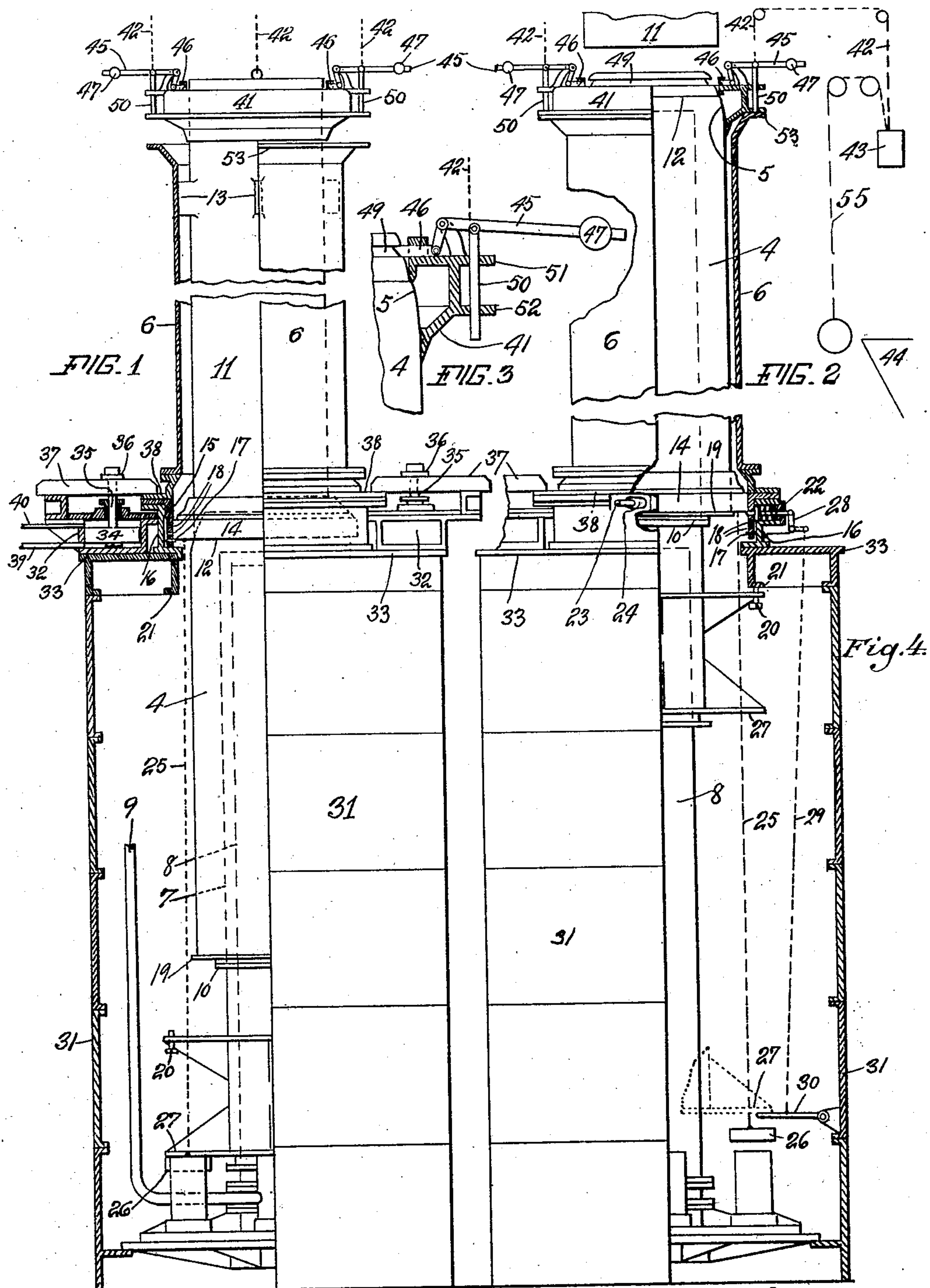


No. 877,998.

