(No Model.) 4 Sheets—Sheet 1.

A. L. TEETOR.

SAND MOLDING MACHINE.

No. 397,316. Patented Feb. 5, 1889.

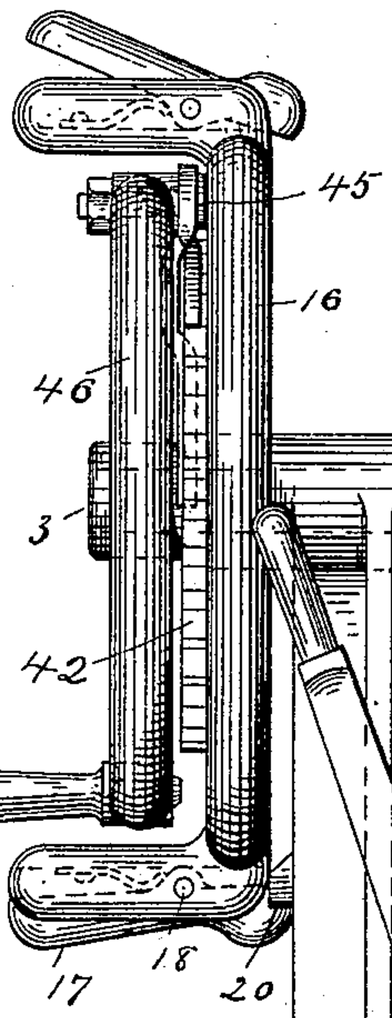


Fig. 1.

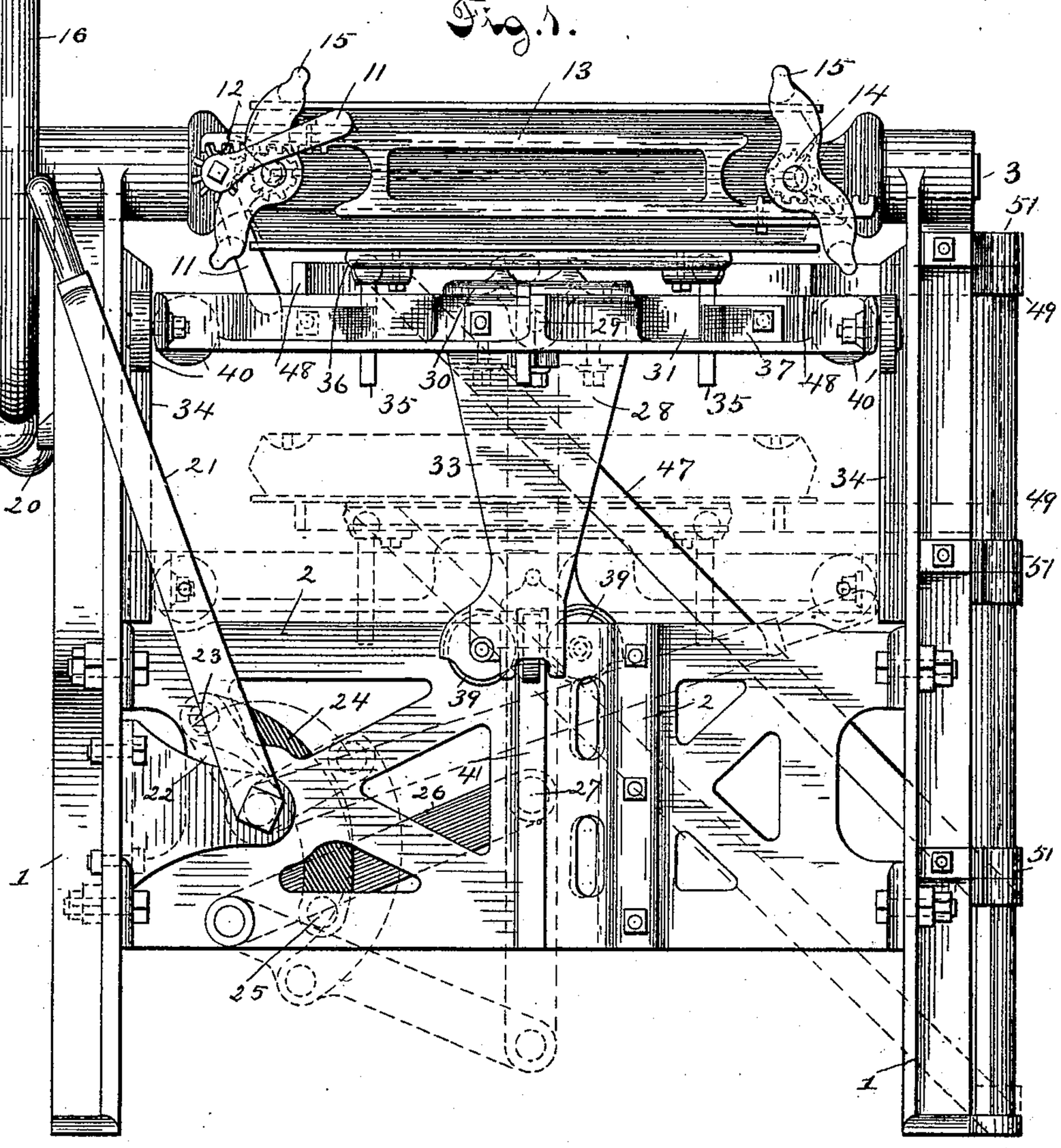
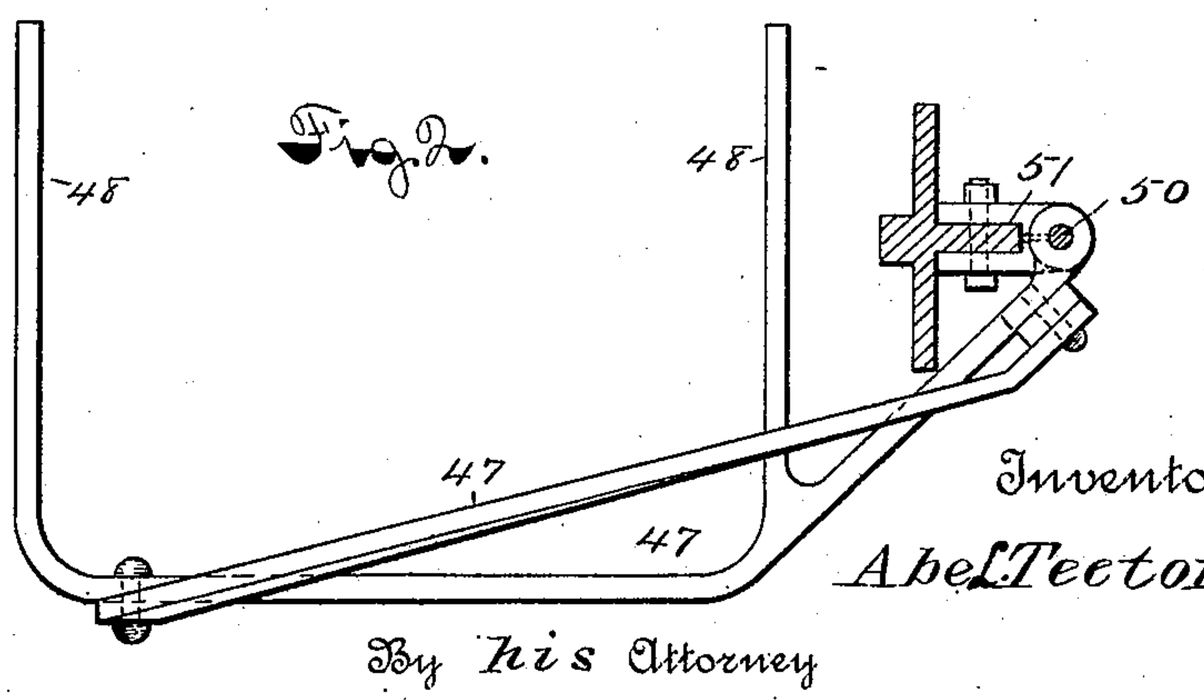


