W. H. HOFMANN.

MOLDING APPARATUS.

APPLICATION FILED SEPT. 8, 1908.

951,782.

Patented Mar. 8, 1910.

2 SHEETS—SHEET 1.

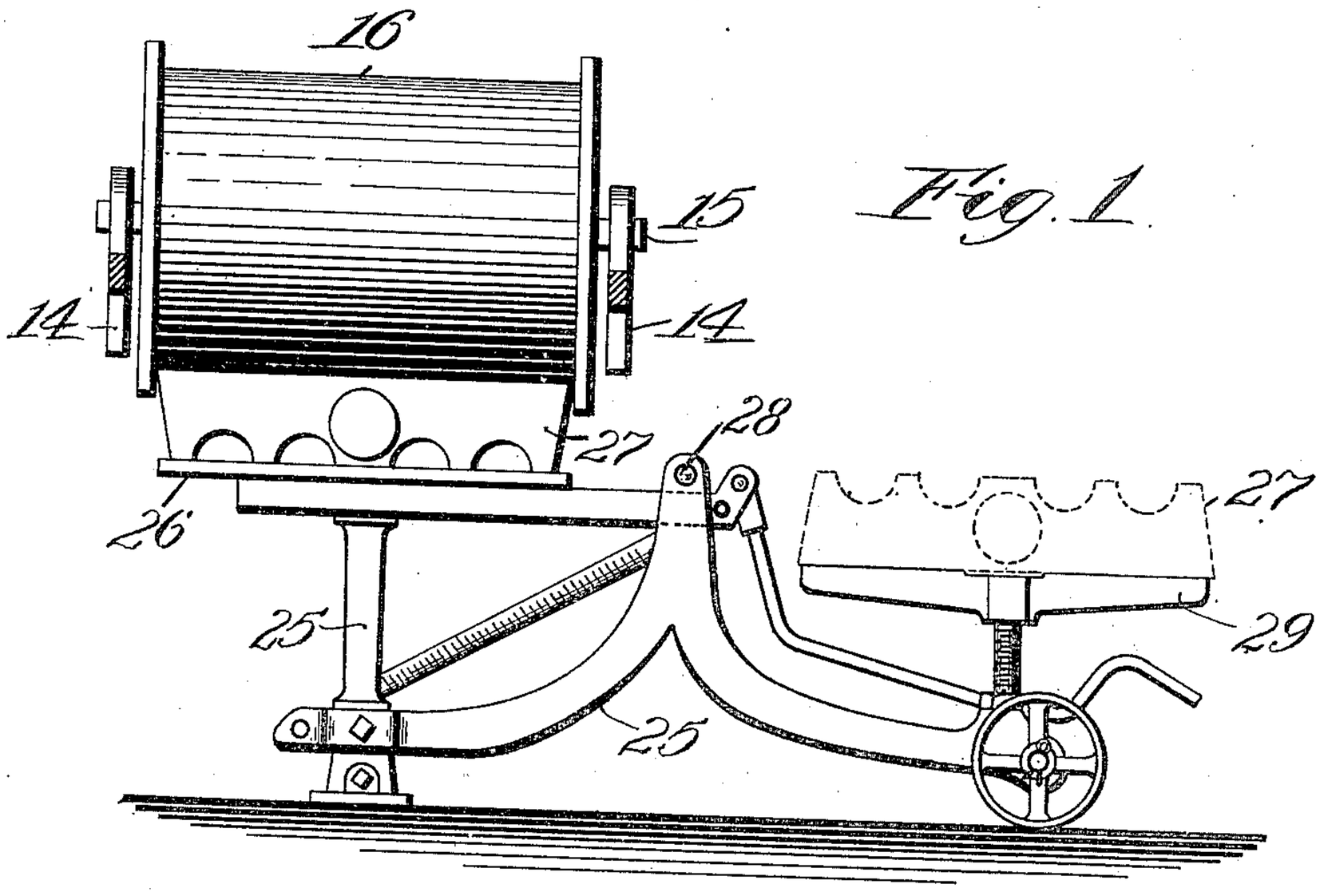


Fig. 1.

