Aug. 15, 1933. E. F. OYSTER 1,922,744

ROLL-OVER MACHINE

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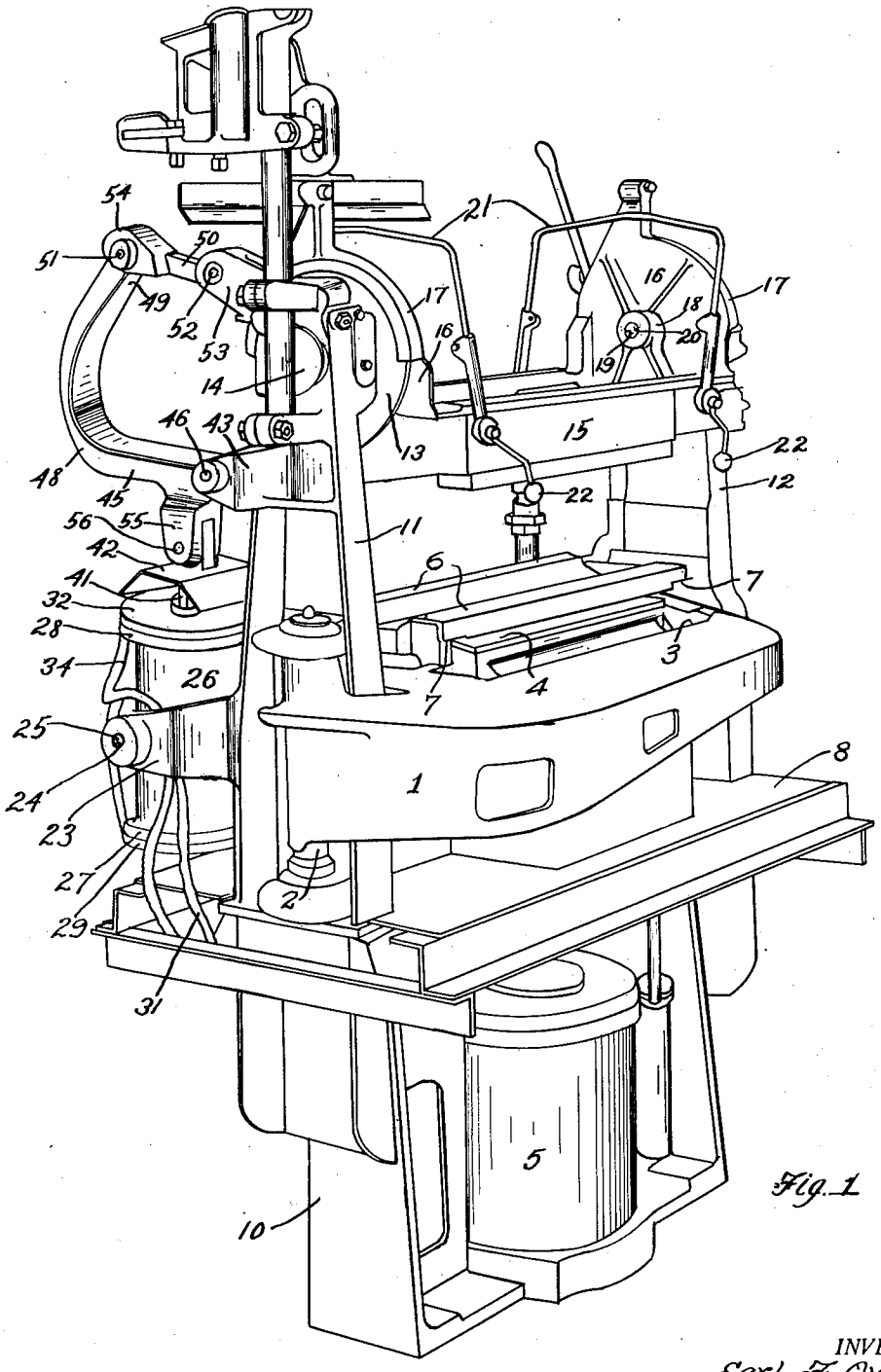