Fig. 2.



Witnesses,
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C. P. Bailey

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By His Attorney
C. P. Jacobs.

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A. L. TEETOR.

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Fig. 5.

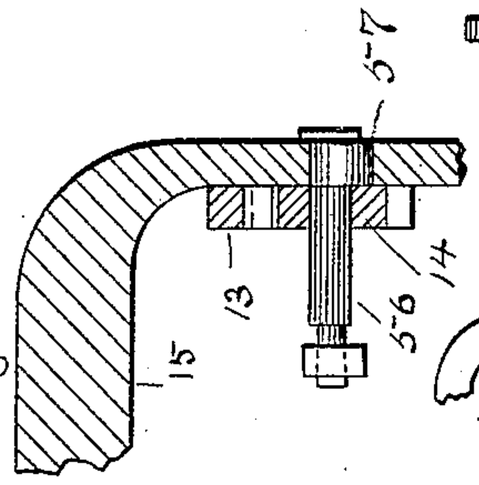


Fig. 6.

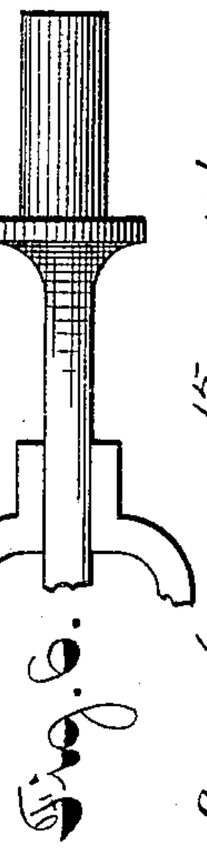


Fig. 4.

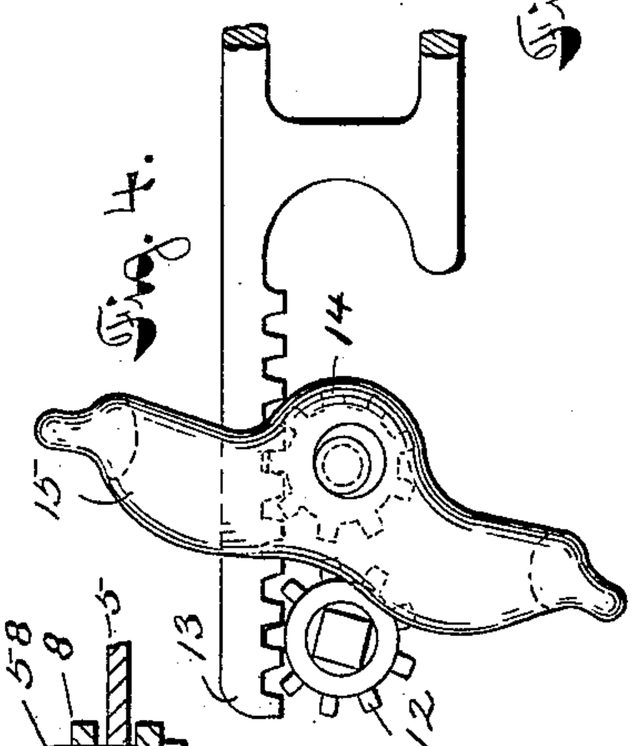


Fig. 1.

