No. 648,292. Patented Apr. 24, 1900.

H. E. PRIDMORE.

MACHINE FOR MAKING MOLDS FOR CASTINGS.

(Application filed Mar. 27, 1893.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

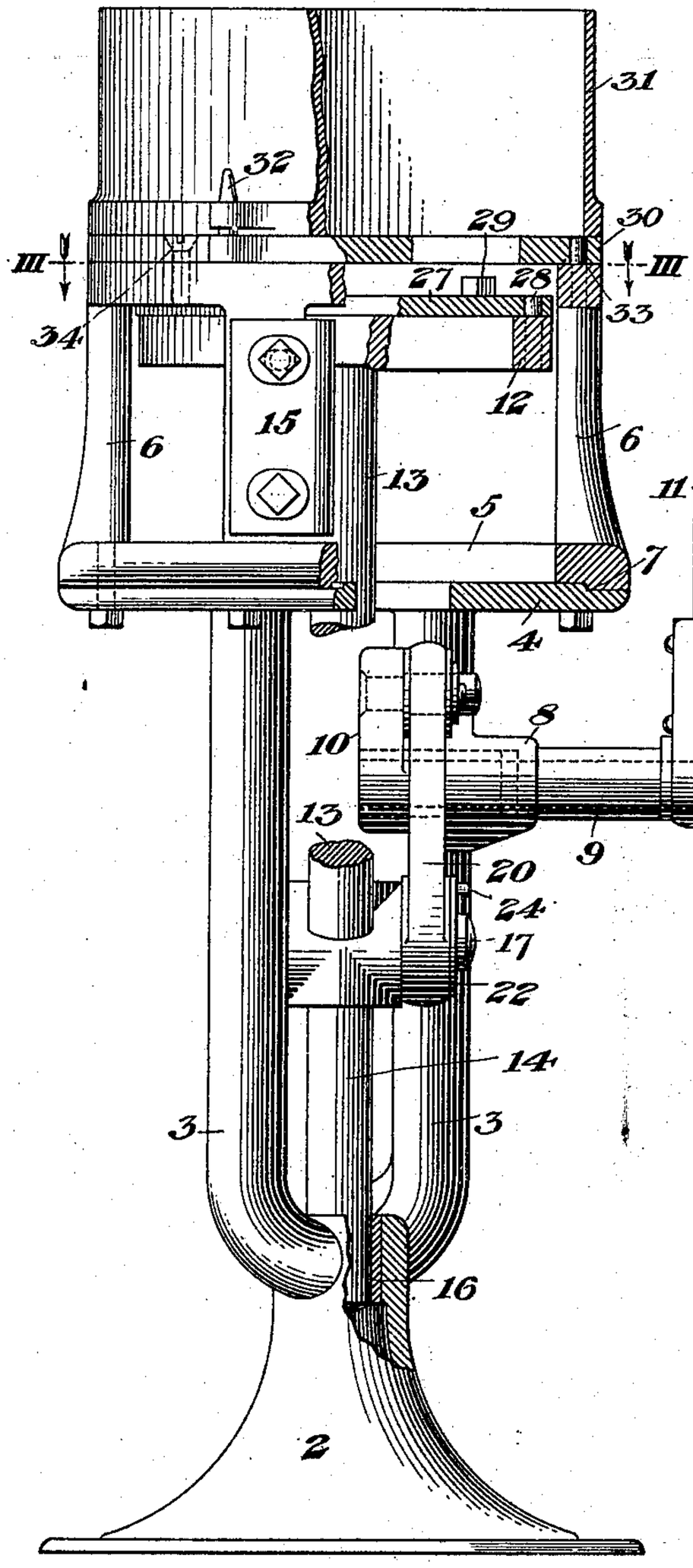

Fig. 2.