Fig. 1

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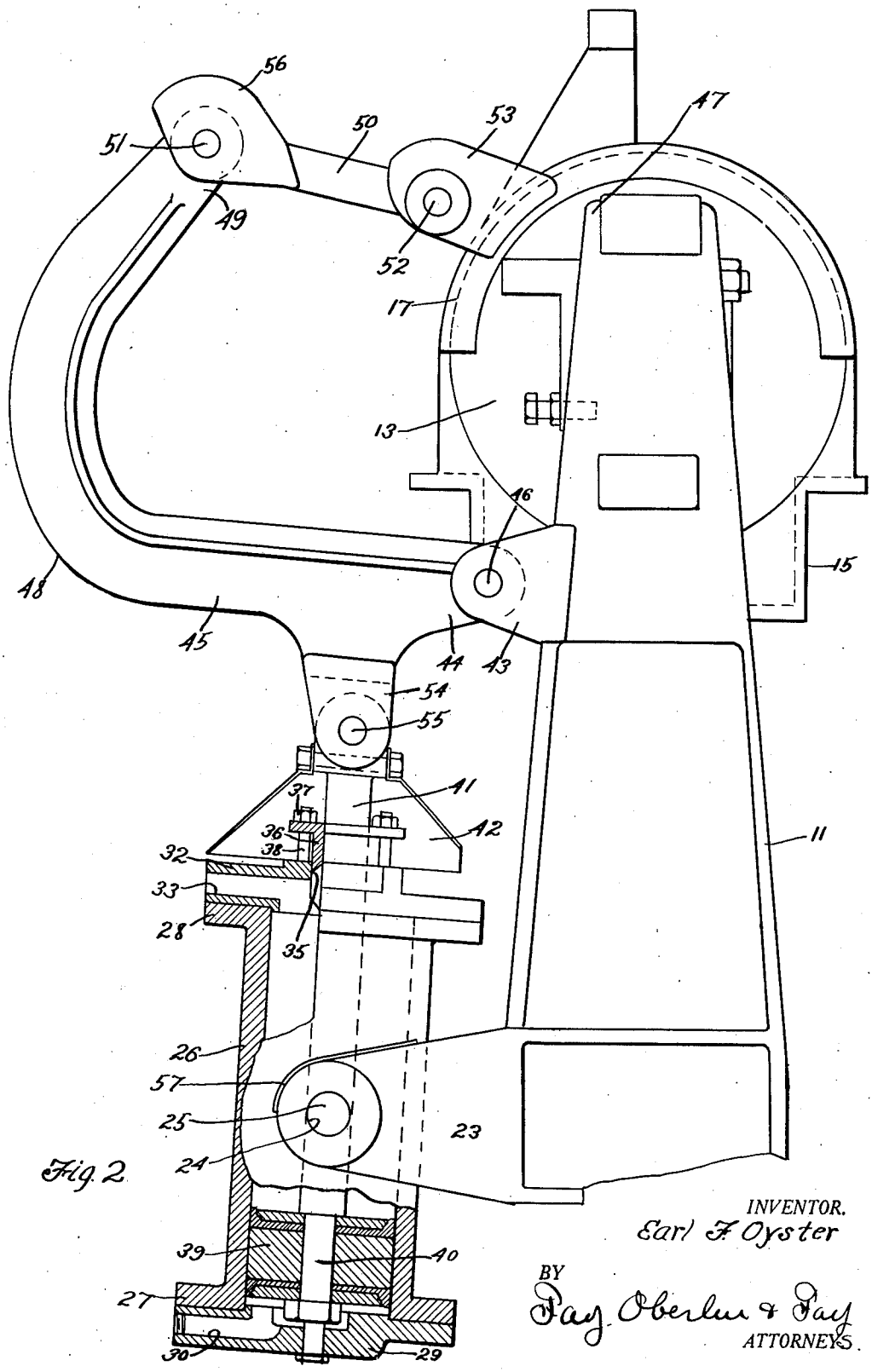


Fig. 2.