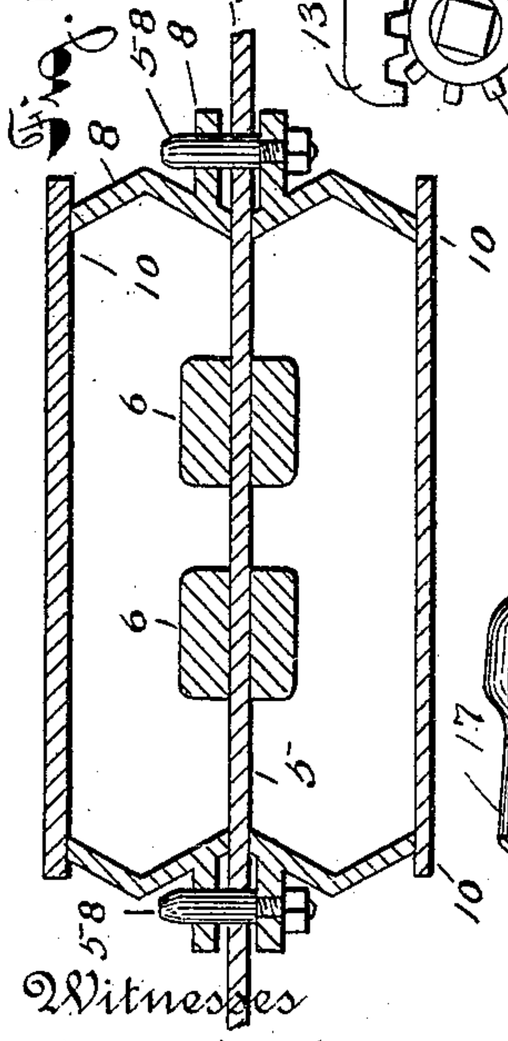
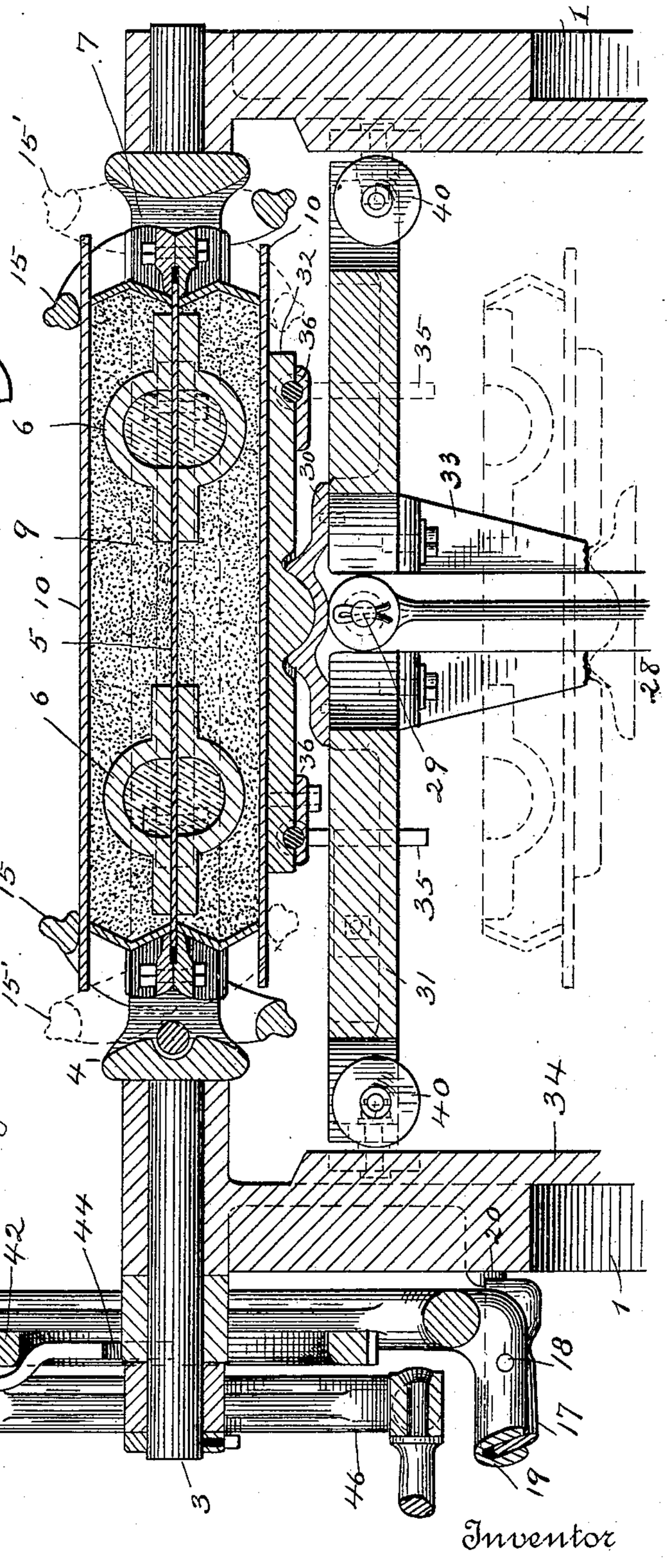


Fig. 3.



Witnesses

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A. L. TEETOR.

SAND MOLDING MACHINE.

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Fig. 7.

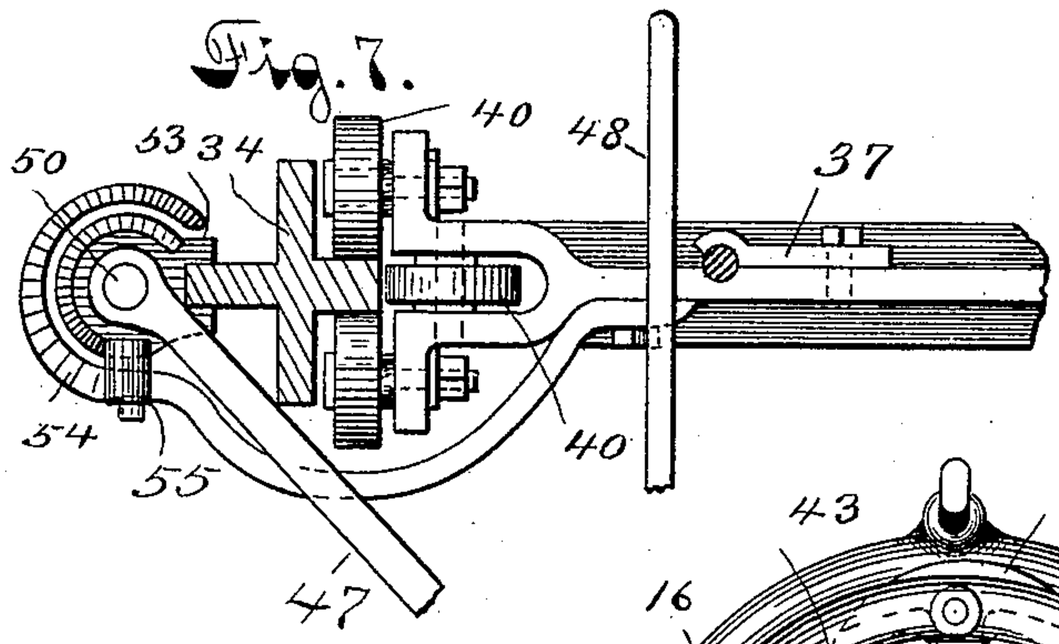


Fig. 9.