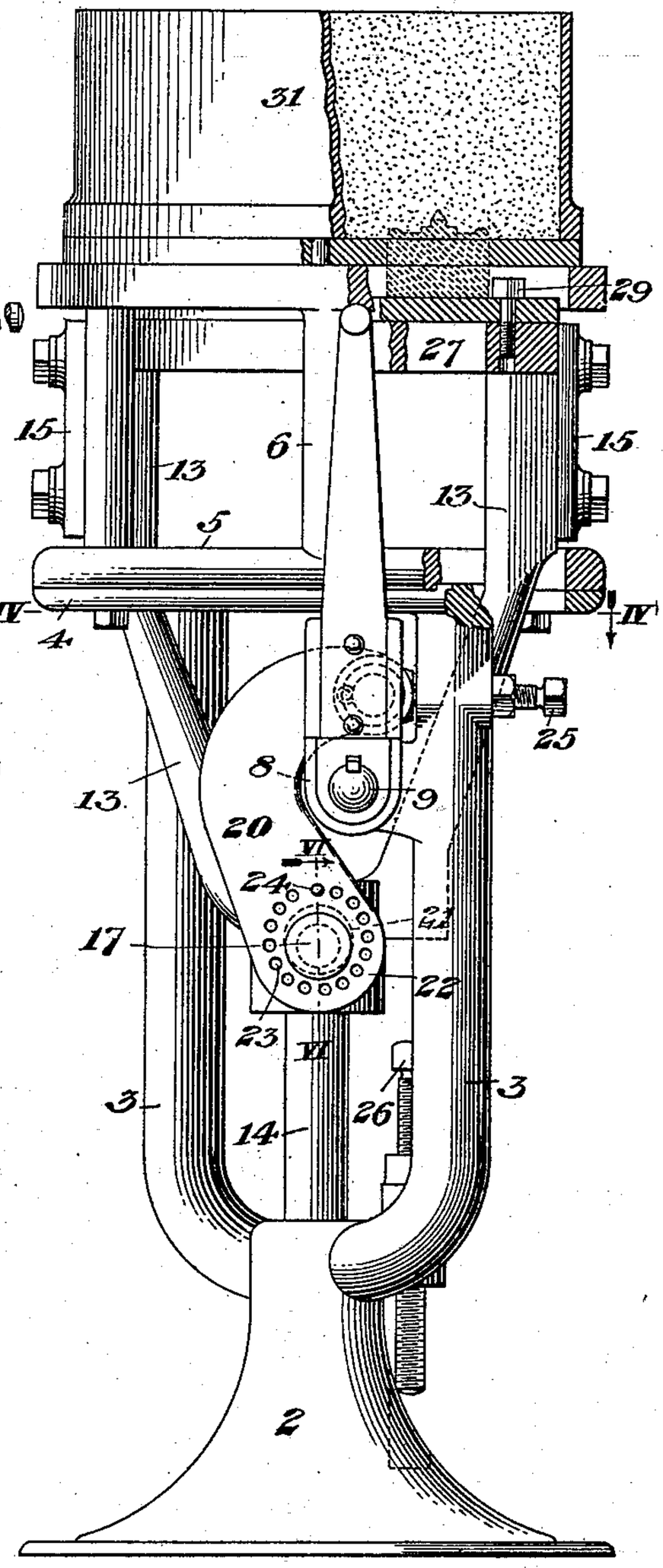

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Fig. 3.