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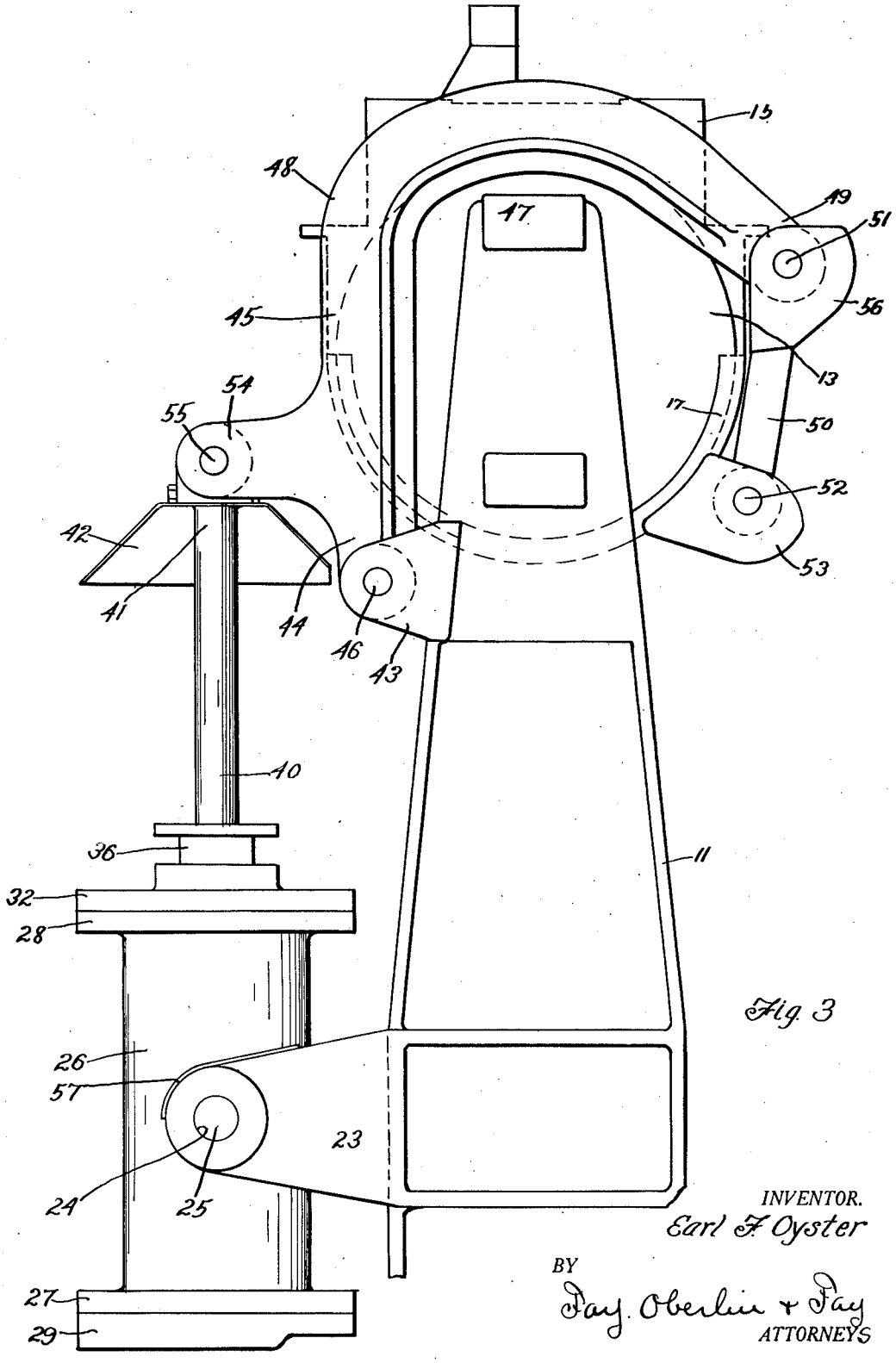