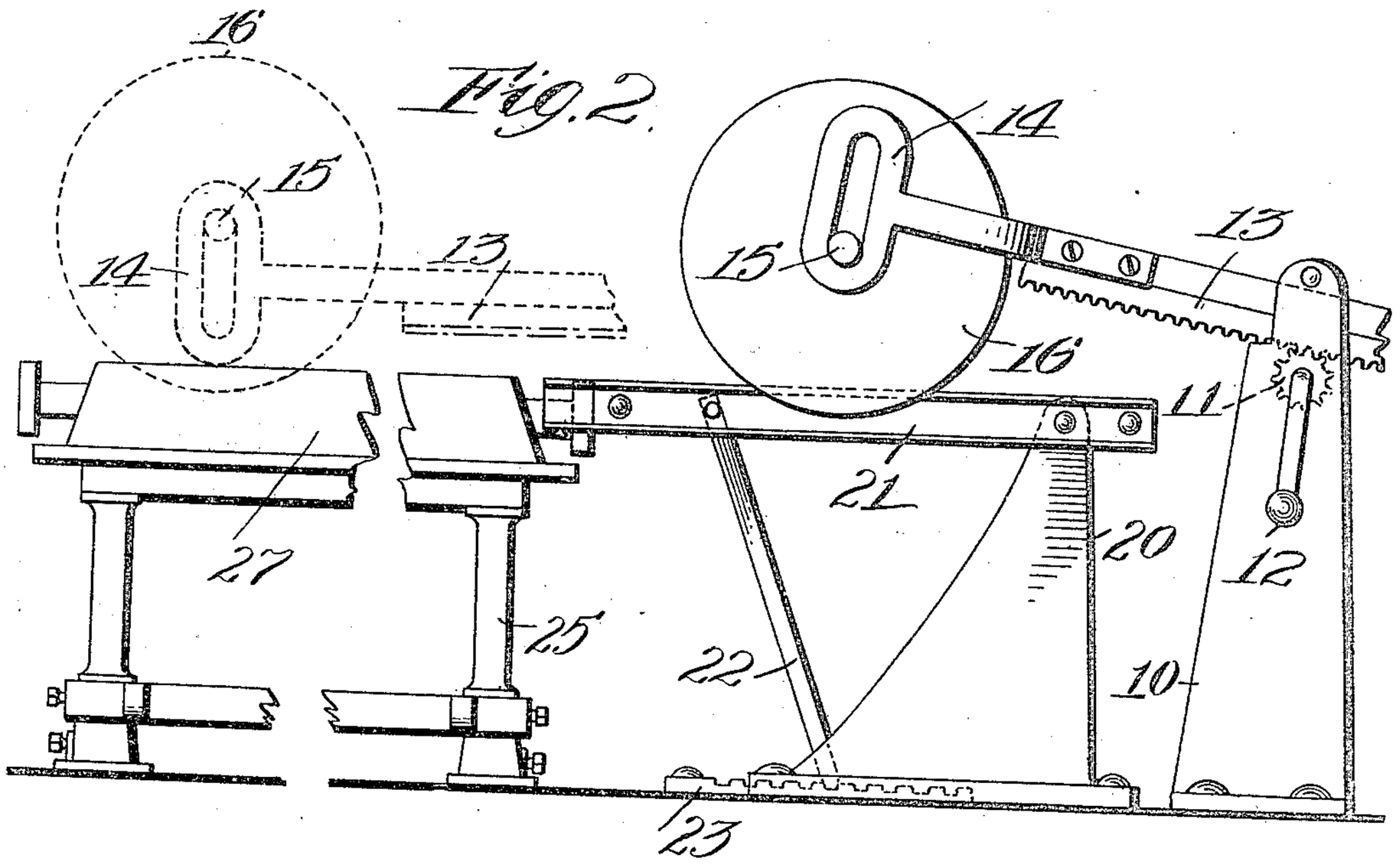


Fig. 2.

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2 SHEETS—SHEET 2.

Fig. 3.