PATENTED FEB. 4, 1908.

F. HERBERT.
MACHINE FOR FORMING SAND MOLDS.

APPLICATION FILED AUG. 13, 1906.



Witnesses

A. Spurr.
A. D. Curtis.

Inventor
Fred Herbert

By his Attorneys

Brown, Darby & Hopkins

UNITED STATES PATENT OFFICE.

FRED HERBERT, OF BIRTLEY, ENGLAND.

MACHINE FOR FORMING SAND MOLDS.

No. 877,998.

Specification of Letters Patent.

Patented Feb. 4, 1908.

Application filed August 13, 1906. Serial No. 330,292.

To all whom it may concern:

Be it known that I, FRED HERBERT, a subject of the King of Great Britain, residing at Birtley, county Durham, England, have made
5 a certain new and useful Invention in Machines for Forming Sand Molds, of which the following is a specification.

The invention relates to machines for forming sand molds.

10 The object of the invention is to provide a construction of machine for forming sand molds and accessory parts therefor, which is simple and efficient in operation.

15 A further object of the invention is to provide means for positively returning the socket pattern to its initial position when the machine has completed its work.

20 A further object is to provide means for adjustably regulating the extent of movement of the socket pattern when advancing to its work.

25 A further object is to provide means whereby that portion of the mold which is known as the socket may be smoothed or ironed or sleeked upon the surface thereof which is formed by the socket pattern.

A further object is to provide hydraulic mechanism for holding and locking the flask in position.

30 Other objects of the invention will appear more fully hereinafter.

35 The invention consists substantially in the construction, combination, location and relative arrangement of parts, all as will be more fully hereinafter set forth, as shown in the accompanying drawing and finally pointed out in the appended claims.

Referring to the accompanying drawing and to the various views and reference signs
40 appearing thereon,—Figure 1, is a view, partly in side elevation and partly in central longitudinal section, of a machine embodying the principles of my invention and showing the parts in their initial positions. Fig. 2 is a
45 broken view, partly in central longitudinal section and partly in side elevation, of the upper ends of the flask and main pattern, and showing the parts in their relative positions when the spigot pattern has completed
50 its work and is released from locking engagement with the end of the main pattern. Fig. 3, is a broken detail view showing a form of automatic locking and unlocking mechanism for the spigot pattern. Fig. 4 is a broken
55 view partly in central longitudinal section and partly in side elevation of the main

casing and the lower end of the flask, and showing the main and socket patterns in their extreme limits of working positions.

The same part is designated by the same
60 reference sign wherever it occurs throughout the several views.

In the practical operation of machines for forming sand molds and especially in machines of the plunger type wherein the mold
65 pattern is carried upon a piston or plunger and is forced longitudinally through a suitably arranged flask containing the sand or other composition to form the mold, it is customary to employ auxiliary patterns to
70 give the mold the proper form to produce the desired shapes of the ends of pipe sections to be cast in the mold. These auxiliary patterns are called the socket pattern and the spigot
75 pattern, one of which may also be so shaped as to form the gate for the introduction of the molten metal in forming the casting. In machines of this class it is desirable that the
80 operations thereof be continuous and automatic so far as possible in order to facilitate the production of the mold and to avoid the loss of time and manual labor required in
85 manual operations. To this end it is desirable that the socket and spigot patterns be automatic in their operations, as far as possible.

One feature of my present invention therefore concerns the construction arrangement and manner of operation of the socket
90 pattern and has in view the provision of means for adjustably regulating the advance of the socket pattern to its work, and means for positively insuring the withdrawal of the same from its working position at the proper
95 time in the operation of the machine. Where a socket pattern has merely been advanced into its working position it effects a compressing or compacting operation upon the sand or other composition employed
100 without any smoothing or ironing effect upon the surface of the portion of the mold shaped or formed thereby and hence when such pattern is again withdrawn from its advanced or
105 working position it leaves the surface of the mold with which it contacted rough and in unfinished condition.

