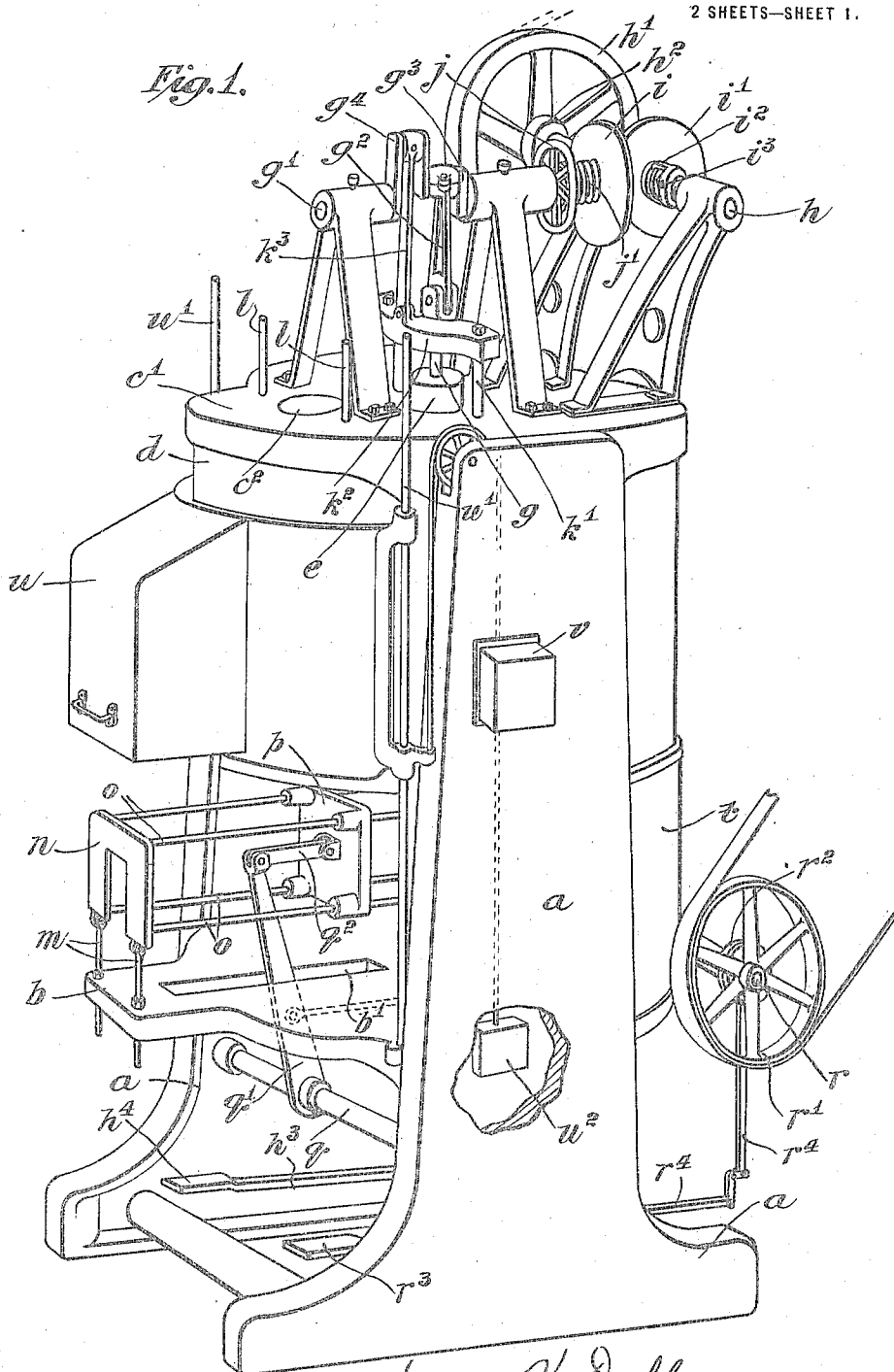


1,249,919.

H. H. DOEHLER.
CASTING APPARATUS.
APPLICATION FILED MAR. 23, 1915.

Patented Dec. 11, 1917.
2 SHEETS—SHEET 1.

