G. M. CLARK, Jr.

INGOT CASTING MACHINE.

APPLICATION FILED FEB. 8, 1909.

946,721. **Patented Jan. 18, 1910.**

4 SHEETS—SHEET 1.

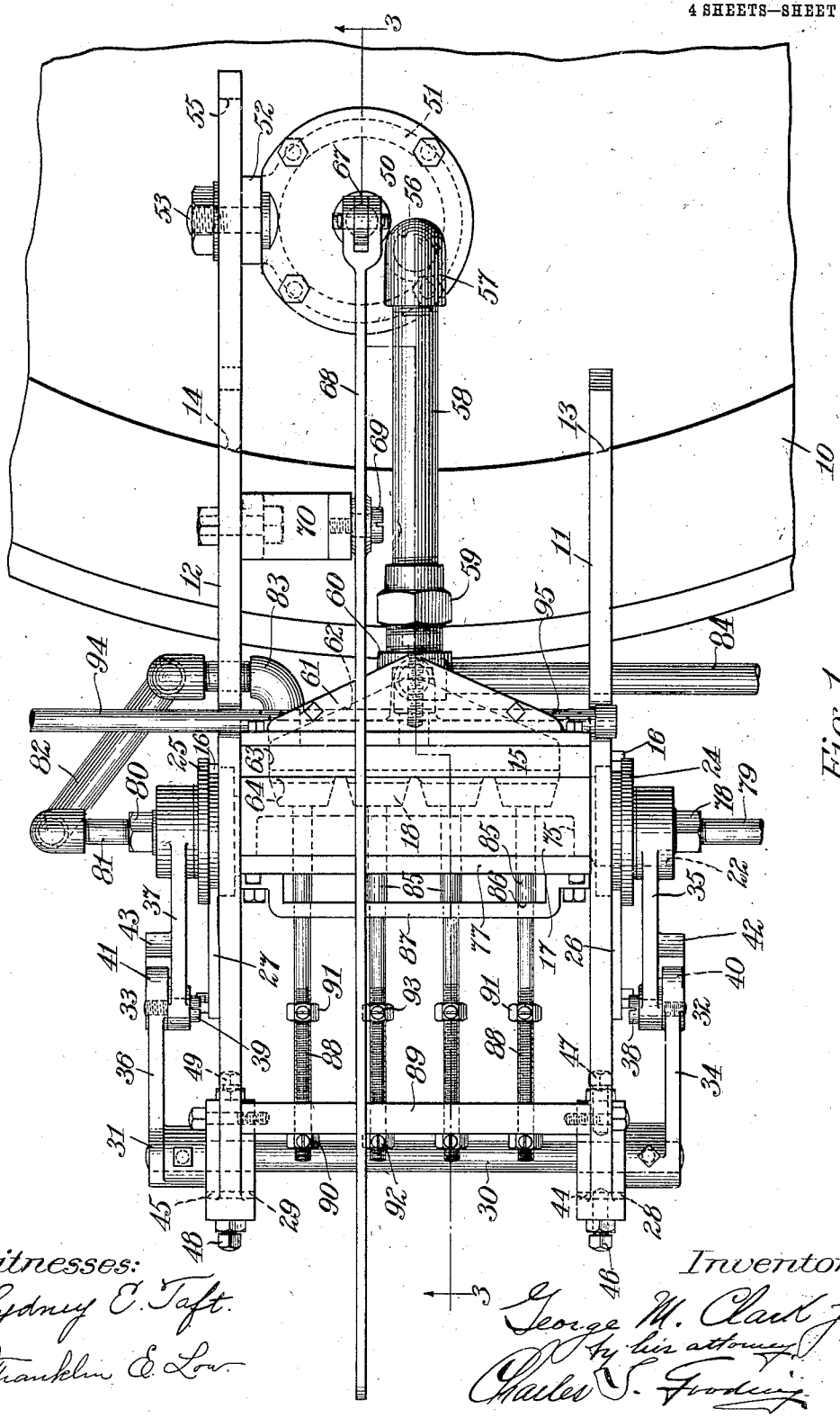


Fig. 1.