My invention also has in view the provision of means for sleeking, smoothing or ironing the surface of that portion of the mold
110 formed by the socket pattern.

My invention also contemplates the provision of means for automatically unlocking

the socket pattern from its working position preparatory to its positive withdrawal to initial position.

Another feature of my invention concerns itself with means for automatically locking and unlocking the spigot pattern to the main pattern and has in view the provision of a simple and efficient construction for accomplishing this result.

Another special feature of my invention is the provision of means locking the flask in position as will be hereinafter more fully pointed out and explained.

Referring to the accompanying drawing reference sign 4, designates the main pattern, which, as shown, is in the form of a tube open at one end and having its opposite end rounded or convexed as indicated at 5. This main pattern is designed to be forced longitudinally through a flask 6, suitably supported in alinement therewith and adapted to contain the sand or other composition to form the mold. The main pattern may be advanced through the flask in any suitable or convenient manner. I have shown a power mechanism for accomplishing this result consisting of a tubular piston 7, closed at one end and telescoped over a central stationary guide tube 8, into which water may be delivered through a pipe connection 9, from a convenient source. The main pattern 4 is telescoped over the piston or plunger 7, and is supported thereon by resting upon a flange or other support carried thereby and indicated by reference sign 10. The power mechanism shown and described and the arrangement of the main pattern thereon, however, in the specific construction and details thereof, form no part of my present invention and therefore I do not desire to be limited or restricted to any particular form, construction or arrangement of actuating mechanism.

In order to enable the sand or other composition to be supplied to the flask and retained in place till the main pattern is advanced through the flask to perform its work of compressing such sand or composition to the required density and ironing out or smoothing the surface thereof, in contact with which the pattern moves, it is customary to employ what may be called a measuring or displacing tube, indicated at 11. This tube, when not required for use, is held suspended over the flask or may be supported in any suitable or convenient manner to be lowered into the flask and into position for the lower end thereof, to receive and rest upon the upper or rounded end of the main pattern, or upon a shoulder 12, formed thereon, as clearly indicated in Fig. 1, whereby said tube is supported and centered. The upper end of the tube may be centered in the flask in any suitable or convenient manner, as, for instance, by means of a spi-

der 13. The socket pattern 14, is in the form of a ring and is arranged within a chamber formed by a flanged band or ring 15, which, if desired, may be supported within the annular frame casing 16. The socket pattern in its normal or retracted position is supported upon pins 17, adapted to be received in holes 18, formed through the ring 15, whereby the initial height of the socket pattern may be adjustably regulated. The socket pattern is supported in position for the main pattern 4, to move or travel freely therethrough when advanced to its work, or when withdrawn to initial position.

Preliminary to charging of filling the flask with sand or other composition, and either before or after the measuring or displacing tube is placed in position the main pattern is raised until the tapered end thereof extends through the socket pattern and above the top edge thereof. The sand or other composition is then introduced through the upper end of the flask and into the space formed between the inner surface of the flask the exterior surface of the displacing tube, the exterior surface of the tapered end of the main pattern and the upper surface of the socket pattern. Thus it will be seen that the tube 11 performs the function of measuring or regulating the amount of sand or other composition required, and hence the propriety of its name of "measuring" tube.

When the flask is filled with sand or other composition as just explained, the machine is ready to be started up. Power is then applied to the main pattern to advance the same longitudinally through the flask, said pattern, during its advancing movement, working freely through the socket pattern. As the main pattern advances through the flask the tapered surface on the entering end thereof effects the compression of the sand or other composition while the cylindrical surface of such pattern performs the function of ironing or smoothing the inner surface of the compressed sand or composition. At the same time the displacing or measuring tube is being raised or carried along with the main pattern until it finally emerges or is carried entirely above the upper end of the flask. It is then removed until again required for use.