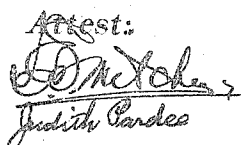


Attest:
C. Mitchell
Judith Pardee

Herman H. Doehler Inventor:
by *Frank P. Wentworth*
his Atty

N. H. DOEHLER.
CASTING APPARATUS.
APPLICATION FILED MAR. 23, 1915.

2 SHEETS—SHEET 2.



Herman H. Doehle Inventor:
by Frank T. Wentworth
his Atty.

UNITED STATES PATENT OFFICE.

HERMAN H. DOEHLER, OF BROOKLYN, NEW YORK, ASSIGNOR TO DOEHLER DIE CASTING COMPANY, OF BROOKLYN, NEW YORK, A CORPORATION OF NEW YORK.

CASTING APPARATUS.

1,249,919.

Specification of Letters Patent.

Patented Dec. 11, 1917.

Application filed March 23, 1915. Serial No. 16,341.

To all whom it may concern:

Be it known that I, HERMAN H. DOEHLER, a citizen of the United States, residing at the borough of Brooklyn, in the city of New York, county of Kings, and State of New York, have invented certain new and useful Improvements in Casting Apparatus, of which the following is a specification, reference being had therein to the accompanying drawings, which form a part thereof.

My invention relates to casting apparatus and more particularly to a type thereof especially adapted for use in the art of pressure die casting.

Casting molten metal under pressure is now extensively practised with various alloys and metals and by means of various apparatus. In certain classes of work, such as casting lines of type in linotype machines, or in casting small articles, such as bullets, entirely automatic machines have been used. By automatic, I mean machines which either operate continuously or make the casting as one of a series of operations controlled by the operator, as in linotype machines. In commercial work where large heavy dies are used, and the machine must be adapted for handling dies of different sizes and for different cast parts, automatic machines have been found to be of no commercial value. This is particularly true where the dies contain one or more movable cores. The time required to set a die prior to each casting operation, in relation to, and to remove the die from, the charging nozzle, to draw the cores, and to eject the casting is much greater than that required for the actual casting operation.

With these conditions in mind, I have produced a machine wherein the actual charging of the die is mechanical, the mechanism employed being under the control of the operator in much the same manner as a punch press is operated in sheet metal working. The mechanism by means of which the charging of the die is accomplished and the parts of the apparatus coöperating therewith, are so constructed as to adapt the machine for use in delivering different volumes of metal to meet the needs of different dies or molds, thus especially adapting this machine to general commercial work.

I also provide mechanical means whereby the die may be set with relation to the charg-

ing nozzle and may be positioned to permit the operator to open the die and eject the casting therefrom.

The mechanism for charging the die, and for handling the die supports are manually controlled through entirely independent devices so that if desired the last named mechanism may be made inoperative, or dispensed with.

I employ a charging mechanism adapted to deliver with each actuation of the said mechanism a definite predetermined quantity of molten metal, sufficient for a single casting operation only, thus insuring not only the proper temperature and fluidity of the metal to secure a sound, clean casting; but uniformity in succeeding castings. This charging mechanism embodies a main melting-pot and an auxiliary chamber fed therefrom in a manner to avoid the introduction of sediment or dross to said chamber. It is not my intention to claim this mechanism broadly in this application inasmuch as the invention of this application relates to mechanical appliances for delivering the metal under pressure to the die.

In conjunction with this charging mechanism, I provide means whereby the metal in the melting-pot may be automatically agitated or stirred so as to secure a substantially uniform mixture with all castings made during any run of the machine. I also provide means for indicating the level of the molten metal in the melting-pot, and a conveniently accessible shield adapted to inclose the die supporting mechanism and protect the operator from possible injury by flying metal.

The invention consists primarily in a casting apparatus embodying therein a melting-pot, a furnace about said melting-pot, a cylinder within said melting-pot having a discharge port opening outwardly of the bottom of said melting-pot, and an intake port within said melting-pot said cylinder having an elongated bore of small dimensions, a reciprocatory piston in said cylinder adapted to normally close said intake port, means adapted to actuate said piston, a main power shaft, operative connections between said power shaft and said means, and manually actuated controlling means whereby the said connections may be made inoperative or operative with relation to said first named

means; and in such other novel features of construction and combination of parts as are hereinafter set forth and described and more particularly pointed out in the claims hereto appended.