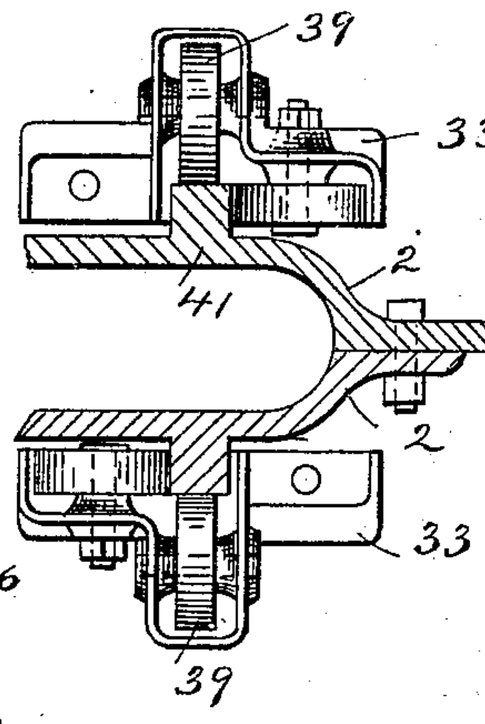
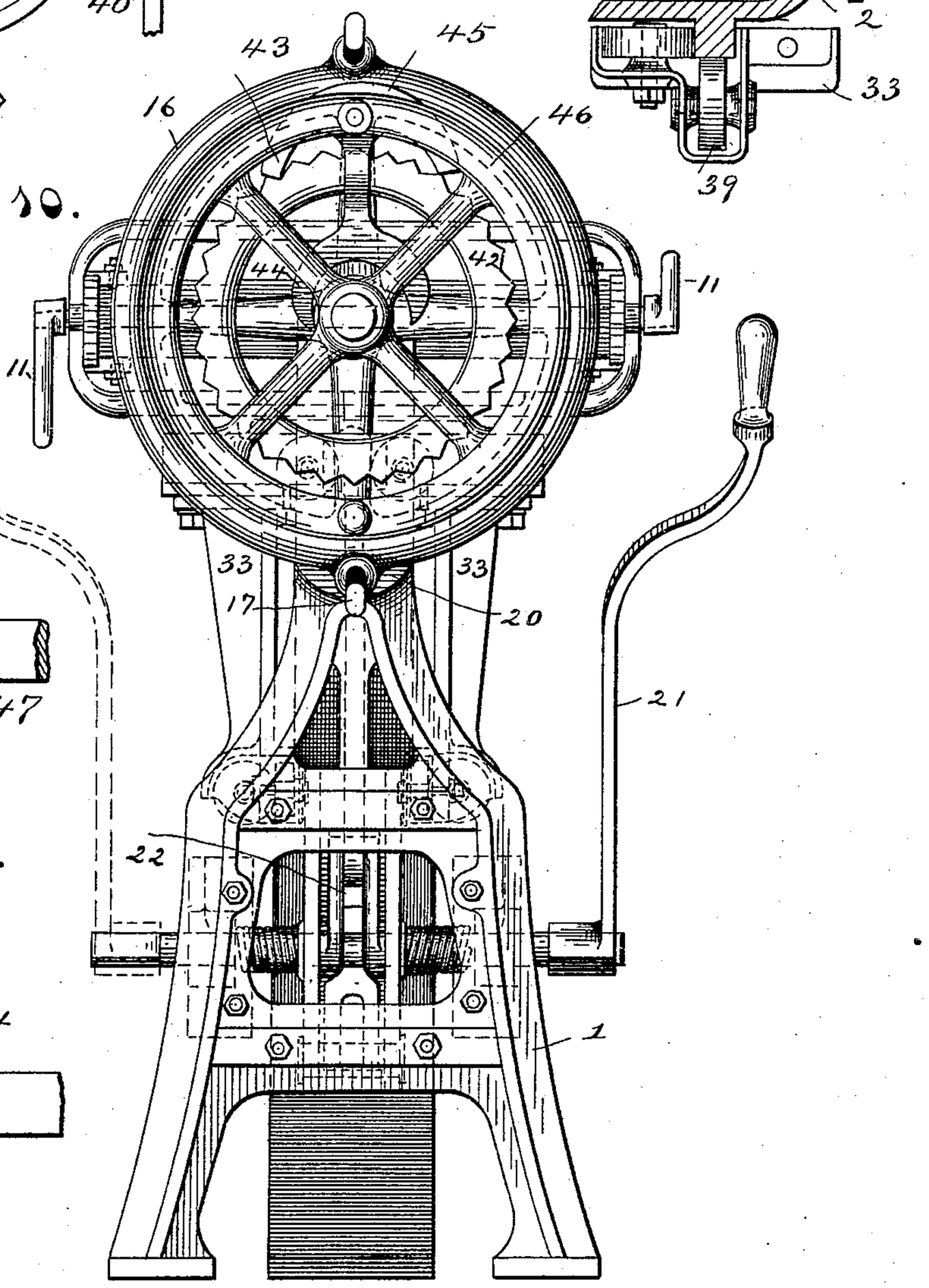


Fig. 10.



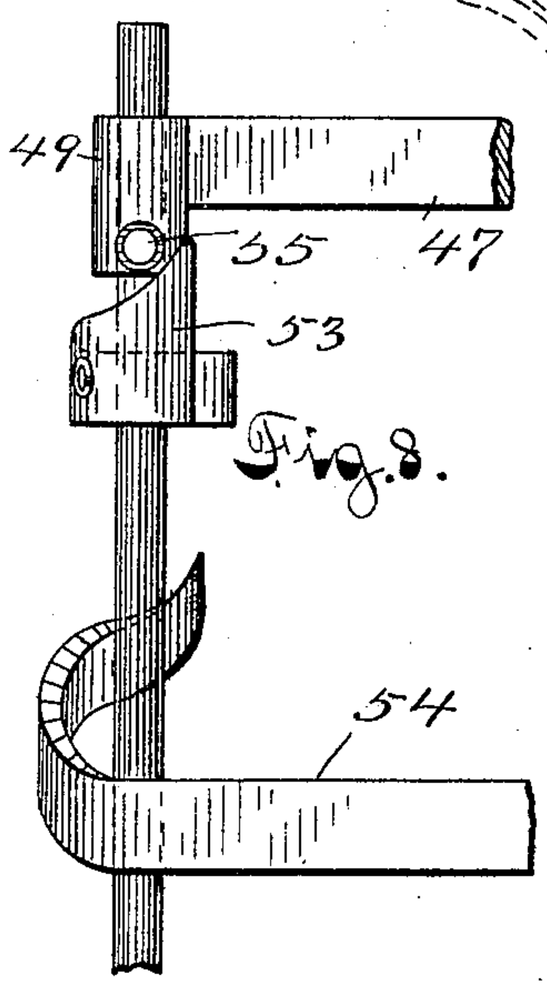


Fig. 8.

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Fig. 11.