Witnesses:
Sydney E. Taft.
Franklin E. Low.

Inventor:
George M. Clark Jr.
By his attorney
Charles S. Fooding

G. M. CLARK, Jr.

INGOT CASTING MACHINE.

APPLICATION FILED FEB. 8, 1909.

946,721

Patented Jan. 18, 1910.

4 SHEETS—SHEET 2.

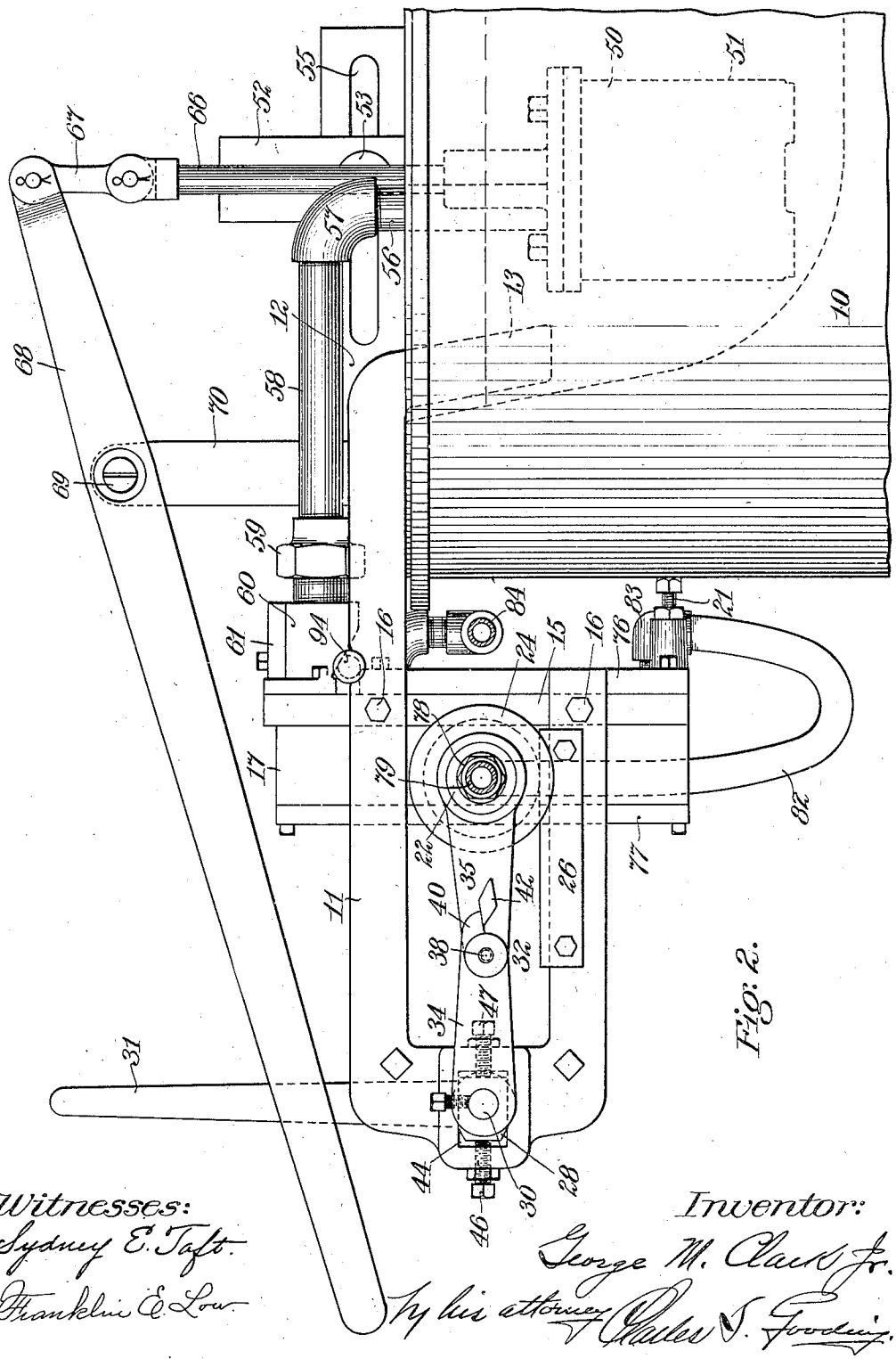


Fig. 2.