Before the main pattern reaches the limit of its advancing movement it is desirable to provide means for advancing the socket pattern to its work. This may be accomplished in many different ways. I have shown an efficient arrangement for accomplishing this result wherein the main pattern is provided with a flange or shoulder 19, adapted to engage underneath the base edge or end of socket pattern and thereafter the socket pattern and the main pattern move together, the socket pattern being thereby caused to perform its function of compressing

the sand or other composition to properly shape or form that portion of the mold which forms the socket end connection in the casting to be produced therefrom. At the same time it also compresses the sand in the lower end of the body of the flask just above the socket and which has been left unrammed by the main pattern. It is desirable to adjustably regulate the extent of advancing movement of the socket pattern when thus advanced to its work. Many specifically different constructions for accomplishing this result may be devised and still fall within the spirit and scope of my invention. While, therefore, I have shown an exceedingly simple and efficient arrangement and consisting merely in tapping limit screws 20, through a flange of the plunger piston 7, and which abut against a convenient flange or part 21 of the stationary frame or casing of the machine, thereby adjustably limiting the upper limit of travel or movement of the main pattern, and hence also of the socket pattern, I do not desire to be limited or restricted to this construction and arrangement.

When the socket pattern reaches the limit of its advancing movement it is desirable to positively lock the same in that position whereby, while the main pattern is being withdrawn to its initial position the danger is avoided of breaking or injuring the socket portion of the mold formed by the socket pattern. To this end a spring pressed locking bolt 22 is arranged to be projected through the socket retaining ring 15, and into position to engage underneath the socket pattern when the latter reaches its extreme working position, thereby positively locking the same in such position.

If the socket pattern were merely advanced to its working position and then withdrawn again, without further manipulation thereof the sand or other composition would be compressed but the surface thereof would be left in a rough condition. In order to avoid this objection and to provide means for ironing or smoothing the surface of the socket portion of the mold, I arrange the socket pattern to be axially rotated within its supporting ring 15, and I connect a shaking handle 23, to the socket pattern, said handle adapted to project through a slot 24, in the casing, whereby the socket pattern, after it has been advanced to form the socket of the mold, may be given axial rotative movements, thereby sleeking, ironing and smoothing the surface of that portion of the mold in contact with which the socket pattern bears. Many other specifically different constructions and arrangements may be devised for accomplishing the same result. I do not desire, therefore, to be limited to the particular means shown and described, as my invention in this respect is broad in scope.

I will now describe means for positively withdrawing the socket pattern to its initial position at the proper time in the operation of the machine.

Connected to the socket pattern are chains, rods or other connections 25, carrying at their lower ends stop weights 26, arranged to be engaged by a flange or other projection 27, on the plunger piston as the latter approaches its retracted position, whereby, through the pull exerted on the connections 25, as the plunger piston continues its downward movement, the socket pattern is positively withdrawn to its initial or retracted position. Before this can be accomplished, however, the socket pattern locking bolt 22, must be withdrawn from engaging relation with the socket pattern. To accomplish this result, I connect one arm of a pivotally mounted bell crank lever 28, to the locking bolt, and to the other arm of said lever I connect a chain, rod or other suitable connection 29, and I attach the lower end of said connection to an arm 30, pivotally mounted in the casing or framing 31, of the machine, in position for the free end thereof to extend into the path of the flange or other projection 27, of the plunger piston, and the arrangement is such that the flange or projection 27, engages and rocks the arm 30, thereby exerting a pull on connection 29, and a consequent withdrawal of the locking bolt 22, before said flange or projection 27, engages the stop weights 26, to effect a return of the socket pattern to its initial position. It is obvious that as many connections 25, 29, and stop weights 26, arms 30, and locking bolts 22, may be employed as may be necessary or desired.