Referring to the drawings:

Figure 1 is a perspective view from the front of, an apparatus embodying my invention;

Fig. 2 is a vertical section through the melting-pot and cylinder showing a portion of the piston actuating means and also the actuating means for the agitator or stirrer;

Fig. 3 is a detail view of the main power shaft and the operative connections between said shaft and the means for actuating the piston;

Fig. 4 is a side elevation of the die or mold supporting mechanism and the controlling means therein; and

Fig. 5 is a detail view of the controlling means for the said die supporting mechanism.

Like letters refer to like parts throughout the several views.

In the embodiment of my invention shown in the accompanying drawings, *a* indicates the main frame of the machine carrying a bed-plate *b* toward the bottom thereof. Supported toward the top of said frame, is a melting pot *c* surrounded by a furnace *d*, which may be of any desired construction. Within the melting-pot *c* is a cylinder *e* having an elongated bore of small diameter and provided with a discharge port *e'* at the bottom thereof, said port opening outwardly of the bottom of the melting-pot *c*. The outer lower end of said cylinder is finished, as at *e''*, to form a discharge nozzle adapted to operatively engage the ingate of a metal die or mold, and the walls of said cylinder within the port *e'* are outwardly flared slightly as shown at *e'''* to facilitate the removal of any metal which, after the casting operation, may accumulate and become chilled while within said port. The flare of the portion *e'''* of said cylinder is merely such as to give the proper draw for removing this metal.

Within the melting-pot *c* the cylinder *e* is provided with an intake port *f* spaced away from the bottom of the said melting-pot sufficiently to cause the metal delivered through said port to the said cylinder, to be drawn from the mass of molten metal in the melting pot at a point intermediate the top and bottom thereof. This arrangement of the port *f* prevents the sediment accumulated toward the bottom of the melting-pot and the oxid or other dross accumulated at the top of the molten metal in said pot, being included in the metal charged into said cylinder for the purpose of being cast.

Mounted in, and having a close sliding fit with, the cylinder *e* is a piston *g* having the

two-fold function of forcing molten metal from said cylinder into the die or mold under the requisite pressure, and of controlling the volume of metal drawn from the melting-pot and delivered to the said cylinder which metal constitutes a charge for a single casting operation. This piston *g* is adapted to be mechanically actuated from the crank shaft *g'* through the connecting rod *g''* mounted upon the crank *g'''* of said shaft and pivotally connected with said piston. Preferably the piston *g* consists of a rod of the same diameter throughout although, if desired, the upper portion of the rod may be of smaller diameter to reduce the element of friction in the actuation thereof. The melting pot *c* is provided with a closure head *c'* through which the end of the cylinder *e* projects, said cylinder being held in position by said closure.

The main actuating mechanism for the machine comprises a power shaft *h* having loosely mounted thereon a fly-wheel *h'*. The said fly-wheel is adapted to be connected with the said shaft *h* by means of a clutch mechanism *h''* similar to that ordinarily employed upon a punch press. This clutch mechanism is controlled by means of a treadle mechanism *h'''*, the treadle *h''''* of which is exposed at the front of the machine where it is conveniently accessible to the operator. The said clutch mechanism *h''* is operative to connect the fly-wheel *h'* to the shaft *h* during a predetermined rotation of said wheel upon the conclusion of which the clutch mechanism is automatically thrown out so as to permit said shaft to come to rest.

The main power shaft *h* is operatively connected with the crank shaft *g'* so that when the clutch *h''* is set, the piston *g* will be reciprocated to first admit molten metal to the cylinder *e* and then to close said cylinder and force the metal therefrom into the die or mold.

If a machine were to be used for making a single article requiring a fixed quantity of metal, direct connection between the shafts *h* and *g'* might be used but where the quantity of metal required is uncertain or variable, it is preferable to provide a differential transmission mechanism so as to permit variation in the speed of the piston *g*, thus controlling the quantity of metal in the charge introduced to the cylinder *e* through variance in the time required for a full stroke of the said piston *g*. In the form of the invention shown in the accompanying drawings, the connection between the main power shaft *h* and the crank shaft *g'* comprises a friction disk *i* carried by the shaft *g'* and a friction wheel *i'* carried by the shaft *h*.