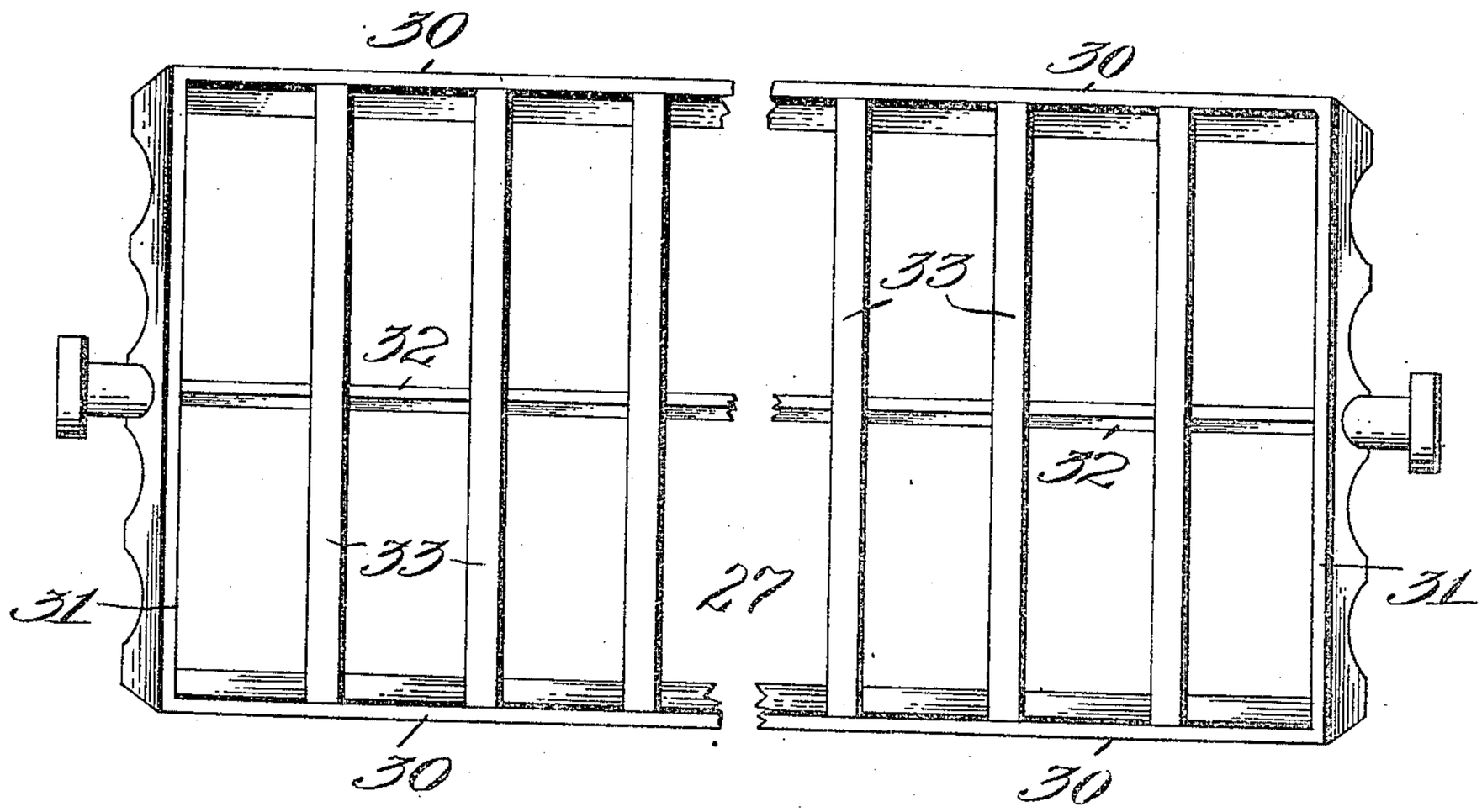



Fig. 4.