Witnesses:
Sydney E. Taft.
Franklin E. Low

Inventor:
George M. Clark Jr.
by his attorney
Charles S. Goodwin.

G. M. CLARK, Jr.

INGOT CASTING MACHINE.

APPLICATION FILED FEB. 8, 1909.

946,721.

Patented Jan. 18, 1910.

4 SHEETS—SHEET 3.

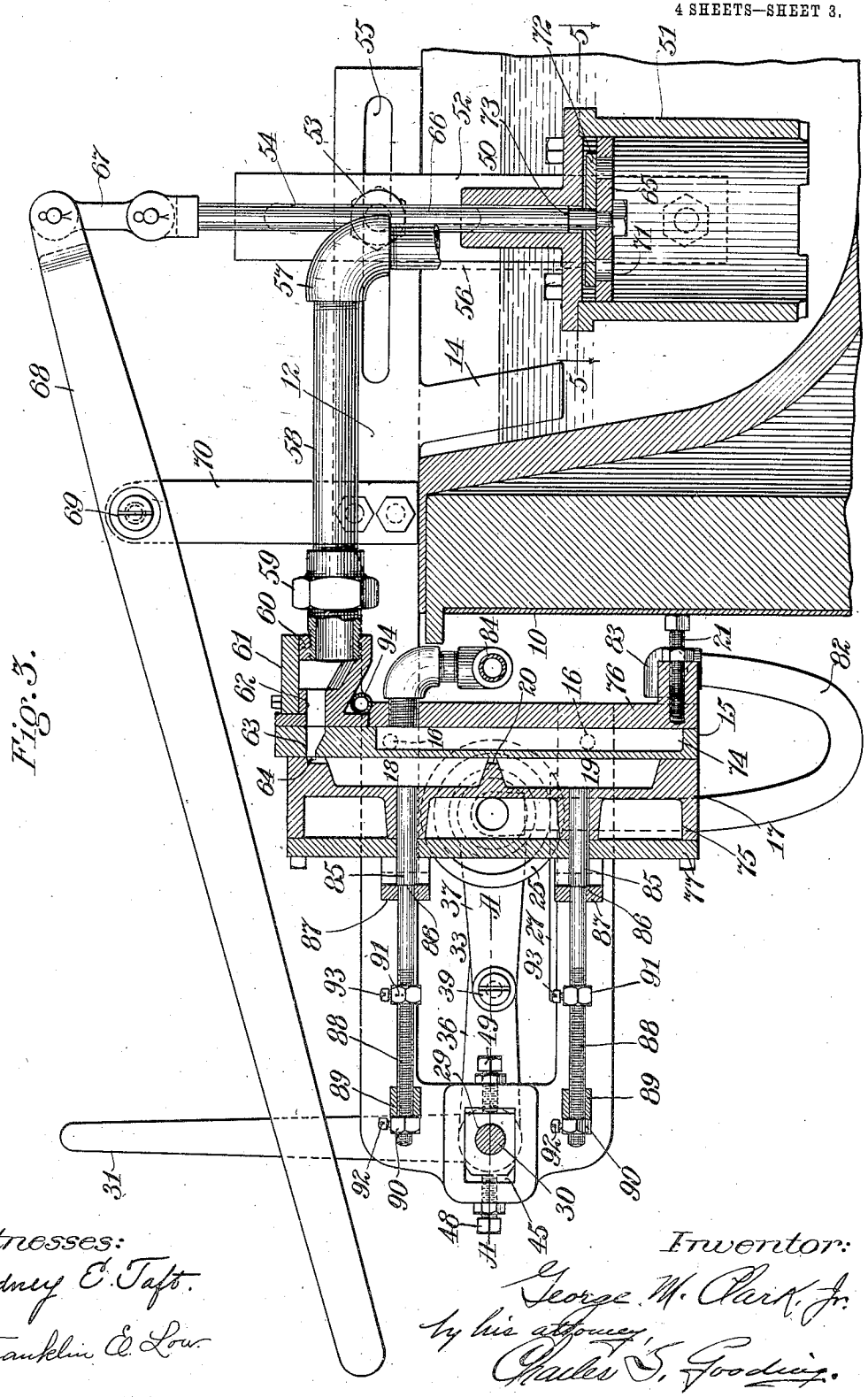


Fig. 3.