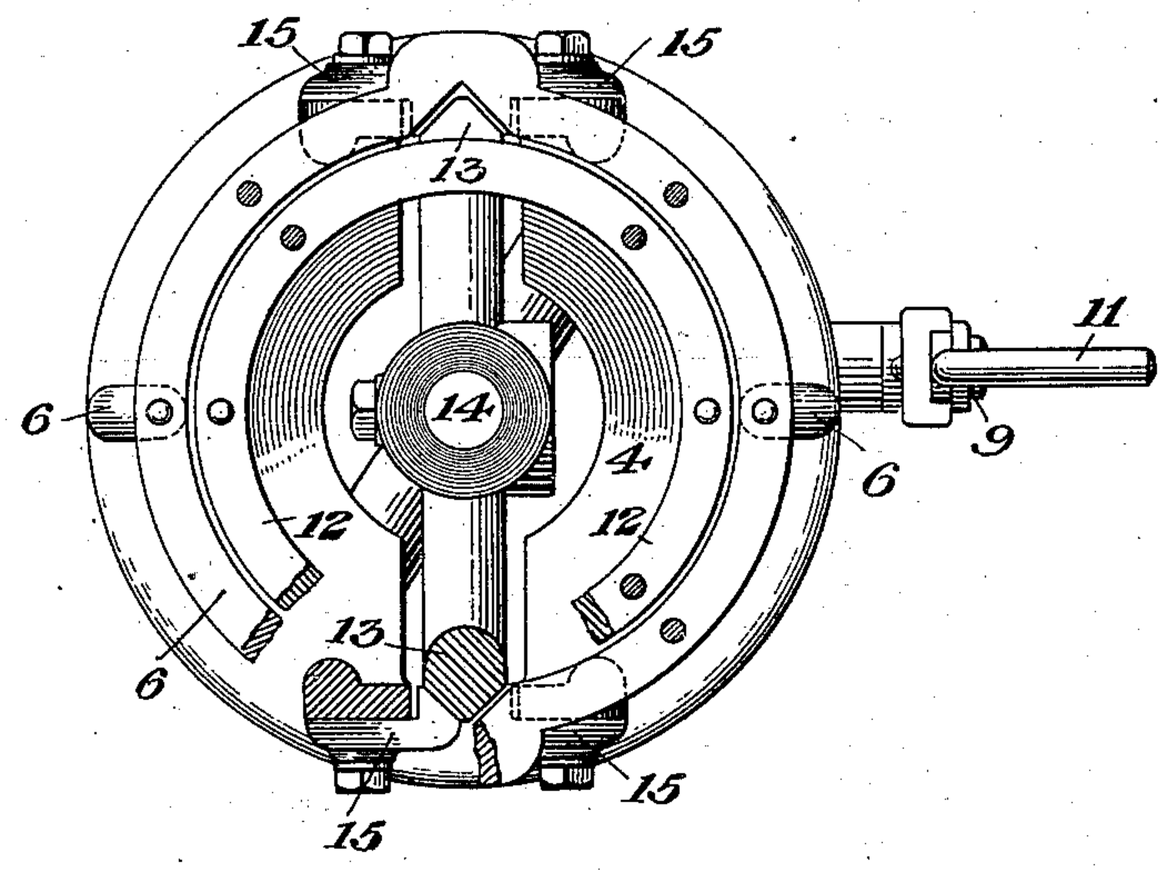


Fig. 4.