It is important to provide means for releasably locking and holding the flask 6, in position upon the frame or casing of the machine and with sufficient power to resist the force by which the main pattern and the socket pattern are operated to perform their respective functions. In the accomplishment of this result I mount cylinders 32, upon the top plate 33, of the machine frame or casing, and at suitable or convenient points around the central opening therethrough through which the main pattern operates. In each cylinder is arranged a piston 34, having the rod 35, to which is connected a cross bar 36, arranged to engage locking plates 37, which are positioned to engage the flange 38 formed on, or secured to, the end of the flask 6. The pistons may be operated in any suitable or convenient manner to cause the locking plates 37, to be clamped down on the flange 38, of the flask, or to be released therefrom to permit the removal of the flask, when desired. In the particular form shown, to which, however, my invention is not to be limited or restricted, I ad-

mit a motive fluid to the cylinders 32, at points on each side of the pistons, as for instance through the pipe connections 39, 40.

The spigot pattern 41, is supported in any
 5 convenient manner over the upper end of the flask until required for use and in position to be lowered upon the advancing end of the main pattern when it emerges above the upper end of the flask. The displacing or measur-
 10 ing tube operates freely through this spigot pattern. In the particular form shown, to which, however, my invention is not to be limited or restricted, the spigot pattern 41, is suspended through chains or other connec-
 15 tions 42, and counterbalancing weights 43, the latter adapted to be received and supported upon brackets 44. Any desired number of suspending weights and connections may be employed. The suspending con-
 20 nections 42, are connected to the long arms of bell crank levers 45, pivotally mounted at their angles upon the spigot pattern, the other arms of said levers being connected to locking bolts 46. Weights 47, are
 25 mounted upon the long arms of levers 45, for adjustment therealong. The end of the main pattern 4, is provided with a peripheral groove or seat 49, to receive the inner ends of the locking bolts 46. To the long arms of
 30 levers 45, are pivotally connected rods 50, which depend therefrom and work loosely through openings formed in the flanges 51, 52, of the spigot pattern, and the lower ends of which are designed to abut against the
 35 flange 53, on the upper end of the flask when the spigot pattern is caused to approach such upper end whereby said rods 50, are positively projected endwise thereby rocking said
 40 levers 45. The weights 47, are so relatively proportioned and positioned as to normally tend to rock the bell crank levers 45, in a direction to cause the inner ends of the locking bolts 46, to be projected inwardly. When
 45 the spigot pattern is held suspended, however, by the counterbalancing weights 43, the action of weights 47, is overcome and said levers 45, are rocked in a direction to withdraw the bolts 46, from their projected position. This same action also takes place
 50 when the spigot pattern is caused to approach the end of the flask whereby the rods 50, abut against the flange 53 and are thereby projected endwise, as will be readily understood. The operation of this part of my in-
 55 vention is as follows: When the rounded upper end of the main pattern emerges from the upper end of the flask in the upward stroke of such pattern, said end is received in the bore of the spigot pattern which is suspended thereover, by lowering the spigot
 60 pattern thereon. As the main pattern continues its upward movement the pull of the counterbalancing weights 43, upon connections 42, is relieved by pulling the hand
 65 chains or other connections 55, or otherwise,

thereby causing the connections 42, to become slack, the weight of the spigot pattern being imposed upon the main pattern. By the slackening of the connections 42, the weights 47, are permitted to rock levers 45, 70
 in a direction to project the locking bolts 46 into locking engagement with the groove 49, in the end of the main pattern, whereby the spigot pattern is automatically locked to the main pattern. When this operation is com- 75
 pleted, the direction of movement of the main pattern is reversed and it begins its downward stroke carrying the spigot pattern downwardly with it thereby causing said
 80 spigot pattern to approach the upper end of the flask and to accomplish its work of properly shaping the sand or other composition in the upper end of the flask to form the spigot end of the mold and to form the
 85 gate therein, as above explained. As the spigot pattern continues its downward movement the ends of the rods 50, are eventually brought into contact with the flange 53, of the flask whereby said rods are projected
 90 endwise thereby rocking levers 45, in a direction to effect the withdrawal of the locking bolts 46, from engaging relation with respect to the main pattern and hence auto-
 95 matically releasing the spigot pattern from the main pattern, whereupon the pull on the hand chain or connection 55, is released and counterbalancing weights 43, become effective to raise the spigot pattern to its initial sus-
 pended position ready for the next operation.