Witnesses:
Sydney E. Taft.
Franklin E. Low.

Inventor:
George M. Clark, Jr.
by his attorney,
Charles S. Gooding.

G. M. CLARK, Jr.

INGOT CASTING MACHINE.

APPLICATION FILED FEB. 8, 1909.

946,721. Patented Jan. 18, 1910.

4 SHEETS—SHEET 4.

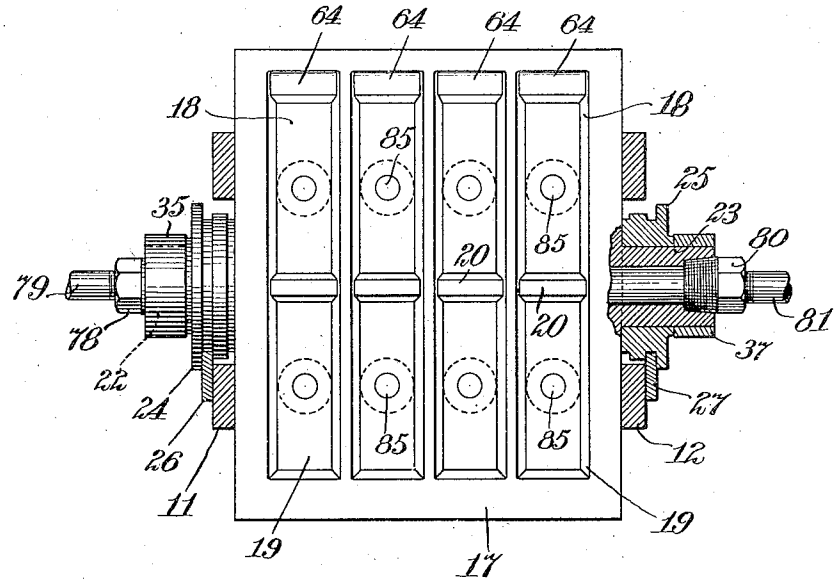


Fig. 4.

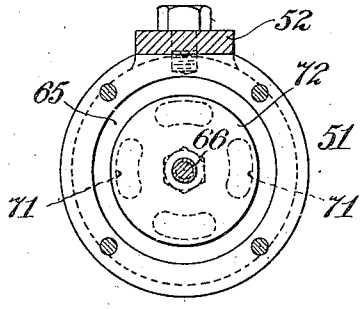


Fig. 5.

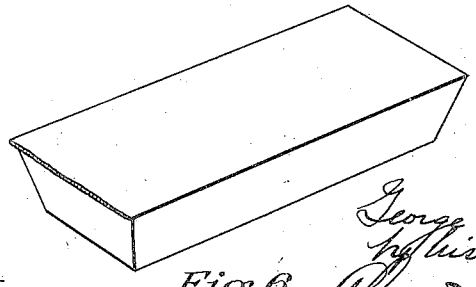


Fig. 6.

Witnesses:

Sydney E. Taft.

Franklin E. Low.

Inventor:

George M. Clark Jr.

by his attorney

Charles J. Harding.

UNITED STATES PATENT OFFICE.

GEORGE M. CLARK, JR., OF NAHANT, MASSACHUSETTS.

INGOT-CASTING MACHINE.

946,721. Specification of Letters Patent. Patented Jan. 18, 1910.

Application filed February 8, 1909. Serial No. 476,728.

To all whom it may concern:

Be it known that I, GEORGE M. CLARK, Jr., a citizen of the United States, residing at Nahant, in the county of Essex and State of Massachusetts, have invented new and useful Improvements in Ingot-Casting Machines, of which the following is a specification.