The wheel *i'* is adjustable axially of the shaft *h* and radially of the disk *i*, any desired means being provided for setting said wheel in any adjusted position upon said

shaft. In the form of the invention shown, I form screw threads upon the shaft h and mount thereon a traveler i^2 operatively engaging the hub of the said wheel in the manner shown. If desired a lock nut i^3 may be used for setting the traveler i^2 in any position. The disk i is also slidably mounted upon the crank shaft g' by means of an angular shaft, said disk being forced toward the wheel i' by means of screw threads upon said shaft having the feed wheel j mounted thereon, and a spring j' between said wheel and the said disk. By this construction the connecting mechanism may be set to develop any desired pressure to be used for forcing the metal from the cylinder e into the die. The diameter of the wheel i is substantially the same as the effective radius of the friction wheel i' so that when the clutch mechanism is set for higher speeds of the piston, that slippage incidental to the actuation of the friction transmission mechanism in imparting a uniform stroke to the piston g may occur. By adjusting the wheel i' radially of the disk i and adjusting the tension of the spring j' , the piston speed may be controlled and in this manner the volume of molten metal delivered to the cylinder e may be regulated.

Most of the so-called white metal alloys, particularly those containing aluminum, require constant agitation or stirring to prevent stratification of the different metals entering therein. To meet this requirement, I mount in the melting-pot c a stirrer k provided with guide rods k' passing through the closure c' and connected by a cross-head k^2 exteriorly of said head. Said cross-head is connected by the pitman k^3 with a crank g^4 upon the shaft g' and in this manner, with each actuation of the machine, the metal is thoroughly stirred and agitated.

Positioned within the melting pot c is a float l provided with the stems l' passing through, and movable in, openings in the said closure c' . By this means the level of the metal in the melting pot may be determined by the operator at all times. A visual level indicator is desirable in a casting apparatus having a closed top. Said float may also be used if desired for manually agitating or stirring the metal in the pot.

Mounted upon the bed-plate b are vertically adjustable rods $m-m'$ disposed toward the front and the rear of the machine. These rods carry the heads $n-n'$ supporting guide-rods o upon which the die support p and its rigging (not shown) is slidably mounted. The rigging upon the support may take any desired form and forms no part of this invention, although means are required in all die casting apparatus to hold the parts of the die together against the heavy pressures to which the die is

subjected during the casting operation. Mounted in the frame a of the machine is a rock shaft q passing through a way b' in the bed plate b and operatively connected with the die support p by the arm q' and the link q^2 , pivotally connected with said arm and said die support.

Carried by the frame a is a power shaft r having mounted loosely thereon a driving pulley r' . A clutch mechanism r^2 is adapted to couple said pulley to said shaft, said clutch mechanism being under the control of a treadle r^3 connected with said clutch by means of a rod r^4 . Said clutch is similar to the type of clutch used in an ordinary punch press being adapted with the tripping of the treadle to connect the pulley r' with the shaft r and automatically disconnect these parts upon the completion of a predetermined quantity of rotation of the said shaft. The shaft r is provided with a crank s connected by the link s' with the arm q' . By this construction after a die has been properly closed it may be mechanically set with relation to the discharge nozzle e' and may be mechanically brought into position adjacent the operator, to facilitate the opening of the die and the ejection of the casting therefrom. The details of the ejecting mechanism is not shown as such is well known in this art.

To accommodate the die support to dies of different thicknesses, I provide the plate n' with an adjustable stop n^2 adapted to engage the rear of the die support and arrest movement thereof when the ingate of the die or mold is in the proper position relative to the discharge port e' and nozzle e^3 . I also provide means whereby the actuating mechanism for the die support will accommodate itself to different positions of the said die support.

In the form of the invention shown, I accomplish this result by making the link s' in two sections and connecting these two sections by means of a spring rigging s^2 . By this construction when the die support comes to rest against the stop n^2 the actuating mechanism therefor will become inoperative with relation to the support.

The frame a rearwardly of the bed-plate b is closed by means of a detachable shield t —and the forward portion of this bed-plate is protected by means of a vertically slidable shield u , mounted upon the guide rods u' and acted upon by a counterweight u^2 . These shields are designed for the purpose of preventing injury to workmen about the machine from hot metal which may be squirted from between the die parts or between the die and the discharge nozzle e^3 .