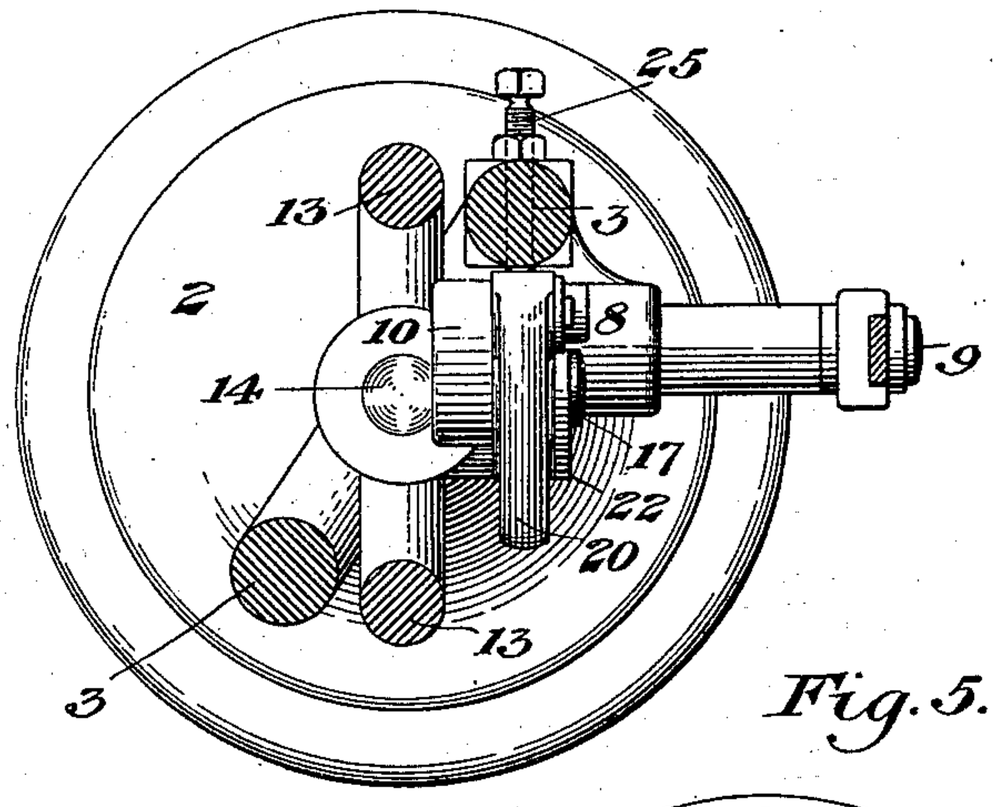
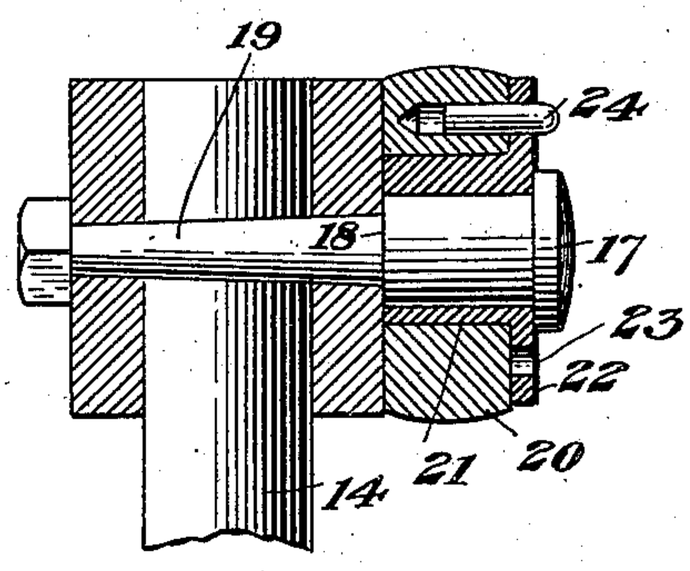
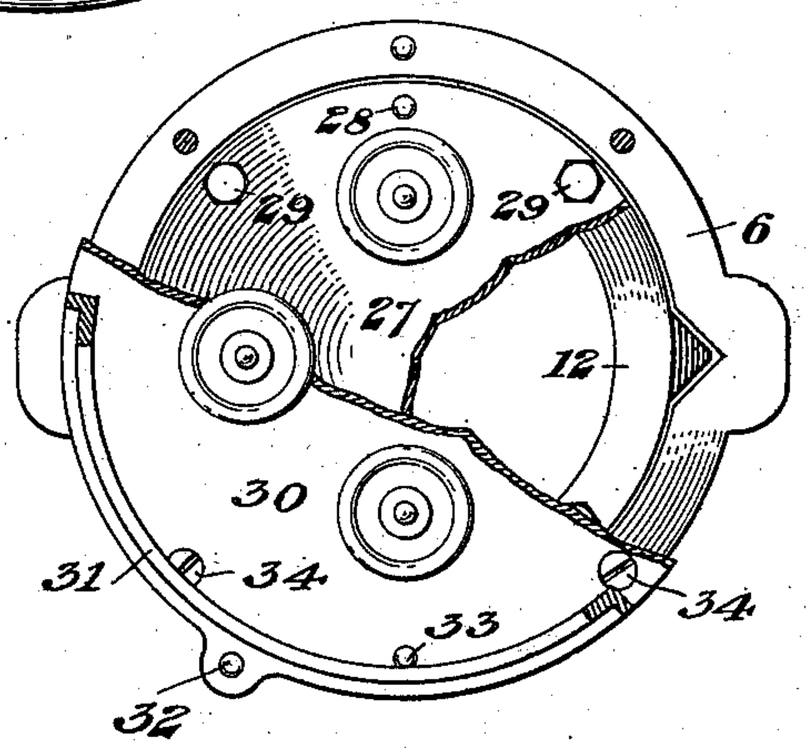


Fig. 5.

Fig. 6.





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HENRY E. PRIDMORE, OF CHICAGO, ILLINOIS.

MACHINE FOR MAKING MOLDS FOR CASTINGS.

SPECIFICATION forming part of Letters Patent No. 648,292, dated April 24, 1900.

Application filed March 27, 1893. Serial No. 467,816. (No model.)

To all whom it may concern:

Be it known that I, HENRY E. PRIDMORE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Making Sand Molds for Castings, of which the following is a full, clear, and exact description.

My invention has to do with machines of the type that project the pattern into the cope or drag through a parting-board having openings of the same peripheral outline as the pattern and after the sand is compressed therein about the pattern withdrawing the pattern through the parting-board, which acts as a support to the sand and preserves the outline of the mold. In operation molding-machines are subjected to rough usage, and it has been found impossible to make any large number of accurate molds with machines of the ordinary kind. A pattern thrust too far through the parting-board may mean the loss of much iron because of overweight, or it may mean a casting that cannot be used, and if not far enough the casting may be too weak and great loss follow from breakage. Should a pattern not be thrust through the parting-board truly, broken molds and ill-fitting castings will result.

One object of my invention is to remedy such defects by making the parts in better forms and to provide adjustments that can be very minute and still firm and solid.