It is believed that the operation of the ma- 100
 chine will be fully understood from the foregoing description taken in connection with the accompanying drawing.

Many changes and modifications in the de- 105
 tails of construction and arrangement might readily suggest themselves to persons skilled in the art and still fall within the spirit and scope of my invention. I do not desire, therefore to be limited or restricted to the specific details shown and described. But 110

Having now set forth the object and nature of my invention and a construction embodying the principles thereof, and having explained such construction, its objects, purposes, and mode of operation, what I claim as new and useful and of my own invention and desire to secure by Letters Patent is:— 115

1. In a machine for making sand molds, a flask to receive the sand, a main pattern, means for moving the same into the said 120
 flask, a socket pattern, means for moving the same up to its work and means actuated by said main pattern moving means for positively withdrawing the same to initial position. 125

2. In a machine for making sand molds, a flask a main pattern, and means for moving the same into said flask, in combination with a socket pattern, means for advancing the same to its working position, and stops for 130

adjustably regulating the extent of such advancing movement.

3. In a machine for making sand molds, a flask, a main pattern, and means for moving the same into said flask, in combination with a socket pattern, means for advancing the same to its work, means for locking the same in its working position, means for releasing said locking means, and means actuated by the main pattern moving means for positively returning said socket pattern to its initial position.

4. In a machine for making sand molds, a flask, a main pattern, and means for moving the same into said flask, in combination with a socket pattern, means connected to move with the main pattern and arranged to engage the socket pattern whereby said socket pattern is advanced to its work, means for locking the socket pattern in its working position, means for automatically releasing said locking mechanism, and means for positively returning the socket pattern to its initial position.

5. In a machine for making sand molds, a flask, a main pattern, and means for moving the same into said flask, in combination with a socket pattern through which the main pattern freely works, a flange carried by the main pattern, and arranged to engage the socket pattern to advance the latter to its work, and means for positively withdrawing said socket pattern to its initial position.

6. In a machine for making sand molds, a main pattern, and means for moving the same into and out of said flask, in combination with a socket pattern, means for advancing the same into working position, means connected to said socket pattern and arranged to be engaged by the main pattern moving means during the withdrawal movement of the main pattern whereby said socket pattern is positively withdrawn to its initial position.

7. In a machine for making sand molds, a flask, a main pattern, and means for moving the same into and withdrawing the same from said flask, in combination with a socket pattern, means for advancing the same into working position, withdrawing means connected to said socket pattern, and means actuated by the main pattern moving means, arranged to engage said withdrawing means during the withdrawal movement of said main pattern whereby said socket pattern is positively withdrawn to initial position.

8. In a machine for making sand molds, a flask, a main pattern, a plunger for moving said pattern into, and withdrawing the same from said flask, in combination with a socket pattern arranged to be engaged by said main pattern, as the latter approaches the limit of its working movement, whereby said socket pattern is advanced to its work, and connections connected to said socket pattern and

having means arranged to be engaged by said plunger during the withdrawal movement thereof whereby said socket pattern is positively withdrawn to initial position.

9. In a machine for making sand molds, a flask, a main pattern, a plunger for moving said pattern into and withdrawing the same from said flask, in combination with a socket pattern having withdrawing devices connected thereto, said socket pattern arranged to be engaged by said main pattern as the latter approaches the limit of its movement into the flask, whereby said socket pattern is advanced to its work, means for locking said pattern in its working position, and means for releasing said locking mechanism, said plunger arranged to engage said withdrawing devices during the movement thereof to initial position whereby said socket pattern is positively withdrawn to initial position.

10. In a machine for forming sand molds, a flask, a main pattern, and means for moving the same to its work, in combination with a socket pattern, means for advancing the same to working position, a locking bolt for locking the same in working position, a bell crank lever connected to said bolt, withdrawing means connected to said lever, an operating arm to which said withdrawing means is connected and means operated by the main pattern operating means for rocking said arm, whereby the locking bolt is withdrawn and means for positively withdrawing the socket pattern to initial position.