At v , I have shown an ordinary pyrometer for indicating the temperature of molten metal in the melting-pot.

The closure c' has a port therein closed

by the removable cap c^2 , to permit the feeding of ingots to the machine while it is in operation.

The operation of the herein described machine is substantially as follows:

Normally the die support p will be close to the plate n where it may be readily opened and closed by the operator, and the piston g will be positioned with its operative face close to the discharge port e' . The fly wheel h and pulley h' rotate continuously.

When a die has been properly cleaned and closed the operator presses the treadle r^3 setting the clutch r^2 so as to cause the shaft r to make one half a full rotation at which point the said clutch will be automatically released. This one-half rotation will through the link s' and spring s^2 oscillate the arm q' and force the die support upon the rods o toward the back of the machine until they engage with the stop n^2 . The stop will arrest the support in position with its ingate in communication with the discharge nozzle e^2 . If the stop n^2 be advanced so that the said holder comes to rest before the partial rotation of the shaft is completed, the spring s^2 will yield sufficiently to permit the completion of this movement while the die is in the proper position. While the die is thus being mechanically set, the operator may lower the shield u .

Immediately upon the release of the clutch r^2 the operator depresses the treadle h^4 , setting the clutch h^2 and causing the power to be applied to the crank shaft g' during one full, or any predetermined quantity of rotation of said shaft, the effect being to impart one full upward and downward reciprocation to the piston g .

The piston g normally closes the valve f in the cylinder e , thus preventing the escape of metal from the melting-pot through said cylinder, when the machine is not in operation. Upon the up-stroke of the piston, however, the valve f is opened to admit molten metal from the melting-pot e at a point intermediate the top and bottom of the mass of metal therein, the volume of metal thus delivered being determined by the speed of movement of the piston, or the interval during which said part remains open. Upon the return stroke of the piston, it will force the metal which has been flowed into the cylinder e through the port e' and into the die or mold at the same time closing the port f . Upon the completion of this return stroke, the said piston will come to rest.

It will be noted that the actuation of the said piston by means of a crank, will cause said piston to start at slow speed, and travel at a gradually accelerated speed for half of the up-stroke, and that the completion of this stroke will be at a gradually reduced speed coming to a dead stop when the said crank is at the top center. During the

down-stroke there will be a gradually accelerated speed from the beginning of the stroke until the said piston has closed the port f , whereupon there will be a gradual reduction of speed during that interval when the greatest pressure is required in forcing the metal into the die. By this construction, the maximum pressure upon the metal will be the final pressure after the greater portion of the metal is in the die. This will result in compactness in the casting.

When the piston becomes operative upon the metal, there will be a solid mass of metal in the lower portion of the cylinder, which metal will have been accumulated by reason of the fact that the ingate of the die is constricted. Furthermore, during the application of pressure by said piston, the metal will be flowing, or have a tendency to flow into the die, under gravity, which also contributes toward compactness in the casting. The movement of the piston will have sufficient rapidity to insure the proper condition of the metal as it enters the die.

When the piston g completes its full reciprocatory movement, the treadle r^3 is again depressed to set the clutch r^2 and cause the shaft r to complete its rotation and bring the die support to its original position adjacent the operator, who thereupon opens the die, ejects the casting, cleans the die and closes it again, and repeats the above operation.

It will thus be seen that the movement of the die into and out of the casting position is mechanically effected. The mechanism, however, being under the control of the operator so that the effective operations of the machine may be timed in accordance with the time required by the operator to draw cores, open the die, eject the casting, clean the die and close it. It will also be seen that the forcing of the metal is purely mechanical, while being under the control of the operator.

With ordinary dies, a machine may be operated by a single man.

When the connection between the power shaft and the crank shaft g' consists of friction devices as described, it is possible to control not only the volume of metal introduced to the cylinder e as a charge for each casting operation, but also the pressure under which the metal is delivered to the die. During the up-stroke of the piston there is little or no load upon the friction mechanism, so that during this up-stroke no slippage in the friction device will occur. Upon the down-stroke, however, very substantial resistance is offered to the movement of the piston and the degree of friction must be adjusted to meet this condition. The variation in the piston speed compensates in part for the gradually increasing resistance to the piston in the cylinder. By adjusting

the tension of the spring j' , the maximum pressure which may be exerted upon the piston may be regulated. This pressure may also be regulated by adjusting the friction wheel i' radially of the disk i , thus shortening the operative leverage of said friction disk and increasing the rotative speed thereof. Under this condition, slippage must occur between the said wheel and the said disk in order to limit the movement of the crank shaft g' to a one full rotation with each actuation of the machine.