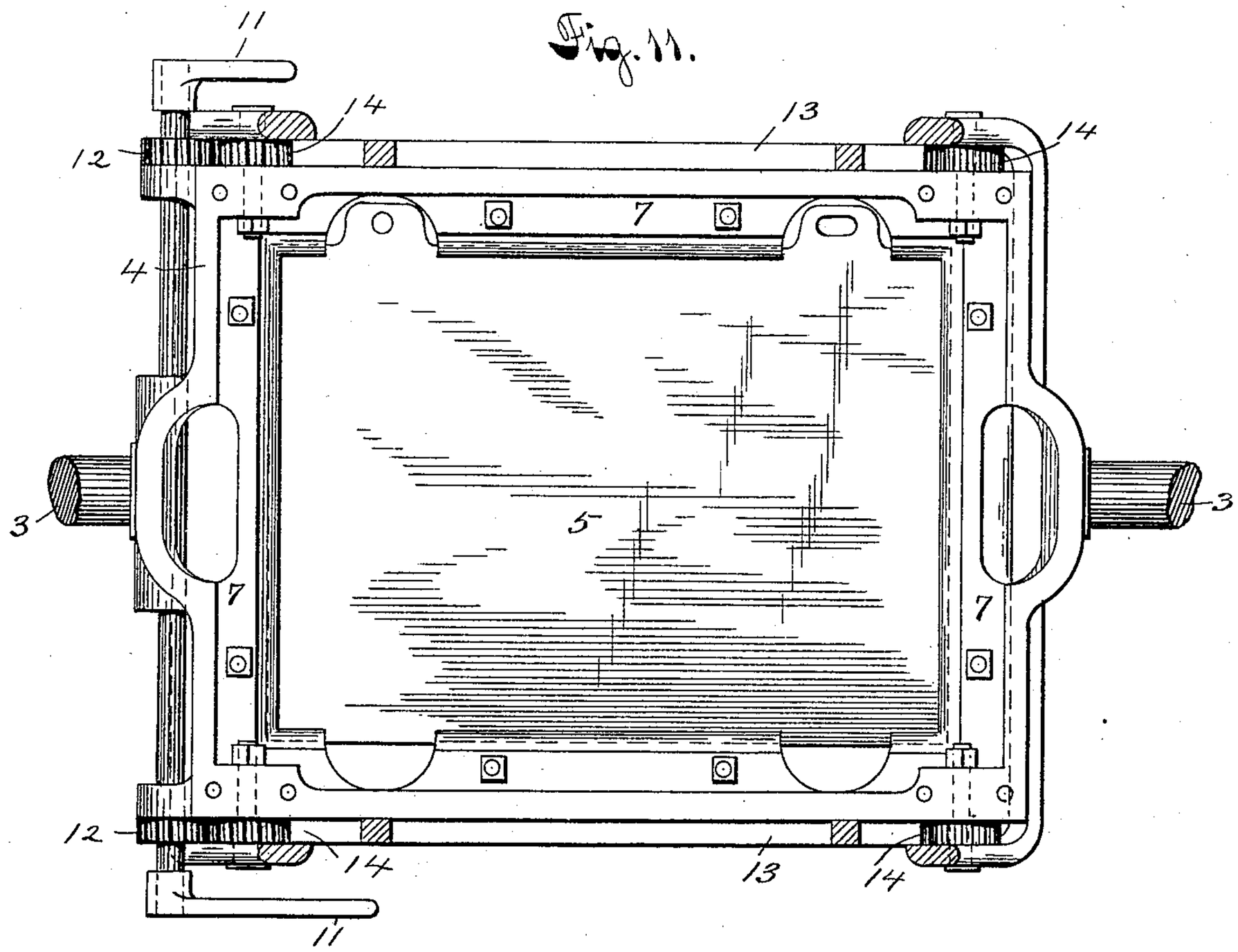
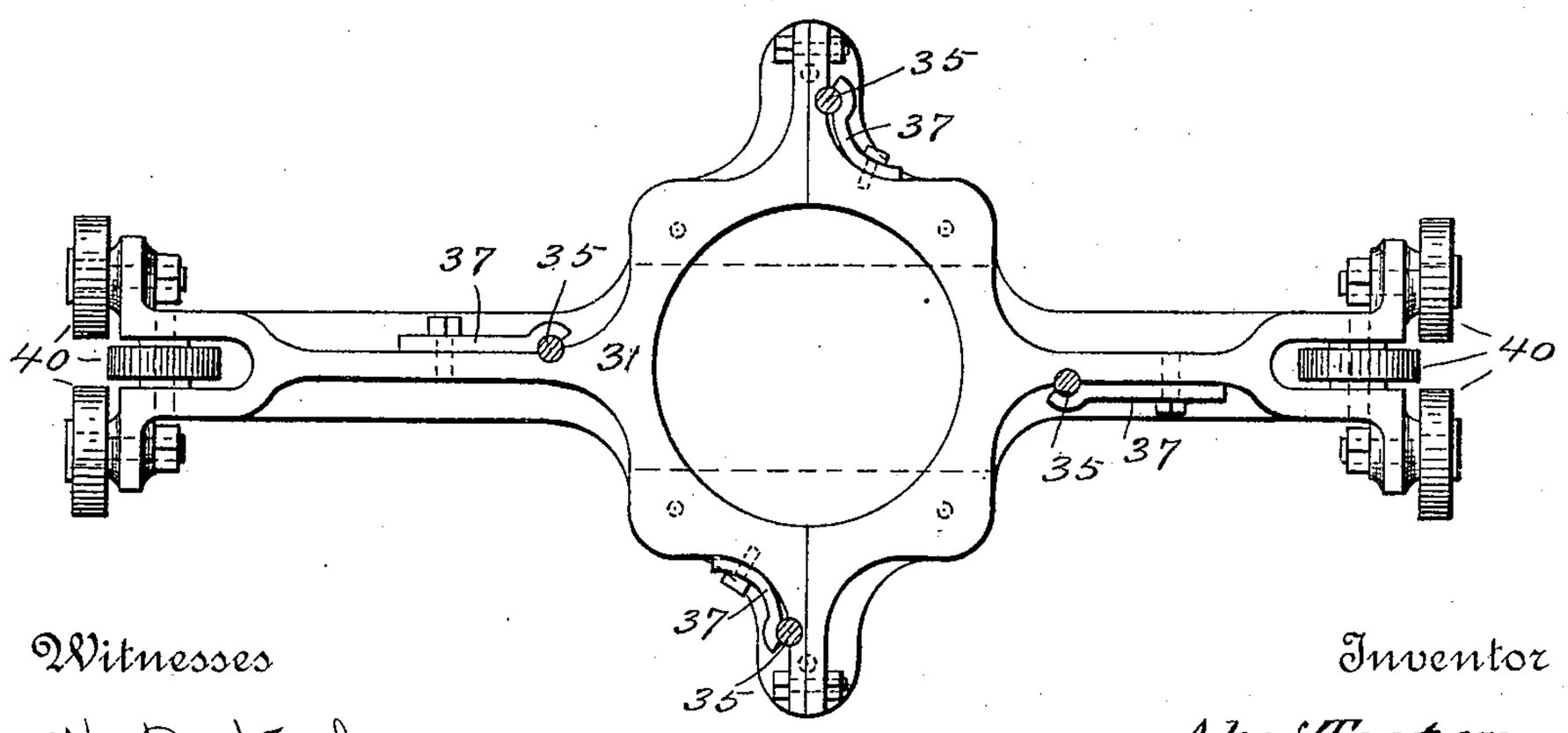


Fig. 12.