Fig. 3

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1,922,744

ROLL-OVER MACHINE

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Application November 4, 1929. Serial No. 404,845

11 Claims. (Cl. 22—33)

The present application relates, as indicated, to a roll-over machine, and more particularly to a device for inverting foundry molds by swinging them about horizontal pivots disposed in prolongation of the ends of the mold. The primary object of the invention is to provide an automatically operable machine of the character indicated. A further object of the invention is to provide a machine of the character indicated which shall be power operated and very smooth in its operation. Further objects of the invention will appear as the description proceeds. To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawings and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:

Fig. 1 is a perspective view of a machine constructed in accordance with my invention; Fig. 2 is a side elevation of the upper portion of the machine; and Fig. 3 is a view similar to Fig. 2, the parts having assumed a different set of relative positions.

Referring more particularly to the drawings, it will be seen that I have provided a frame 10 comprising a pair of spaced upstanding elements 11 and 12, each of said elements being provided adjacent its upper end with an inwardly facing disc 13 centrally provided with a bearing hub 14. In order to remove the finished molds from the machine, the arm 1 swings horizontally about a post 2 to and from a position between uprights 11 and 12, this post 2 being one of the rigid elements of the machine frame. The arm has a central opening 3, through which a squeeze table 4 can be moved up and down by a cylinder 5, in the usual manner. Two parallel bars 6, 6 bridge this opening 3 and, when not supported by the table 4, rest on their ends at the notches 7, on the arm 1 at the ends of the opening 3 to support a flask in a manner hereafter to be described. The horizontal plate 8 constitutes the floor plate of the machine, and is at the level of the foundry floor. A rock over table 15 is mounted between the upper ends of said elements 11 and 12, and is provided at each of its ends with an upstanding ear 16 having a portion thereof rebent to form a part-annular channel 17 fitting over one of said discs 13. Each of the ears 16 is provided on its inner face with a hub 18 formed with a central aperture 19 therein for the reception of a pin 20 received in said bearings 14. The table is provided adjacent its opposite ends with U-shaped members 21 pivoted to said table and adapted to be moved into retaining engagement with a mold flask placed on said table, said members 21 being operable through the medium of handles 22.

At a point below the bearings 14, the frame member 11 is provided with a pair of laterally extending lugs 23, each of said lugs being formed adjacent its outer end with an aperture 24 in which is journaled a pin 25. The pins 25 are carried substantially centrally of a cylinder 26, whereby said cylinder is mounted to oscillate about a substantially central horizontal axis.

In the embodiment shown, the cylinder 26 is provided at its lower end with a flange 27 and at its upper end with a flange 28. To the flange 27 is suitably secured a head 29 provided with a passage 30 communicating with the interior of said cylinder 26 and adapted to have connected thereto a flexible hose 31 leading from a source of fluid under pressure. To the flange 28 there is secured a head 32 formed with a passage 33 communicating also with the interior of the cylinder 26 and having connected thereto a flexible hose 34 leading likewise from a source of fluid under pressure. The head 32 is centrally apertured and is preferably formed to provide a chamber 35 adapted to receive packing material. A gland 36 is entered in said chamber 35 and is movable through the medium of nuts 37 and bolts 38 to compress the packing in said chamber.

Within the cylinder 26 there is reciprocably mounted a piston 39 having connected thereto a shank 40, the upper end 41 of which projects through said chamber 35 and gland 36 to the exterior of the cylinder 26. A shield 42 is preferably secured to said upper end 41 of the shank 40 for a reason later to be mentioned.