11. In a machine for forming sand molds, a flask, a main pattern, an operating plunger therefor, said pattern and plunger provided with flanges, a socket pattern, a locking bolt therefor, a pivoted arm connections between said arm and locking bolt, withdrawing devices for the socket pattern, the plunger flange arranged to engage and rock said arm to withdraw said bolt, said flange also arranged to engage said socket withdrawing devices for returning said socket pattern to initial position.

12. In a machine for forming sand molds, a flask, a main pattern, and means for operating the same, in combination with a socket pattern arranged to be engaged by said main pattern, whereby said socket pattern is advanced to its work, and adjustable set screws for limiting the advancing movement of said socket pattern.

13. In a machine for forming sand molds, a flask, a main pattern, and a flanged plunger for operating the same, in combination with a socket pattern, means actuated by the plunger for advancing the socket pattern to its work, and set screws mounted in the flange of said plunger, and arranged to engage a fixed part of the framework to adjustably regulate the extent of advancing movement of said patterns.

14. In a machine for forming sand molds,

a flask, a main pattern, and means for advancing said pattern to its work, in combination with a socket pattern, arranged to be engaged by the main pattern as it approaches the limit of its advancing movement whereby said socket pattern is advanced and means independent of the socket pattern advancing means and for rotatively moving said socket pattern relative to the main pattern.

15. In a machine for forming sand molds, a flask, a main pattern, and means for advancing said pattern to its work, in combination with a socket pattern, means for advancing said socket pattern to its work, said socket pattern being mounted for rotative movement relative to said main pattern, and means adapted to be engaged with said socket pattern, to rotatively move the same relative to the main pattern.

16. In a machine for forming sand molds, the combination of a flask, a main pattern, and a socket pattern, means for advancing the main pattern to its work longitudinally through the socket pattern, a flange on the main pattern for advancing the socket pattern to its work and means for rotatively moving the socket pattern independently of the main pattern.

17. In a machine for forming sand molds, a flask, a main pattern, and a socket pattern, in combination with means for advancing the main pattern to its work longitudinally through the socket pattern, means for advancing the socket pattern to its work, and means independent of the socket pattern advancing means adapted to engage the socket pattern when in its advanced position for rotatively moving the same independently of the main pattern.

18. In a machine for forming sand molds, a flask, a main pattern, and means for advancing the same to its work, in combination with a socket pattern, a ring in which said socket pattern is mounted for rotative movement, said ring being slotted, and a handle

operating through said slot to rotatively move the socket pattern.

19. In a machine for forming sand molds, a flask, a pattern, and means for moving the pattern longitudinally through said flask, in combination with power actuated mechanism for clamping and holding said flask in longitudinal alinement with said pattern and for releasing said flask.

20. In a machine for forming sand molds, a flask, a pattern, and means for moving the pattern longitudinally through said flask, in combination with a support for the flask for holding the same in longitudinal alinement with the pattern, means for clamping said flask upon said support, and power actuated mechanism for operating and releasing said clamping means.

21. In a machine for forming sand molds, a pattern, and means for moving the same, in combination with a flask, a support therefor, power cylinders mounted on said support, and having pistons, clamps controlled by said pistons for clamping and releasing said flask, and means for supplying power medium to said cylinders to operate said pistons.

22. In a machine for forming sand molds, a flask, a main pattern, and means for moving the same, in combination with a spigot and gate pattern, and means for automatically locking said spigot and gate pattern to and releasing the same from said main pattern, including a locking bolt, a bell-crank lever for operating said bolt, a weight mounted on one of the arms of said lever, a counter balancing weight and a projecting arm, also connected to said weighted arm.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this second day of August A. D. 1906.

FRED HERBERT.

Witnesses:

WILLIS C. SWIFT,
EDWARD HALL DRACUP.