Witnesses

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C. P. Bailey

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Abel Teetor

By his Attorney

C. P. Jacobs.

UNITED STATES PATENT OFFICE.

ABRAHAM L. TEETOR, OF INDIANAPOLIS, INDIANA, ASSIGNOR OF ONE-HALF TO WILLIAM C. WHITEHEAD, OF SAME PLACE.

SAND-MOLDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 397,316, dated February 5, 1889.

Application filed June 16, 1888. Serial No. 277,394. (No model.)

To all whom it may concern:

Be it known that I, ABRAHAM L. TEETOR, of Indianapolis, county of Marion, and State of Indiana, have invented certain new and useful Improvements in Sand-Molding Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which like letters refer to like parts.

My invention relates to the construction of sand-molding machines; and its object is to provide a safe and ready means for clamping the flask in position upon a revolving plate or frame; also, to provide means for vibrating the pattern, so as to loosen it in the sand to allow its free withdrawal, dispensing with the usual method of wrapping the pattern; also, to provide means for raising the cross-head and table in position for receiving the flask, and for carrying the flask from the machine out of the way by means of the swinging crane, such crane being either automatic or otherwise in its operation; and it consists in the construction and arrangement of the various parts, hereinafter described and claimed, and as will be understood from the following description.

In the drawings, Figure 1 is a front view of the entire machine, the dotted lines representing the position of the parts when the flask has been lowered. Fig. 2 is a bottom view of the swinging crane. Fig. 3 is a vertical longitudinal section of the upper part of the machine. Fig. 4 is an enlarged detail view of one end of the clamping device. Fig. 5 is a section through a part of the clamping-plate, pinion, and eccentric. Fig. 6 is an edge view of one end of the reversible plate to which the patterns may be directly attached, and which may be used either with or without the frame shown in Fig. 11. Fig. 7 is a top view of one arm of the cross-head, its anti-friction rollers, guide, and upright; also the device for automatically operating the swinging crane. Fig. 8 is a side view of the automatic device for swinging the crane. Fig. 9 is a bottom view of the guide-brackets. Fig. 10 is a view of one end of the machine, showing the hand-wheels and vibrating mechanism. Fig. 11 is a top view of the revolving frame and plate to which the patterns are secured. Fig. 12 is a top view of the cross-head. Fig. 13 is a cross-section through the upper and lower flasks and pattern-plate, showing how the guide-pin from the lower flask passes up through the pattern-plate into the projection from the upper flask.

In detail, 1 1 are the end supports or uprights which support the entire mechanism, these being tied together and braced by the plates 2, and arranged so as to form a tripod-base, and having projections at the upper end, in which are journaled axles 3 of a revolving plate or frame, 4. The plates 2 are bolted together, in this case near the center of the machine, as seen in Figs. 1 and 9, forming a housing in which to place the link-motion used in the machine, and are at each end bolted to uprights 1 1.

In the center of the revolving frame is secured a pattern-plate, 5, by strips 7, secured with screws or otherwise. The pattern-plate 5 in this case has two projections at one side, one having a hole corresponding in size and location to the guide-pin of the flask to be used, and the other having a slot which is longitudinal with the machine and equal in width to the diameter of the other hole, so as to admit of any variation or irregularity in the distance that may occur between the guide-pins. To the plain sides of this plate are secured the patterns or parts of patterns at the general parting-lines, as may be seen at 6, and when the parting-lines are irregular the plate can be made to conform thereto.

8 is a flask of the usual form used in sand-molding.

10 is a board, such as is used in hand-molding to prevent the sand from falling out of the flask on its being rolled or turned over.

11 11 are levers mounted on external ends of a shaft journaled in the revolving plate 4 and transversely through the axis of the latter.

12 12 are pinions mounted on each end of said shaft against the revolving plate, which are adapted to engage with the rack-bars 13—one on each side—which in turn engage with pinions 14, of which there is preferably one

at each corner of frame 4. These latter pinions are mounted centrally on fixed stud-pins 56, and are provided with an eccentric sleeve or hub, 57, formed integral therewith, the latter being journaled in the center of the end section of the clamping-bail 15. One of these clamping-bails is at each end of the revolving plate, as seen at 15 15 in Fig. 3, and as is evident the upper sides of these clamping-bails must fall or incline toward each other to bind down the board 10 on flask 8. The bails being really rings surrounding the revolving plate entirely and pivoted centrally, it is evident that while the upper part of each is falling toward the center the lower side must recede from the center of the machine. Thus while a flask is being bound down on the upper side of the revolving plate the flask on the under side is thereby released. These bails are operated in the following manner: The double rack-bars 13 are moved back and forth by the levers 11, one of which is always in proper position to operate and engage, say, at the upper side of the pinions 14 at one end of the machine and at the under side of the pinions at the other end. It is seen that they will revolve in opposite directions, and by virtue of frictional contact occurring between the sides of the pinions 14 and inner surfaces of the bails, against which they bear, the bails are moved in a corresponding direction until they strike down against the top of the board 10, covering the flask, as seen at 15 15, Fig. 3, when they will cease moving forward. As the pinions with their eccentrics 57 are revolved still further by the same operation of lever 11, the bails will be drawn down firmly by the action of the eccentrics which operate now, drawing in a direct line from the point of contact of the bail on the board 10 toward the center of the eccentrics, holding the board firmly to the flask.

16 is a hand-wheel mounted securely upon one axle, 3, of the revolving frame, and is provided with two handles placed diametrically opposite, within which are latches 17, pivoted at 18, which are alternately forced by springs (not shown) into engagement with a projection, 20, which is formed on the outside of the end upright of the machine and adapted to catch and hold the latches firmly, these springs being located within the spaces 19. (See Fig. 3.)

21 is a lever secured at will on either end of a short transverse shaft, on which are mounted counteracting springs and an arm, 22, to which is movably attached at 23 a curved link, 24, which is attached to lever 26 at 25. This lever is pivoted to plates 2 at its outer end, and has connected to its inner end at 27 a link, 28, which is connected at 29 to plate 30, which may be secured to or be integral with the cross-head 31, which is provided at each end with anti-friction wheels 40, as shown in Fig. 12, adapted to move along the three sides of the guides 34, which are fixed on the inner sides of the uprights of the frame.