At a point intermediate the lugs 23 and the bearings 14, the frame member 11 carries a second pair of lugs 43 to which is pivoted one end 44 of a lever 45 through the medium of a pin 46. At a point removed from the pivot point 46 by a distance substantially equivalent to the distance from said pivot point 46 to the upper end 47 of the frame member 11, the lever 45 is curved upwardly as at 48, and the end 49 of said lever 45 has pivoted thereto one end of a link 50 through the medium of the pin 51. The opposite end of said link 50 is pivoted at 52 to an element which may be termed a housing 53 secured

to the channeled portion 17 of one ear 16 on the table 15. At a point intermediate the end 44 and the curved portion 43 of the lever 45, said lever is provided with a laterally or downwardly projecting lug 54 which, through the medium of a pin 55, is pivoted to the upper end 41 of the shank 40.

The operation of the herein disclosed device is believed to be obvious, but it may be noted that, if fluid under pressure is admitted through the hose 31 and the passage 30 to the portion of the interior of the cylinder 26 below the piston 39, said piston will be moved upwardly in the cylinder 26. Such movement of the piston results in clockwise rotation of the lever 45 about its pivot point 46, such movement being transmitted through the link 50 to the ear 16. As will be obvious from a comparison of the relative positions of the parts in Figs. 2 and 3, the parts are so proportioned that a 90° movement of the lever 45 results in a 180° oscillation of the table 15 about the pins 20. This movement of the lever 45 is, of course, accompanied by an oscillation of the cylinder 26 about its pivots 25, such oscillation being in a counter-clockwise direction during the first portion of the movement of the lever 45, and in a clockwise direction during the latter portion of such movement. Obviously, if fluid under pressure is admitted through the hose 34 and the passage 33 to the portion of the interior of the cylinder 26 above the piston 39, the parts will be moved back into the positions illustrated in Fig. 2.

The cycle of operations of the entire machine is as follows. The table 15 and operating linkages being in the position of Figs. 1 and 2, and a pattern plate being secured to what is then the upper side of the table 15, the operator manually places an empty flask over the pattern plate, fills the flask with sand, either with a shovel or by admitting sand from a chute, strikes the sand off level, places the bottom board, and fastens the clamps 21 over the ends of the bottom board. Air is then admitted at 30, thus inverting the table 15 with the flask secured thereto. The table 4 is then raised by the cylinder 5 carrying up the bars 6 into contact with the bottom of the flask and squeezing the mold upwardly against the inverted table 15, which at this time serves as a squeeze head. The clamps 21 are then released, and the table 4 lowered. On the downward movement the bars 6, with the mold thereon, go down with the table until their end notches 7 are stopped by the arm 1. The table 4 continues its downward movement sufficiently to clear, after which the arm 1 is swung out around its pivot 2 and the mold is removed by suitable conveying means. The table 15 is again brought to the position of Fig. 1 and the cycle repeated, it being understood that the same pattern plate will serve for making the entire series of molds of any particular pattern.

It is desirable to protect certain points in this apparatus from falling sand and other dirt which may fall from the flasks or from the table 15. Consequently means have been provided for protecting all pivot points which, at any time, lie below the level of the table 15. As will be obvious, the point 55 always lies below that level, and the ears 54 are so designed as to protect this pivot point. The shield 42 at all times protects the relatively reciprocable parts 41 and 36, and a shield 57 at all times protects the pivot point 25. A guard 56 is provided to protect the pivot point 51 when the latter is in the position of Fig. 3, and the housing 53 protects the pivot point 52 in the position of Fig. 3.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:

1. In a device of the class described, a frame including fixed standards, aligned horizontal pivots fixed on said standards, a table supported by bearings on said pivots, means associated with said table for holding a mold thereon with said pivots in prolongation of the mold ends, a cylinder mounted on said frame, a piston in said cylinder and adapted to be reciprocated therein, and means connecting said piston and said table whereby a single stroke of said piston in one direction causes oscillation of said table 180° about its axis.

2. In a device of the class described, a frame including fixed standards and pivots fixed on said frame in horizontal alignment, a table rotatably supported upon said pivots, means for holding a mold on said table between said pivots, a cylinder pivotally mounted on said frame, a piston in said cylinder and adapted to be reciprocated therein, and means connecting said piston and said table whereby reciprocation of said piston causes oscillation of said cylinder about its pivotal axis and inversion of said table upon its axis from one to another of the vertically aligned positions.