Another feature has to do with the handy assembling of the parts and the ease and rapidity with which the patterns can be changed and the machine fitted to do different kinds of work.

The drawings and description hereto attached will clearly point out one form of a machine having my improvements thereon. Other combinations and details of construction will also be set forth.

In the drawings, Figure 1 is a side elevation of a machine constructed according to my invention, parts being broken away to more clearly expose the mechanism, and an empty cope or drag mounted thereon. Fig. 2 is also a side elevation, but the machine has been turned one-quarter round. Parts are broken away, as in Fig. 1, the cope or drag is shown filled with sand, and the form of a pattern is shown therein, projected through the parting-board. Fig. 3 is a top plan view on line III III of Fig. 1, with the plunger-head and plunger-head casing partly broken away to more clearly show the adjustable guides for the plunger-head. The pattern-plate is removed from the plunger-head. Fig. 4 is a sectional plan view on line IV IV of Fig. 2. Fig. 5 is a plan view, with parts of the flask, parting-board, and pattern-plate broken away. Fig. 6 is a section in elevation on lines VI VI of Fig. 2, showing an enlarged detail of the attachment of the plunger-operating pitman to the plunger.

The operative parts of the machine are mounted upon and guided by a strong frame-work, which may be of skeleton outline with diverging legs, but which I prefer, for greater strength and to prevent breakage, to make solid with a diverging bell-shaped bottom 2. From the top of this bell-shaped base I extend diverging arms 3, separated sufficiently to accommodate the working parts of the machine and extended upwardly to a height such as will bring the machine conveniently to the operator, these arms being connected at the top by an annular ring or plate 4. This arrangement forms a solid, compact, firm foundation for the other parts of the machine which are to be attached to it. Bolted to the annular plate 4 on the top of this frame is a strong iron casing 5, which may be of skeleton form—that is, in place of being solid, formed with several upright posts 6, which extend upwardly and are connected at the top and bottom by annular rings, thus making a connected, though open, vertical cylinder. This cylinder or casing 5 is bolted to the annular plate 4 of the frame, as shown in the drawings, and that it may always keep its place and be firm the annular plate 4 is rabbeted on its upper face at 7 to fit into the converse rabbet on the lower face of the casing 6. With these parts assembled and bolted together the frame of the machine is complete. Within this casing the plunger-head reciprocates, and upon the top of the casing the parting-board is positioned and fastened and the cope or drag suitably mounted.

On one of the arms 3 of the frame, in a suitable bearing 8, formed thereon or attached thereto, a crank-shaft 9 is placed, on which

a crank 10 is mounted, having at its outer end a handle 11, that the crank may be rotated by hand or power. In all other machines of this class which I have seen the bearing for this crank has been so mounted that it was impossible to slip the crank and its shaft into the bearing when they were connected. The crank-shaft was necessarily placed in the bearing from the handle end and the crank pinned thereto after being placed. In the heavy work to which these machines are subjected it has been found that any attachment of the crank to its shaft that could be made after the machine had been assembled is defective and liable to get out of order. I have therefore so constructed my machine-frame and the bearing for this crank that the crank-shaft 9 and its crank 10 can be made in one piece, or, if separately made, so firmly keyed and fastened that there can be no danger of their becoming loose and after so fastened easily slipped through the bearing 8 on the machine-frame. The handle 11 can then be attached and the crank thrown through its stroke, even though the handle may become loose upon its crank-shaft. The purpose of this crank is to reciprocate the parts so as to carry the pattern into and out of the sand. All that part of the machine that is thus reciprocated I call the "plunger." It is formed with a heavy annular ring 12 at its top, that serves as a bed for the pattern-carrying plate that is attached to it in a way that will hereinafter be explained. Rigidly connected to this annular ring 12 is a depending yoke, the arms 13 of which are carried downwardly through the annular plate 4 on the frame and between the arms of this frame and continued in a firmly-attached strong shaft 14, that is guided in its vertical reciprocation by a bearing in the top of the bell-shaped base 2 of the frame. The reciprocation of the plunger at its upper end is guided by adjustable sliding bearings on the posts 6 of the casing 5. The downwardly-extending arms 13 of the plunger-head yoke are beveled, as shown in Fig. 3, and adjustable guides 15, that are bolted to the casing and have a movement through slots cut in them and have beveled edges corresponding to the beveled edges of the plunger-yoke, furnish guides for the reciprocation of the plunger-head. These guides, with the guide below, insure the patterns being truly projected and withdrawn from the sand. A removable bushing 16 is fitted in the guide-bearing in the base of the frame and when worn can readily be replaced, thus saving a new frame.