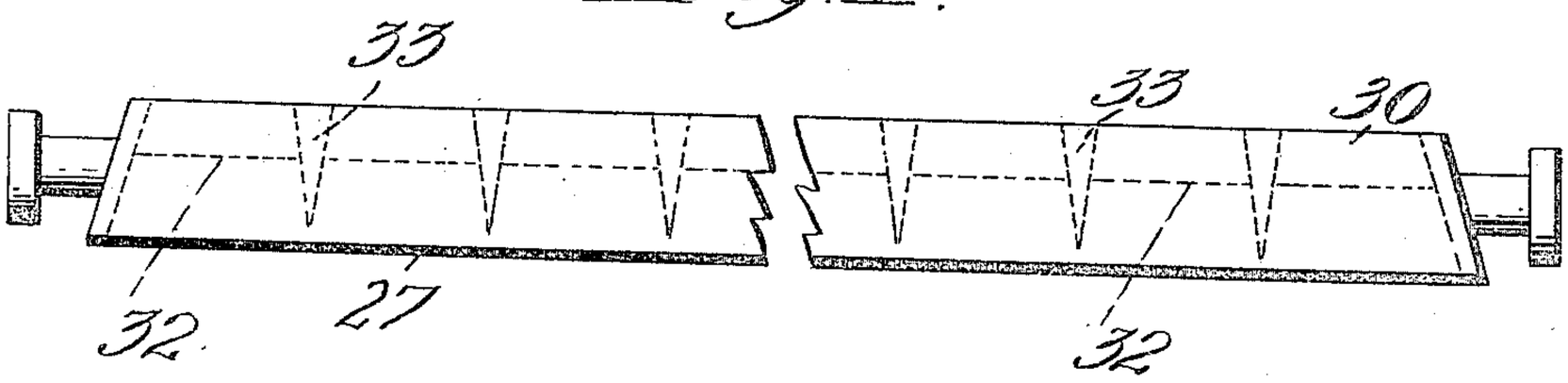
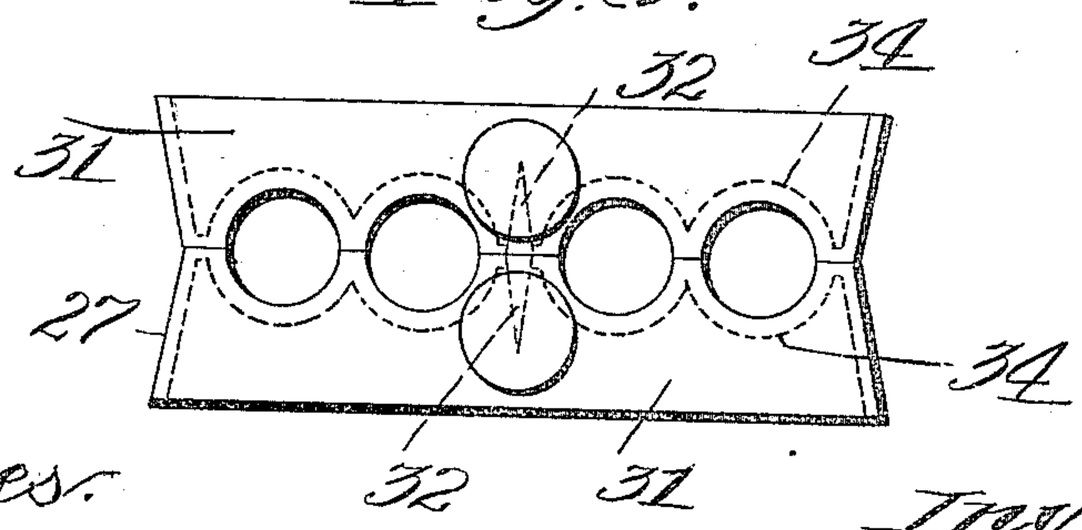



Fig. 5.

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# UNITED STATES PATENT OFFICE.

WALTER H. HOFMANN, OF RICHMOND HILL, NEW YORK.

## MOLDING APPARATUS.

951,782. Specification of Letters Patent. Patented Mar. 8, 1910.

Application filed September 8, 1908. Serial No. 452,024.

*To all whom it may concern:*

Be it known that I, WALTER H. HOFMANN, a citizen of the United States, residing at Richmond Hill, borough of Queens, county of Queens, and State of New York, have invented a new and useful Molding Apparatus, of which the following is a specification.

This invention relates to the molding of sand in foundries.