This invention relates to an improved ingot casting machine and the object is to provide a simple, durable and inexpensive machine by means of which molten type metal may be cast into ingots, the machine being employed in practice in melting up linotype, monotype and stereotype plates and casting the molten metal in the form of ingots of a convenient size to place in the melting pots of linotype and monotype machines.

One of the objects of the invention is to provide a machine of the class described in which the mold is so constructed as to make easy the removal of the ingots therefrom.

Another object is to provide means for ejecting the ingots from the mold.

A further object is to provide means whereby the mold and ingot therein may be quickly cooled.

A still further object is to provide improved means for relatively moving the mold members and to lock the same in coöperative relation to receive the molten metal.

Still another object is to provide means for adjustably supporting the mold and operating mechanism upon the pot for the molten metal and in such a manner as to be capable of being fitted to pots of various sizes and shapes.

The invention consists in the novel features of construction and in the combination and arrangement of parts set forth in the following specification and particularly pointed out in the appended claims.

Referring to the drawings: Figure 1 is a plan of an ingot casting machine embodying my invention, the pot for the molten metal being partly broken away to save space. Fig. 2 is a side elevation of the same. Fig. 3 is a section, partly in elevation, taken on line 3—3 of Fig. 1. Fig. 4 is a detail elevation, partly in section, of the movable mold member, its supporting wheels and tracks therefor. Fig. 5 is a detail plan section taken on line 5—5 of Fig. 3. Fig. 6 is a detail perspective view of one of the ingots.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings, 10 is a pot of any usual or desired construction, on which is supported a frame comprising two frame members 11 and 12 resting upon the upper edge of said pot and provided, respectively, with lugs 13 and 14 extending downwardly into the interior of the pot. To the frame members 11 and 12 a mold member 15 is rigidly secured in any suitable manner as by means of a plurality of screws 16, while another mold member 17 adapted to coöperate with the member 15 is movable toward and away therefrom. The member 17, as is clearly shown in Fig. 4, is provided with a series of depressions 18 and a series of depressions 19 of the proper shape for the ingots to be cast, these depressions being arranged in pairs connected by grooves 20. A positioning screw 21 having screw-threaded engagement with the mold member 15 is adjustably secured thereto in such a manner as to bear against the outer wall of the pot 10, this adjustment being provided for the purpose of adapting the mechanism to pots of different sizes.

Formed on or secured to the member 17 upon opposite sides, respectively, thereof are hubs 22 and 23 on which are journaled wheels 24 and 25, respectively, adapted to run on a track comprising rails 26 and 27 fast to the frame members 11 and 12, respectively, said wheels being grooved as clearly shown in Fig. 4 so as to be guided laterally on said rails. The mold member 17 is moved toward and away from the mold member 15 by the following mechanism: Mounted in bearings 28 and 29 in the frame members 11 and 12, respectively, is a rock shaft 30 having fast thereto an operating arm 31 by means of which a rocking movement may be imparted thereto. The rock shaft 30 is connected to the mold member 17 by toggles 32 and 33, the toggle 32 comprising an arm 34 fast to said rock shaft and a link 35 pivotally connected to said arm and also pivotally connected to the hub 22, while in like manner the toggle 33 comprises an arm 36 fast to said rock shaft and a link 37 pivotally connected to said arm and also pivotally connected to the hub 23. It will be readily understood that when the arm 31 is rocked downwardly toward the left from the position shown in Fig. 3 the toggles 32 and

33 will be actuated to move the mold member 17 away from the mold member 15.

Referring to Fig. 3 it will be observed that the toggles 32 and 33 are so constructed and arranged that the axes of the pivots 38 and 39 are normally located below a plane A—A containing the axis of the rock shaft 30 and the axes of the hubs 22 and 23, said pivots being prevented from passing below the position shown by means of lugs 40 and 41 formed on the arms 34 and 36, respectively, and adapted to engage lugs 42 and 43 formed on the links 35 and 37, respectively. It will be evident that by virtue of this arrangement when the toggles 32 and 33 occupy the position shown in the drawings, said toggles act to lock the mold member 17 against movement away from the mold member 15.