It will be noticed in my machine that the casing 5 is of sufficient diameter to allow the plunger to be placed in it from above and that the annular plate 4 of the frame is also so cut out that the yoke of the plunger can easily pass through it. In other machines of this type it has been necessary to dismantle the machine and take off the casing and parts of the framework in order to withdraw the plunger from the machine. It will be found of great convenience when it comes to the changing of patterns or the adjusting of the parts to withdraw this plunger in the way that I have shown. In order to do so, it will only be necessary to remove the parting-board and disconnect the pitman that connects the plunger to the operating-crank. The annular plate 4, as before said, is cut out only sufficiently to allow the plunger-yoke to pass through it. Its surface thus extends into the path of the plunger, as shown in Figs. 1 and 3, and serves as a stool or stripper support when the form of the pattern necessitates the use of stools. In forming molds of pulleys, wheels having spokes, and some special castings it becomes necessary to support the sand at the center or about the spokes of the pattern and the parting-board must be supplemented by supports attached to the frame of the machine in such manner that the plunger can reciprocate about them. The plate 4 furnishes a very convenient support for such attachment.

The downwardly-extending arms 13 of the plunger-yoke are united at their lower ends and then extended downwardly into the base of the frame, so as to make a guide for the lower part of the plunger. The preferable construction for the lower extension of this plunger-yoke is to fit a removable shaft into the yoke, as shown in Fig. 6. Thus should it become worn it can be replaced without a new plunger-head. This shaft 14 is closely fitted into the yoke of the plunger and is tightly held in place by a stud 17, having shoulders 18, and the bevel-shank 19, so that it can be drawn up tightly by means of a nut and the parts firmly joined together. This stud 17 also serves as a stud for the pitman 20, that connects the plunger with its operating-crank 10. In the position in which the pitman 20 must work it has been found more convenient to make it curved and somewhat hooked in shape that it may pass over the shaft 9 as the hand-crank is vibrated. As heretofore spoken of, it is very important that the throw of the pattern into the sand be very accurate and that it be regulated by an adjustment that not only will be minute, but that will when once adjusted invariably stay in its place without getting loose and causing trouble. The making of this adjustment is one of the features of this invention. The pitman 20 has fitted in one of its bearings, as shown in Fig. 6, a bushing 21. This bushing is bored eccentrically to fit the shank of the stud 17. The bushing 21 has a flange 22, that extends along the face of the pitman, and around the flange are holes 23. These holes 23 are arranged as closely together as is possible and still retain sufficient strength to hold the bushing in place. Beginning at a position on the bushing that will give the plunger-head its greatest throw these holes are arranged at equal distances apart when the bushing is turned in one direction, but

are so arranged that as the bushing completes its rotation the last movement will be greater, or, in other words, the final holes will be a greater distance apart than the others are—for instance, one and one-half times the distance between the other holes. It will thus be seen that the throw of the plunger is easily set to very minute adjustments. If the bushing be revolved in one direction, it can be adjusted through equal distances to any degree, while if thrown in the other direction it can be given a greater movement. If an adjustment of one-half the distance between the holes is required, the bushing can be thrown to the other side of the center into the hole corresponding with that from which it has been removed. A pin 24, passing through the flange of the bushing into the pitman, holds the bushing in the desired place. A heavy set-bolt 25 on the machine-frame limits the throw of the crank over its center, and one below 26 limits the draw or downward movement of the plunger and renders it possible to use the machine for making patterns of different heights.

On the plunger the plate 27 that carries the pattern or patterns is mounted. It is my intention to gage the fitting of the patterns to the pattern-plates by means of dowel-pins 28. These pins are bedded in the ring 12 of the plunger-head located in a fixed relation to the dowel-pins 33 on the machine-frame, by which the parting-board is to be positioned, as will be hereinafter explained. The known relation between the dowel-pins for the parting-board and those for the pattern-plate on the machine and the fact that the pin-holes in the parting-boards and pattern-plates intended for use with the machine have the same relation will serve as a guide for the quick forming of the openings in the parting-board and the fitting of the patterns to and upon the pattern-plates. Again, this known relation of these pins on the machine and the holes on the parting-boards and pattern-plates intended to receive them will permit the machine to be changed from the making of one part of the mold to the making of another part—that is to say, after the cope has been molded the drag can be molded on the same machine and its alinement with the cope will be accurately insured if the pattern-plate and the parting-board for the drag have been positioned and formed with proper reference to the pin-holes on the pattern-plate and parting-board for the cope. This plate 27 after having been placed upon the ring 12 of the plunger-head upon the dowel-pins 28 can be held thereon by means of removable screws or bolts 29, which are sufficient to hold the plate down on the ring of the plunger-head, and the dowel-pins also serve the important function in addition to that above referred to of preventing the twisting and working of the pattern-plate out of the proper alinement, a function which experience has demonstrated the screws only partially and temporarily perform. At any time a different pattern is required it can be fitted upon a separate plate with holes for the dowel-pins and by their means placed upon the machine without trouble.

