth, of a piston having a striking head adapted to coöperate with the aforesaid striking head, and also provided with a depending guide telescoping over the striking head on the cylinder and bearing against the side thereof, and a table carried by said piston.

4. In a machine of the class described, the combination with a cylinder having an annular striking head at its mouth, of a piston having an annular striking head adapted to coöperate with the striking head aforesaid, and also provided with a depending annular guide telescoping over the annular striking head on the piston and bearing against the side thereof, and a table telescoping over, and fitting, the annular guide and extending laterally beyond said guide.

5. In a machine of the class described, the combination with a cylinder, of a piston, a table carried by the piston, a guide pin carried by the piston, a guide lug on the cylinder coöperating with said pin, said piston

having an oil channel and said cylinder having an oil hole communicating with the interior of the cylinder and with the guide lug.

6. In a machine of the class described, the combination with a cylinder, of a piston having a head, safety bolts carried by the piston head and working in guides on the cylinder, and a table carried by the piston, said table holding the safety bolts in position.

7. In a machine of the class described, the combination with a cylinder, of a piston, admission and exhaust ports, a ported shiftable piston-controlling valve carried by the piston, and a stop stool loosely arranged to be kicked by the movement of the piston in one direction and stopped by the cylinder on opposite movement of the piston and, in turn, shift, or arrest, the valve.

8. In a machine of the class described, the combination with a cylinder, of a piston, admission and exhaust ports, a ported shiftable piston-controlling valve carried by the piston, and a stop-stool adapted to rest on the cylinder and normally separated from the piston by clearance space, said stool, when engaged by the piston, being adapted to kick the valve in one direction, and means on the piston adapted to kick the valve in the opposite direction.

9. In a machine of the class described, the combination with a cylinder, of a piston, admission and exhaust ports in the cylinder, a ported shiftable spring-pressed valve carried by the piston and bearing against the ported portion of the cylinder and adapted to remain where set, said piston having means to engage and shift the valve in one direction, and a stool normally resting on a wall of the cylinder and separated from the piston by a free clearance space and serving as a stop for the valve when the latter is kicked by the piston, said stool also serving as a valve kicking device.

10. In a machine of the class described, the combination with a cylinder having a valve seat provided with intake and exhaust ports, of a piston-controlling spring-seated valve carried by, and shiftable in relation to, the piston, said valve being slidable on said valve-seat and having admission and exhaust ports adapted to coöperate with the ports aforesaid, said piston being adapted to kick the valve in one direction, and a loose stool supported by the cylinder and having clearance in relation to the piston, said stool alternately serving as a stop for the valve and as an actuator therefor, according to the position of the piston.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM C. NORCROSS.

Witnesses:

HARRY J. BAKER,

HELEN A. MCCULLOUGH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."