The principal objects thereof are to provide a device for this purpose in which by the combined operation of the packing means and the assistance which it receives from the shape and construction of the molding flask itself the sand will be packed or compressed in a most efficient manner and will be packed in around the pattern on all sides thereof without any preliminary peining.

The invention also involves an improved flask for assisting the molding operation and the combination thereof with a certain form of molding machine and also an improved means for adjusting such a packing roller as is described in my previous application Serial No. 406,731, filed December 16, 1907, on a molding machine.

Reference is to be had to the accompanying drawings in which,

Figure 1 is an end view of a well known type of rock-over molding machine showing certain features of this invention applied thereto. Fig. 2 is a side elevation of the same. Fig. 3 is a plan of the flask shown in Fig. 1. Fig. 4 is an elevation thereof, and Fig. 5 is an end view of the assembled cope and drag.

In my above mentioned application, I have described a frame and roller for packing sand and means for adjusting it adjacent to the flask or molding machine. This invention may in some respects be considered as an improvement over the one set forth in said application and reference is to be had thereto for a general description of the improvements of the roller packing device. In this case I have shown as in the other, a stand 10 having a pinion 11 thereon and operating by a crank 12 or by power or in any other desired way so as to work a traveling rack 13. One of these racks is employed and on one end is provided with two slotted heads 14 for receiving the studs 15 of the packing roller 16. The slot is at right-angles to the rack so as to permit the rack to swing downwardly after the center of gravity thereof moves to the right of the pinion, which takes place as soon as the roller rests on the track. This longitudinal movement of the rack takes part of the weight of the rack off the roller and the swinging motion allows the lower end of the rack to remain down near the floor of the shop. On account of the inclined position of the heavy rack it tends also to silde down and help draw the roller up the track as soon as the roller rests thereon.

While the roller is not in use it is preferably supported in the following manner; A stand 20 is provided on which is pivotally mounted a frame 21 preferably supporting a pair of tracks. This frame is provided with a pivoted strut 22 and on the floor is located a block 23 having a series of teeth for receiving the end of the strut so as to hold the inner end of the frame at any desired elevation. This ordinarily supports the roller when the latter is not in operation. This adjusting and supporting device is located adjacent to a mold support which in the present instance is shown as an ordinary type of rock-over machine 25. As is well understood, this kind of machine is provided with a mold board or pattern plate 26 which receives the flask 27 while the same is being filled with sand and the latter compressed. After this operation has been performed ordinarily a bottom board has to be placed on the flask and then the mold board, flask, and bottom board are turned over about an axis 28 on a support 29. The bottom board and patterns are then reversed to the ordinary position and the flask removed from the support 29. The use of the bottom board is avoided by this invention, as will appear hereinafter. It will be understood that this particular type of rock-over machine is illustrated merely to show how this invention works as it can be applied to any form of rock-over or roll-over molding machine. The feature which it is desired to bring out is the extreme convenience of the location of the roll and its support 21, at the end of the flask 27 supported by the rock-over machine so that the roller moves longitudinally of the flask and the flask is then reversed on a longitudinal axis. This is of particular advantage in molding pipes and other long articles as it enables the operator to control the roller and reverse the flask in

a most convenient and expeditious manner so as to materially increase the out-put of the plant. However, if the ordinary flask is employed in this combination the efficiency of the whole combination is much less than is the case when a flask is employed involving the principles of this invention.

It will be understod, of course, that in ordinary molding machines a preliminary peining or tamping of the sand has to take place before it is fully compressed. Also a bottom board has to be used as described above. In order to do away with both of these features and thus decrease the cost of equipment and time spent on the manipulation of the flask and compression of the sand so that the sand can be compressed in a single operation of the roller back and forth without the least preliminary tamping, the flask is preferably made as follows:—In the first place it is provided with means whereby the sand in the flask after it is molded assumes a shape in which it is partially cut up into blocks having a similar appearance on both sides of the flask but in which the corresponding parts are not located in the same position on both sides. To be more specific the flask in its preferred form is provided with such construction that the blocks extending to one face of the mold have converging longitudinal sides and those extending to the other side have converging transverse sides. This provides for assisting the tamping operation by causing the sand to be crowded inwardly about the pattern simply by the vertical pressure of the roller and thus does away with the preliminary tamping while at the same time it obviates the necessity of using a bottom board because of the slanting surfaces of the flask which tend to hold the sand in it as it is reversed. To describe in detail a construction for accomplishing this result, reference is to be had to Figs. 3, 4 and 5.