The pattern or patterns carried on the top of the pattern-plate on the plunger-head pass through closely-fitting openings in a board 30, that is mounted on the casing of the machine-frame. This is the parting-board before referred to, and the openings are of the same peripheral outlines as the patterns. The patterns are projected through these openings beyond the upper face of the parting-board 30, and when in the extreme of their upper movement and after the cope or drag has been placed upon the parting-board they are in readiness for the sand to be rammed upon them. The cope or drag 31 is removably held in position on the parting-board by the dowel-pins 32. The parting-board is supported directly on the annular ring at the top of the casing, and it is positioned and secured in place by means similar to those employed in connection with the pattern-plate—viz., dowel-pins 33, seated into the ring and taking into openings in the board. The board after being positioned on the machine can be held thereon by means of removable screws or bolts 34, similar to the ones 29 used to hold the pattern-plate.

The purpose of seating the dowel-pins 28 and 33 rigidly in the plunger-head and machine-frame, respectively, in connection with the holding-down screws 29 and 34 is to secure and accurately preserve the proper alinement of the pattern-plate and parting-board. The dowel-pins have little or no effect to hold the parting-board and pattern-plate down, and in practice I have found that some means is necessary to secure these parts against upward movement—the parting-board when the plunger is thrusting the pattern therethrough, and the pattern-plate when the same is being withdrawn from the mold. For this purpose I provide the beforementioned holding-down screws in addition to the dowel-pins. These screws of themselves are insufficient to hold the board and plate against lateral displacement and to preserve that accurate alinement which is essential to the proper working of the parts, and, as before stated, the dowel-pins could not perform the function of the screws. I therefore employ both means in conjunction and by their combined effect hold the plate and board down and insure and preserve their proper relation.

In practice it is usual to use two machines for each flask, one for the cope and one for the drag; but by the means pointed out on this machine it can be quickly changed to do the work of forming the mold for both cope and drag. The cope or drag is placed upon the machine and the pattern raised through the parting-board by means of the hand-lever. Parting-sand, if necessary, is then dust-

ed thereon and green sand filled into the cope or drag. It is compressed therein either by pounding, by air, or other means, and the sand is then struck off from the top and leveled, the lever depressed, and the patterns lowered from the sand. The parting-board serves as a support for the sand, thus preventing liability to the breaking and injury of the mold. The cope or drag is then removed and inverted on the floor of the molding-room. Its companion can then be put with it to form a flask ready for casting.

It is to be understood that the present machine permits the use of different parting-boards and pattern-plates and that patterns of the same peripheral outline can be put on the plates in proper relation to the parting-boards without stopping the machine and without dismantling it until the pattern is actually ready to be inserted. The dowel-pins for the parting-board and those for the pattern-plate have a fixed and known position relatively to each other, and the pin-holes for these pins are formed in the different parting-boards and pattern-plates, so as to have the same position relatively to each other as the pins on the machine have. It results from this that a mechanic, without the presence of the machine, knowing the relations between the dowel-pins upon the casing and the plunger-head, can take a parting-board having holes adapted to fit the pins on the casing and make the peripheral outline of his pattern thereon and can then take a pattern-plate having pin-holes adapted to fit the dowel-pins on the plunger-head and having the same relation to the pin-holes on the parting-board that the dowel-pins on the plunger-head have to those on the casing and can so position his pattern upon the pattern-plate that he can then take the parting-board and pattern-plate to the machine and know that they will fit accurately.

I do not intend herein to limit myself to the specific form of the mechanisms described, as the machine can be made of different shapes, as round, elongated, or rectangular to accommodate castings of different forms.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a machine for making sand molds for castings, in combination, a frame supporting the flask and parting-board, a plunger mounted in guides located within the casing of the frame and actuated by a crank, and a yoke carrying the plunger, the frame of the machine being cut out for the free passage of the plunger and its yoke, the arms of the yoke forming the bearings on the plunger within the casing that guides its reciprocation, substantially as and for the purpose specified.