To the under side of cross-head 31 are secured, centrally and opposite each other, two guide-brackets, 33, at the lower ends of which are mounted anti-friction wheels 39, there being two of these wheels in each bracket, and placed in this case opposite to other two and all in contact with guides 41 on plate 2. (See Figs. 1 and 9.) It is seen that with this arrangement of wheels at this point and that of the wheels mounted in each end of the cross-head 31 when the cross-head is raised or lowered its movement must be uniform and equal at all points and with but little frictional resistance.

32 is a universally-adjustable movable table, supported at its center by means of a ball-and-socket joint, and steadied at three or four lateral points by pins 35, which are held in sockets adapted to them by plates 36. These pins extend down through openings in the cross-head arms, and are given a certain frictional resistance which may be regulated to any desired degree by the use of screws, which secure the spring clamping-arms 37, which partly embrace these pins, as shown in Fig. 12. Thus it will be seen that though the flasks be unequal in depth at one side or end as compared to that of the other this table will accommodate itself to such irregularity, upon being pressed up firmly against the flask below, as seen in Figs. 1 and 2, and is held in such adjusted position by the steadying-pins 35, so that the flask moves evenly at all points from the pattern-plate on being withdrawn. This feature makes possible and practical the process of returning the pattern back into the mold after having been withdrawn and dusted with fine facing-sand, as is practiced to a considerable extent where fine castings are produced. Again, this is a very valuable feature in cases where patterns are used having but little or no draft and very deep. Thus in this case if the table were rigid and the flask uneven in a slight degree, the flask would fall on being unclamped at the side having the least depth until it had equal bearing on the table, which would cause the pattern to undercut or break down the sand, and this would be destructive to the mold.

The vibrating mechanism will now be described.

46 is a wheel loosely mounted on an axle, 3, (see Fig. 10,) outside of hand-wheel 16. It has pivoted to its rim at 45 an anchor-shaped double cam-lever, its middle arm reaching to the center of the wheel and terminating at its free end in a fork, as seen at 44, the two prongs of which reach, preferably, to opposite sides of the hub of wheel 16. This double cam-lever has its two lateral arms of the same size and shape, each forming a pallet, as seen at 43, adapted to follow closely the contour of the cam-wheel 42, which may be angular at its periphery, as shown in the drawings; or it may be represented by an undulating or wave line. Thus it will be seen that when

the wheel 46 is rotated on its axis, carrying with it the double cam-lever, the wheel 42 remaining stationary, being in this case secured to arms of wheel 16, said lever is oscillated rapidly upon its axis, causing the prongs 44 to strike sharply from either side against the hub of wheel 16, jarring the axle 3 and the pattern, and loosening it in the sand, as more fully described hereinafter.

Fig. 2 is a view, looking from beneath, of a swinging crane, 47, having transverse fingers 48, and hinged at 49 to rod 50, which is secured to the end upright of the machine by clips or eyes 51. The fingers 48 of this crane 47 reach by the ends of the table and under the ends of the flask which project beyond the table. When it is closed into the machine, these fingers lie next over the long arms of the cross-head, the upper edges being a little lower than the top of the table 32, and are carried by the cross-head as the latter is raised and lowered, the eyes 49 being adapted to slide upon the rod 50 as the table moves. When the swinging crane is applied to the machine without the automatic operating-cams, the projections 51 (see Fig. 1) act as rests or stops for the crane when at its lowest position, and one or more of these projections are placed at such height that when the table is lowered with the flask the crane stops its descent a short distance above the lowest point reached by the table, thus supporting the flask clear of the table, so that the crane can be easily swung out from within the machine, and when relieved of the flask may be swung back again into the machine to be carried up and back to receive the next flask. This crane is made to operate automatically by an anti-friction roller, 55, secured on the upper eye, 49, of the crane, as seen in Figs. 7 and 8, and a cam, 53, set on rod 50 at any desired height, said cam having projections engaging with the end upright which keep it from turning when the roller 55 comes in contact with it, and rolling down the incline the crane will swing out, carrying with it the flask. The crane is then at the lowest point necessary for it to drop to, and the roller 55 rests on the opposite and lower point on cam 53. A cam, 54, which is a reverse cam, as compared with 53, is secured at one end to the cross-head arm, as seen in Fig. 7, reaching out and nearly surrounding cam 53, and near to it so as to catch the roller 55. This cam, rising with the table, will evidently return the crane automatically to its position near the table to receive another flask.

The machine operates as follows: One of the latches 17 is brought into engagement with projection 20, that the revolving frame and pattern-plate may assume a fixed horizontal position. Now suppose that there is no flask on the machine, as shown in Fig. 3, and that the bails 15 are in a reversed position, as represented by dotted lines 15′. A flask, 8, is placed in position on pattern-plate 5, the pins of the flask in place. The flask is then filled with sand and tamped or rammed in the usual manner and the board 10 placed thereon, and the bails drawn as shown at 15 15, the table and crane being at their lower position, as represented by dotted lines, Fig. 1. The latch 17 is then released from catch 20 and the revolving plate 5 turned the upper side down, when the latch 17 in the opposite handle will be brought into engagement with the catch 20, and the table and crane elevated by lever 21 through the intervening mechanism, until the table bears firmly against the board 10, beneath and under the flask. Another flask matching the one now beneath is set upon the plate, the pins of the first flask projecting through the pattern-plate 5 and locating the second flask properly. The second flask is filled with sand, tamped, covered with another board 10, and the bails drawn, at the same time being withdrawn, as before shown, from the flask beneath, allowing it to rest entirely on the table 32. Now to withdraw the lower flask from the pattern, a few rapid turns are given in either direction to the wheel 46, to which is pivoted at 45 the double cam-lever, which is rapidly oscillated through its engagement with the cam-wheel 42, and being adapted to strike sharply against the hub of wheel 16 sets up a series of rapid vibrations, and the strokes coming as they do from all sides toward the axis of the revolving frame a general tremor permeates this entire section of the machine, freeing the sand thoroughly from the pattern. After this tremor has begun and before it ceases, the table is lowered with the flask, the table moving a little below the lowest point to which the crane-fingers 48 drop. The flask is then carried from the machine on said crane. Plate 4 is again revolved, bringing the second flask beneath. The table 32 is again elevated, another flask placed on the machine, and the operation continued as before.

I am aware that sand-molding machines having reversible molding-tables mounted in bearings on the top of the machine and provided with clamps on each side are not new, and do not broadly claim the same as my invention; but

What I do claim as my invention, and desire to secure by Letters Patent, is the following, viz:

1. A sand-molding machine comprising, in combination, a reversible molding-table mounted in bearings at the top of the machine, a pair of clamps connected by a rack-bar which is operated by means of a lever and pinion at one end of the table, whereby the upper clamps are thrown in position for holding the board upon the flask, a frame-work providing bearings for the axle of such reversible molding-table, and a hand-wheel mounted on such axle provided with latches engaging with projections connected to the uprights of the frame for locking the reversible molding-table in a horizontal position, substantially as shown and described.