3. In a device of the class described, a frame including fixed standards and pivots fixed on said frame in horizontal alignment, a table rotatably supported upon said pivots, a cylinder pivotally mounted on said frame, a piston reciprocable in said cylinder, a link pivoted to said frame and having a pivotal connection with said piston and a connection with said table, whereby a single stroke of said piston in one direction causes inversion of said table upon its axis from one to another of two vertically aligned positions.

4. In a device of the class described, a frame, a table pivotally mounted on a fixed horizontal axis in said frame, means on said table for holding a mold thereto with a horizontal axis of the mold coincident with said horizontal axis of the table, a cylinder pivotally mounted on said frame, a piston in said cylinder, a link having its one end pivoted to said frame, means connecting the other end of said link to said table, and means connecting said piston to said link intermediate the ends of said link.

5. In a device of the class described, a frame, a table pivotally mounted on a horizontal axis in said frame, a cylinder pivotally mounted to oscillate on a horizontal axis below and to one side of the axis of said table, a piston reciprocable in said cylinder and projecting through the upper end thereof, a link having its one end pivoted to said frame at a point intermediate the pivotal axes of said table and said cylinder, and means connecting the other end of said link to said table at a point above the pivotal axis of said table, the projecting end of said piston being connected to said link at a point intermediate the ends of said link.

6. In a device of the class described, a frame, a table pivotally mounted on a horizontal axis in said frame, a cylinder pivotally mounted to oscillate on a horizontal axis below and to one

side of the axis of said table, a piston reciprocable in said cylinder and projecting through the upper end thereof, a link having its one end pivoted to said frame at a point intermediate the pivotal axes of said table and said cylinder, and above the normal position of the free end of said piston, means connecting the other end of said link to said table at a point above the pivotal axis of said table, the projecting end of said piston being connected to said link at a point intermediate the ends of said link, and means for forcing fluid into said cylinder to move the free end of said piston to a point above the pivot point of said link on said frame.

7. In a device of the class described, a frame including fixed standards and pivots fixed on said frame in horizontal alignment, a table rotatably supported upon said pivots, means for holding a mold on said table between said pivots, a link pivoted at one end to said frame and at the other connected to said table, and means for moving said link about its pivotal axis on said frame to cause oscillation of said table about its pivotal axis, the limiting positions of oscillation of the table being in vertical alignment.

8. In a device of the class described, a frame including fixed standards and pivots fixed on said frame in horizontal alignment, a table rotatably supported upon said pivots, a curved link pivoted at its one end to said frame, a second link pivoted to the other end of said first-mentioned link and to said table, and a piston for moving said first-mentioned link about its pivotal axis on said frame by a single piston stroke in one direction to cause oscillation of said table about its pivotal axis between two vertically aligned end positions.

9. In a device of the class described, a frame including fixed standards and pivots fixed on said frame in horizontal alignment, a table rotatably supported upon said pivots, a level pivoted to said frame, and means connecting said lever to said table whereby oscillation of said lever through 90° about its pivotal axis causes oscillation of said table through 180° about its pivotal axis between two vertically aligned positions.

10. In a device of the class described, a frame, a table pivotally mounted on a horizontal axis in said frame, a lever pivoted to said frame, means connecting said lever to said table whereby oscillation of said lever through 90° about its pivotal axis causes oscillation of said table through 180° about its pivotal axis, and means vertically reciprocable and horizontally oscillable with respect to said frame for shifting said lever.

11. In a device of the class described, a frame, a table pivotally mounted on a horizontal axis in said frame, a lever pivoted to said frame, means connecting said lever to said table whereby oscillation of said lever through 90° about its pivotal axis causes oscillation of said table through 180° about its pivotal axis, and fluid-actuated means vertically reciprocable and horizontally oscillable with respect to said frame for shifting said lever.

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