2. In a machine for forming molds for castings, in combination, a frame upon which is positioned a parting-board, a plunger carrying a pattern and reciprocating in guides on the frame, a yoke attached to the plunger, a bearing on the frame, a crank mounted in said bearing and actuating the plunger and yoke, the yoke extending downwardly below the bearing for the plunger-actuating crank, whereby the shaft with its crank attached can be placed in its bearing on the frame through the arms of the yoke, substantially as and for the purpose specified.

3. In a machine for forming molds for castings, in combination, a plunger guided in the frame and carrying a pattern, a parting-board mounted on the frame, a yoke on the plunger, an actuating-shaft and crank journaled on the machine-frame, the yoke extending below the bearing for the shaft, and the machine-frame being cut away for the passage of the crank and its shaft, whereby said shaft with its crank attached can be passed through the plunger-yoke in putting the machine together, substantially as and for the purpose specified.

4. In a machine for making molds for castings, in combination, an open-topped frame, a parting-board on the machine-frame above the plunger, a plunger carrying the pattern on its head, a depending yoke attached to the plunger and reciprocating in guides on the machine-frame, and a transverse stool-plate positioned in the frame just below the lowest position the plunger-head takes in its reciprocation, the stool-plate being cut out at the center for the passage of the plunger-yoke, substantially as and for the purpose specified.

5. In a machine for making molds for castings, in combination with the machine-frame and a parting-board thereon, a reciprocating pattern-carrying plunger, a depending yoke attached to the plunger, the plunger and yoke being actuated by a crank, a bearing for the shaft of the crank positioned on the machine-frame above the plane of the lowest position of the plunger-yoke, the plunger-yoke being open between its arms, whereby the rigidly-connected crank and shaft can be placed endwise in its bearing through the arms of the yoke without taking it apart, substantially as and for the purpose specified.

6. In a machine for making molds for castings, in combination with the machine-frame and a parting-board thereon, a reciprocating plunger carrying the patterns, a yoke attached to the plunger, a crank located on the machine-frame and connected to the plunger by an adjustable pitman, a stop to limit the throw of the crank over the center of its upward throw and a stop below to limit its downward draw, substantially as and for the purpose specified.

7. In a molding-machine, in combination with the parting-board mounted on the machine-frame, a plunger carrying a pattern, an actuating-crank mounted on the machine-frame, a connecting-rod connecting the crank with the plunger, an eccentric bushing fitted in one of the bearings on the connecting-rod,

and means whereby the bushing can be held in its place and from rotation, substantially as and for the purpose specified.

8. In combination in a molding-machine, a frame, a parting-board mounted thereon, a plunger reciprocating in the frame and carrying a pattern, a crank mounted on the machine-frame, a connecting-rod uniting the crank with the plunger, a box forming a bushing for one end of the connecting-rod and bored eccentrically, the box having an outset flange, holes in the flange and a lock to prevent the rotation of the box, substantially as and for the purpose specified.

9. In combination in a molding-machine, a frame, a parting-board mounted thereon, a plunger reciprocating therein and carrying a pattern, a crank pivoted to the machine-frame, a connecting-rod uniting the crank with the plunger, a bushing bored eccentrically and fitted in the connecting-rod, means for rotating the bushing in the rod, and a locking mechanism to prevent its rotation, substantially as and for the purpose specified.

10. In combination in a molding-machine, a frame, a parting-board mounted thereon, a plunger reciprocating in the frame, a crank journaled on the frame, a connecting-rod uniting the crank with the plunger, a bushing fitted in the connecting-rod and having a flange extending outwardly against the face of the connecting-rod, holes around the periphery of the flange, these holes being equal distances apart, with the exception of the distance between the last two holes, whereby a rotation of the bushing in one direction will effect a different degree of adjustment in the length of the connecting-rod from that obtained by rotating it in the opposite direction, substantially as and for the purpose specified.

11. In a molding-machine, in combination, a parting-board mounted on the machine-frame, a reciprocating plunger working therein and carrying a pattern, a downwardly-extending yoke from the plunger, an extension to the yoke having a bearing in the base of the frame, a crank mounted on the frame, a pitman connecting the crank with the yoke, and a pin holding the yoke and its extension together and forming the stud for the attachment of the pitman of the actuating-crank, substantially as and for the purpose specified.

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