In order to prevent leakage between the two mold members it is desirable that their opposed faces shall be pressed tightly into contact with each other and to that end the bearings 28 and 29 are adjustably mounted in slots 44 and 45, respectively, formed in the frame members 11 and 12, the bearing 28 being adjusted and rigidly held by means of oppositely opposed adjusting screws 46 and 47, while the bearing 29 is in like manner held and adjusted by screws 48 and 49. It will be evident that by adjusting the bearings 28 and 29 the rock shaft 30 may be so positioned with respect to the stationary mold member 15 as to cause the toggles 32 and 33 to force the mold member 17 tightly against the mold member 15, it being evident that a considerable pressure will be exerted thereupon as the axes of the pivots 38 and 39 approach and pass the plane A—A.

I will now proceed to describe the pump and connections whereby the molten metal is drawn from the pot 10 and forced into the mold. Located within the pot 10 is a pump 50 comprising a cylinder 51 rigidly secured to an arm 52 depending from and secured to the frame member 12 by means of a bolt 53 extending through a vertical slot 54 in said arm and through a horizontal slot 55 in said frame member, whereby when the mechanism is assembled the pump may be properly positioned with respect to the pot. A pipe 56 connected to the top of the cylinder 51 extends upwardly therefrom and is connected to an elbow 57 to which elbow is connected a horizontal pipe 58, said horizontal pipe being connected by means of a suitable coupling 59 to what I shall term a throat 60 having a cover plate 61 secured thereto. The throat 60 is secured to the mold member 15 and has therein a passage 62 forming a continuation of the passage 63 through said mold member, the latter passage communicating with a series of depressions 64 leading into the depressions 18, respectively.

Located in the cylinder 51 is a piston 65 connected to a piston rod 66, said piston rod being connected by a link 67 to an operating lever 68 pivoted at 69 to a standard 70 fast to the frame member 12, whereby said piston may be reciprocated in said cylinder. The piston 65 is provided with a series of ports or passages 71 shown in Figs. 3 and 5, while a circular valve 72 slidably mounted upon the piston rod 66 is adapted to open and close said ports, the extent of movement of said valve vertically being determined by a shoulder 73 upon said piston rod. It will be evident that when the operator forces the piston 65 downwardly into the molten metal in the pot the valve 72 being lighter than the molten metal will lift and allow a portion of the metal to flow through the ports 71 into the space above the piston 65 and that when said piston is lifted said valve will close and force the molten metal thereabove through the pipes, 56 and 58, through the passages 62 and 63 and through the depressions 64 into the depressions 18, it being evident that the metal will fill not only the depressions 18, but the depressions 19 so as to form a series of ingots cast in pairs.

In order that the mold may be kept at a low temperature so as to rapidly cool the ingots after they have been cast, the mold members 15 and 17 are provided, respectively, with chambers 74 and 75 and for convenience of manufacture said mold members are provided with cover plates 76 and 77, respectively.

The hub 22 has screwed thereinto a plug 78 to which is connected an inlet pipe 79, while in like manner the hub 23 has screwed thereinto a plug 80 to which is connected an outlet pipe 81, said outlet pipe being connected by a flexible tube 82 to connections forming an inlet pipe 83 communicating with the chamber 74, said flexible tube being adapted to yield as the mold member 17 is moving toward and away from the mold member 15. Connected to the chamber 74 is an outlet pipe 84, it being understood that this outlet pipe as well as the inlet pipe 79 will be connected to any suitable pump, not shown, for circulating a cooling fluid such as water through the chambers 74 and 75, whereby the mold is maintained at such a low temperature as to quickly cool the ingots therein.