2. A sand-molding machine comprising, in combination, a reversible molding-table mounted in bearings at the top of the machine, a frame-work supporting and providing bearings for the axle of such molding-table, a hand-wheel mounted on such axle and provided with latches engaging with projections on the frame for locking such table in a horizontal position, and a vertically-movable table resting upon self-adjusting center and corner bearings below the reversible molding-table, mounted on guides in the frame and connected by suitable rods and links to a shaft provided with a lever for operating the elevating mechanism, substantially as shown and described.

3. A sand-molding machine comprising, in combination, a reversible molding-table mounted at the top of the machine, a frame-work providing bearings for the axle thereof, and vibrating mechanism for jarring such table and the pattern supported by it, said mechanism being mounted on and constructed and arranged to strike upon such axle, substantially as shown and described.

4. A sand-molding machine comprising, in combination, a frame-work, a reversible molding-plate mounted in bearings at the top thereof, a pair of clamps connected to each end of such molding-plate, a rack-bar for operating such clamps, a pinion whose inner face bears against the inner face of such clamp, provided with an eccentric hub mounted upon a stud-pin passing through such clamp and connected to the frame, a pinion mounted on a transverse shaft, a lever for operating such pinion, whereby motion is communicated to the rack-bar and the clamps thrown down so as to bind the top of the flask placed upon the molding-plate, a table mounted on self-adjusting bearings for supporting the lower half of the flask when the table is reversed, a vertically-moving cross-head carrying such table and mounted on guides in the frame and connected by suitable links or rods to a shaft provided with a lever for operating the lifting mechanism, and a swinging crane hinged to a rod connected with one side of the frame-work, and provided with fingers resting upon the cross-head beneath the adjustable table which carries the flask-section, such fingers adapted to support the flask, whereby the latter may be swung back out of the machine, substantially as shown and described.

5. In a sand-molding machine, a self-adjusting vertically-moving table for supporting and lowering the lower half of the flask, mounted upon a universal bearing at its center and provided at or near its edges with universally-jointed steadying-pins having an adjustable frictional resistance, and supported by a cross-head mounted on guides in the frame and adapted to be raised or lowered by means of suitable mechanism, substantially as shown and described.

6. In a sand-molding machine, a reversible molding-plate provided with trunnions having bearings in the top of the frame and carrying a pair of pivoted double clamps at each end, a rack-bar on each side connected to such clamps at each end, operated by suitable pinions, and lever mechanism, whereby the clamping of the upper bail of the clamp will release the grip of the lower by the same movement, substantially as shown and described.

7. In a sand-molding machine, the vibrating mechanism herein described, comprising a wheel, 46, loosely mounted upon the axle 3, which carries the reversible molding-frame 4, the double cam-lever 44, pivoted at 45 to the rim of such wheel, its middle arm depending to strike the axle, its other end terminating in a fork provided with two lateral arms forming a pallet, 43, and the cam-wheel 42, keyed upon the axle 3, substantially as shown and described.

8. In a sand-molding machine, a swinging crane, 47, having fingers 48, loosely hinged to the rod 50 by eyes 49, the upper one of which carries a friction-wheel, 55, engaging with the cam-block 53, secured to the rod 50, and the reverse-cam 54, having one end secured to an arm of the cross-head 31, substantially as shown and described.

9. A sand-molding machine comprising, in combination, a frame composed of the uprights 1, connected by the bridge-plate 2, having the cross-head 31 moving therein by friction-wheels 40 upon guides 34, the reversible plate or frame 4, provided with trunnions 3, having bearings in the top of the frame, a hand-wheel, 16, mounted upon one of such trunnions for revolving the same, provided with latches 17, pivoted at 18 in recesses 19, such latches engaging with a projection, 20, upon the outside of the frame, the pattern-plate 5, carried in strips 7, for supporting the patterns 6, the double reversible clamps 15, having frictional contact with the pinion 14, and being eccentrically mounted thereon, the latter engaging with the rack-bar 13, the pinion 12, having a lever for revolving the same, such pinion also engaging with the rack-bar for operating the clamps at each end, the adjustable table 32, for supporting the lower section of the flask, carried in self-adjusting bearings at the top of the cross-head, the casting 33, link 28, pivoted at 27 to link 26, the latter pivoted at 25 in the side of the frame and connected by a wrist with the curved link 24, the latter connected with the crank or arm 22, whose other end is connected with a shaft upon which a lever, 21, is mounted for operating the elevating mechanism, and counteracting springs, substantially as shown and described.

10. A sand-molding machine comprising, in combination, a frame-work supporting in bearings upon its top a reversible molding-plate, means for locking such molding-plate in a horizontal position, a table resting upon self-adjusting bearings for supporting the flask-section carried upon a cross-head movable vertically within the frame, mechanism, sub-

stantially as described, for raising and lowering such table, a crane hinged to the frame and carried up and down by the movement of such cross-head, and means for automatically swinging the crane when it has reached its lowest point, carrying the flask away from the machine and closing it into the machine by the elevation of the cross-head, operating and arranged substantially as described.

11. In a sand-molding machine, a crane having fingers for carrying the flask-section, hinged to a rod connected to the frame of such machine, the fingers resting, when closed, upon a cross-head movable vertically in the frame, such crane provided with an automatic opening and closing mechanism, and means whereby this mechanism is actuated by the ascent and descent of the cross-head, substantially as shown and described.

12. A sand-molding machine comprising, in combination, a frame-work carrying a reversible molding-plate in bearings upon its top, such molding-plate having a pair of double clamps connected at each end with mechanism for operating such clamps, whereby the bringing of the upper pair in position to lock them upon the flask releases the grip of the lower clamps, substantially as shown and described.

13. In a sand-molding machine, the combination, with a reversible molding-plate journaled in a frame-work, and means for locking such molding-plate in a horizontal position, of a self-adjusting vertically-moving table for supporting or lowering the lower flask-section, mounted upon a universal bearing at its center and provided at or near its edges with universally-jointed steadying-pins having an adjustable frictional resistance for lowering such flask evenly at all points from the pattern, substantially as shown and described.

In witness whereof I have hereunto set my hand this 11th day of June, 1888.

ABRAHAM L. TEETOR.

Witnesses:
C. P. JACOBS,
E. B. GRIFFITH.