The flask is shown as provided with a pair of side walls 30 and a pair of end walls 31 having openings for the ends of the pattern, and core prints. All these walls are of slanting form but they slant in opposite directions; that is, the two side walls converge toward the bottom of the flask when the same is in the position shown in Fig. 1, and the ends converge in the opposite direction as indicated in Figs. 2 and 4. Parallel with the sides 30 is placed one or more longitudinal bars 32 which coöperate with the sides 30 for the purpose of assisting to crowd the sand laterally when the vertical pressure is applied to it. For this purpose these longitudinal bars are V-shaped with their apexes on the same side of the flask as the outer edges of the sides 30. This gives two slanting surfaces, as shown in Fig. 5, opposite each other, both tending to crowd the sand inwardly toward the patterns as the roller passes longitudinally over the flask. They also assist in holding the sand in the flask while it remains that side up.

In order to assist the ends to hold the sand when the flask is reversed a series of cross-bars 33 are provided of triangular or wedge-shaped cross section and extending from the top downwardly (in the position shown in Fig. 4) so that their slanting surfaces will be opposed to each other and to the adjacent end walls. It will be seen, therefore, that the blocks of sand between any two cross bars 33 and between the end ones and the end walls 31 will have transverse sides which converge in one direction while the blocks formed on the other side of the mold between the bars 32 and side walls 30 will have longitudinally converging sides oppositely disposed. It will be understood that the cope and drag are made exactly alike and that both are rolled or rammed on the side indicated in Figs. 1 and 2. They are then reversed on the support 29 and on account of the slanting end walls and the slanting surfaces of the cross bars 33, no bottom board has to be employed while the reversing takes place or while they are supported on the supports 29. Also while the compression of the sand is taking place by means of the roller, the same will be assisted by the side walls 30 and longitudinal bar or bars 32, so that the sand is packed firmly along these slanting surfaces. This also helps hold the sand in the flask, and obviates the necessity of preliminary peening. Another advantage of this construction is that in certain types and sizes of flasks, the flask can be turned over by itself without turning the mold board with it thus saving one manipulation. This is due of course to the holding power of the slanting sides and bar 32. It will be understood also that while the cross bars 33 and end walls 31 hold the sand in the mold while it is being reversed from the molding position, yet when the cope has to be again reversed for bringing it into casting position, as shown in Fig. 5, the inwardly slanting side walls 30 and outwardly flaring longitudinal bars 32 then assist in holding the sand in position. The flask also requires less sand for a mold than a straight sided one. It will be understood, of course, that while only one longitudinal bar 32 is employed the number may be increased in certain types of machines. Preferably the bars 33 extend nearly to the bottom of the flask and are cut out, as shown by dotted lines 34 for receiving the patterns and the longitudinal bars extend in the opposite direction part way through but not clear to the top.

It will be seen that the roller has a central cylindrical portion of uniform diameter which projects beyond the inner edges of the flask so that it will not sink down in the

flask and so that it can roll over the edges and off the end, thus compressing the sand in the flask to a uniform level surface flush with the edges. Therefore a perfect mold is formed. On account of the construction of the flask it can be reversed without using a bottom board and considerable saving of time is effected in the manipulation of the mold after it is packed. Moreover by rolling the roller longitudinally over a long flask on an axis parallel with its length, considerable additional saving of time is effected because the roll is left in proper position to commence a new operation when the flask is returned. The flask is inverted also with the least possible expenditure of labor.

In referring to the flask I have used the word "top" and "bottom" to indicate the respective sides when the flask is in the position in which the sand is compressed as shown in Fig. 1, but it will be understood that in ordinary foundry manipulation both the cope and drag have to be reversed one or more times. When the cope and drag are completed they are placed together, as indicated in Fig. 5 for the pouring of the metal.