The ingots after being formed are ejected by the following ejecting devices: Slidably mounted in the mold members 17 are a plurality of plungers 85 corresponding in number to the depressions for the ingots in said mold member, said plungers being arranged in two series, an upper series and a lower series, said plungers being provided, respectively, with shoulders 86. The shoulders 86 of the plungers 85 are normally adapted to abut against stop plates 87, 87 fast to the

cover plate 77 on the mold member 17. The plungers 85 are provided, respectively, with screw-threaded portions 88 slidably arranged in upper and lower guides 89, 89 fast to the frame members 11 and 12, each of said screw-threaded portions having mounted thereon two nuts 90 and 91 which may be adjusted one toward and away from the other by rotating the same in the proper direction, these nuts when properly adjusted being held against rotation by means of set screws 92 and 93, respectively, having screw-threaded engagement with said nuts and adapted to bear against the plunger 85. When the mold member 17 moves toward the left, from the position shown in Figs. 1, 2 and 3, the screw-threaded portions 88 of the plungers 85 slide freely toward the left through the guides 89 for it will be understood that the ingots always stick in said mold member and no relative movement takes place between said plungers and said mold member until the nuts 91 strike against the guides 89. Thereafter as the mold member 17 continues to move toward the left it will be readily apparent that a relative movement will take place between the plungers 85 and the mold member 17 which will result in said plungers forcing the ingots out of their respective recesses and owing to the fact that said recesses are vertically disposed the ingots fall therefrom without hindrance on the floor or into any suitable receptacle. Located beneath the throat 60 is a burner 94 provided with suitable orifices 95, said burner being adapted to be supplied with gas, whereby said throat may be subjected to heat for a purpose which will appear hereinafter.

The general operation of the machine hereinafter specifically described is as follows: It will be understood that when the mechanism is assembled upon the edge of the pot the pump cylinder 51 is adjusted to the proper position in said pot according to the shape and size thereof, after which the pipes 56 and 58 are properly fitted up to connect said cylinder to the mold. Assuming the parts to be in the position shown in Figs. 1, 2 and 3, the operator first grasps the handle of the operating lever 69 and lifts the same, thereby causing the piston 65 to descend. He then pushes downwardly on the handle of the operating lever 68 thus raising the piston 65 and thereby forcing a supply of the molten metal through the connecting passages to and into the mold. He then releases the lever 68 and a slight reactionary movement of the piston 65 takes place, this resulting in the molten metal, which is in the passages 63, 62 and pipe 58, being drawn backwardly somewhat, thus lowering the level of said metal to the lower part of the restricted portion of the passage 63 and thus the ingots are separated from the metal in the passage 63. The solidifying of the ingots is a matter of but a few moments because the mold members are amply cooled by the circulating water. The operator then grasps the operating arm 31 and swings said arm downwardly toward the left from the position shown in Figs. 2 and 3, during which movement the mold member 17 is carried toward the left and the ingots are ejected from their respective receses, as hereinbefore described. The operator then swings the arm 31 upwardly to the position shown in Figs. 2 and 3, thereby moving the mold member 17 into coöperative relation with the mold member 15 and locking the mold member 17 in such relation, after which the operation just deseribed is repeated.

It will be understood that the ingots will be formed in vertical pairs connected by a small web of metal and this web may then be broken so that the individual ingots will appear as shown in Fig. 6.

When the machine has been out of operation it may be that some of the molten metal will solidify in the throat 62 and, therefore, in starting the machine up again it will be found necessary to apply heat to said throat, this being accomplished by means of the burner 94.

Having thus described my invention, what I claim and desire by Letters Patent to secure is:

1. An ingot casting machine having, in combination, two relatively movable mold members, a toggle connected to one of said members, a rock shaft operatively connected to said toggle to impart a reciprocatory movement to one of said mold members, bearings in which said rock shaft is mounted to rock, a frame on which said bearings are mounted and adapted to be moved toward and away from said members, and means to adjustably secure said bearings to said frame.

2. The combination with a melting pot of an organized ingot casting machine detachably supported thereon, said machine including a mold, a pump located in said pot and adapted to pump molten metal from said pot into said mold, and a lug projecting downwardly in contact with the interior of said pot, a portion of said machine engaging the exterior of said pot.

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

GEORGE M. CLARK, Jr.

Witnesses:
ALLAN S. H. CHAPMAN,
HIRAM E. MILLER.