While I have illustrated and described a preferred embodiment of the invention, I am aware that many modifications may be made therein by any person skilled in the art without departing from the scope of the invention as expressed in the claims. Therefore, I do not wish to be limited to the details shown and described, but

What I do claim is:—

1. The combination with a mold support, of an adjustable frame mounted at the end thereof, and a mold roller movable from said frame over the support, said frame comprising a track having one end adjacent to the support, and means for holding said end in adjusted positions.

2. The combination with a mold support, of an adjustable frame mounted at the end thereof, a mold roller movable from said frame over the support, means for holding one end of the frame in adjusted positions, and means located beyond the frame for operating the roller, said means comprising racks having slotted end pieces for receiving the studs of the roller.

3. The combination with a reversible mold support, of a pivoted frame mounted at the end thereof, and having the end adjacent to the support adjustable, and a mold roller movable from said frame over the support.

4. The combination with a reversible pattern plate or mold board, of a flask adapted to be supported thereon and reversed therewith and having means for supporting the sand before and after it is reversed without a bottom board, and a ramming device comprising a roller having a cylindrical portion of uniform diameter extending from one edge of the flask to the other and supported at substantially the height thereof, whereby said roller can be rolled over the flask from end to end to compress the sand therein to a uniform level surface flush with the upper edges of the flask.

5. In a molding apparatus, the combination of a pattern plate or mold board capable of being reversed about an axis, a flask adapted to be supported on said pattern plate or mold board and located with its longest dimension parallel with said axis, a mold ramming device comprising a roller having a cylindrical portion of uniform diameter reaching from one side of the flask to the other, means for moving the roller over the top of the flask in a direction parallel with the longest dimension of the flask and with said axis, and a support adjacent to the end of the pattern plate or mold board for receiving the roller from the end of the flask.

6. In a sand molding machine, the combination of a flask adapted to receive a pattern in its lower face and having longitudinal members slanting inwardly from the top to the bottom toward the pattern, and a sand ramming device extending all the way from one of said longitudinal members to the other and adapted to pack the sand simultaneously and uniformly all the way across the space between said members, whereby the sand is forced by said members toward the pattern.

7. In a sand molding machine, the combination of a flask adapted to receive a pattern in its lower face and having longitudinal members slanting inwardly from the top to the bottom toward the pattern, and a sand ramming device comprising a cylindrical uniform roller extending all the way from one of said longitudinal members to the other and adapted to roll over the flask along the top edges thereof to pack the sand simultaneously and uniformly all the way across the space between said members and to pack it uniformly from end to end, whereby the sand is forced by said members toward the pattern.

8. A molder's flask having an open bottom and top, slanting sides and a central longitudinal bar therein of V-shaped cross section supported at the ends, the base of said bar being substantially flush with the side of the flask on which are located the inner edges of said sides, whereby when the sand is packed with said side down the flask will retain the sand therein.

9. A molder's flask having an open bottom and top and oppositely slanting walls, and a bar therein of V-shaped cross section, having its broader edge substantially flush with the side of the flask on which are the inner edges of said walls, and the apex

thereof extending substantially to the opposite side, and being cut out along the sharp edge to provide space for the pattern and mold cavity.

10. A molder's flask having an open top and bottom and having transverse and longitudinal wedge-shaped bars therein, the base of a transverse bar being flush with one side, and the base of a longitudinal bar being flush with the other side of the flask, whereby the packing of the sand is assisted and the flask can be lifted or reversed without a bottom board.

11. A molder's flask having slanting sides and oppositely slanting ends, cross bars parallel with the ends and of V-shaped cross section, and a longitudinal bar parallel with the sides and of V-shaped cross section, the larger side of each of said bars being on the same side of the flask as the inwardly extending edge of the adjacent side or end, whereby the sand in the flask will take the form of a series of partially separated blocks each having its sides adjacent to the other face converging in the other direction.

In testimony whereof I have hereunto set my hand, in the presence of two subscribing witnesses.

WALTER H. HOFMANN.

Witnesses:
ROSE MEYER,
OSSA SOWERS.