When it is desired to reduce the volume of metal introduced to the cylinder e , the friction wheel i' is adjusted toward the axis of the disk i , thus increasing the speed of the piston. If it be desired to decrease the pressure at the same time, the pressure of the spring j' may be lessened. When the machine is so set, slippage will occur between the wheel i' and the disk i toward the end of the downward stroke of the piston and the said piston will always come to rest in a position to close the port f .

The rotation of the crank shaft g' will with each actuation of the apparatus actuate the agitator or stirrer k so as to keep the metal in the proper condition.

Various mechanisms may be employed for transmitting power from the power shaft to the piston and it is not my intention, therefore, to limit the invention to the precise details of construction shown and described. The mechanism for moving the die holder toward and from the discharge nozzle e may also be varied without departing from the spirit and scope of the invention.

Having described the invention, what I claim as new and desire to have protected by Letters Patent is:—

1. An apparatus for casting fluid metals embodying therein a melting-pot, a furnace about said melting-pot, a casing forming an elongated chamber of small dimensions within said melting pot, said casing having a discharge port at the bottom thereof opening outwardly of said melting-pot and an intake port within said melting-pot, means supporting a die with its ingate in communication with said discharge port and adapted to coöperate with both said discharge port and said intake port whereby the volume of metal delivered to said chamber may be controlled, and said metal may be forced through said discharge port into said die.

2. An apparatus for casting fluid metals embodying therein a melting-pot, a furnace about said melting-pot, a casing forming an elongated chamber of small dimensions within said melting-pot, said casing having a discharge port at the bottom thereof opening outwardly of said melting pot and an intake port within said melting-pot,

means supporting a die with its ingate in communication with said discharge port and independently operative means whereby the volume of metal delivered to said chamber may be controlled, and said metal may be forced through said discharge port into said die.

3. An apparatus for casting fluid metals embodying therein a melting pot, a furnace about said melting-pot, a casing forming an elongated chamber of small dimensions within said melting-pot, said casing having an outwardly flared discharge port at the bottom thereof opening outwardly of said melting pot and an intake port within said melting pot, means supporting a die having a constricted ingate in communication with said discharge port and means whereby the volume of metal delivered to said chamber may be controlled, and said metal may be forced through said discharge port into said die.

4. An apparatus for casting fluid metals embodying therein a melting-pot, a furnace about said melting-pot, a casing forming an elongated chamber of small dimensions within said melting-pot, said casing having an outwardly flared discharge port at the bottom thereof opening outwardly of said melting pot and an intake port within said melting-pot, means supporting a die having a constricted ingate in communication with said discharge port and independently operative means whereby the volume of metal delivered to said chamber may be controlled, and said metal may be forced through said discharge port into said die.

5. A casting apparatus embodying therein a melting pot, a cylinder within said melting pot having a discharge port opening outwardly of the bottom of said melting pot and an intake port within said melting pot, said cylinder having an elongated bore of small dimensions, a reciprocatory piston in said cylinder adapted to normally close said intake port, means adapted to actuate said piston, a main power shaft, operative connections between said power shaft and said means, and manually actuated controlling means whereby the said connections may be made inoperative or operative with relation to said first named means.

6. A casting apparatus embodying therein a melting pot, a cylinder within said melting pot having a discharge port opening outwardly of the bottom of said melting pot and an intake port within said melting pot, said cylinder having an elongated bore of small dimensions, a reciprocatory piston in said cylinder adapted to normally close said intake port, means adapted to actuate said piston, a main power shaft, operative connections between said power shaft and said means, manually actuated controlling means whereby the said connections may be

made inoperative or operative with relation to said first named means, a reciprocatory die support, power driven means adapted to intermittently actuate same and manually operative controlling means for said power mechanism.

7. A casting apparatus embodying therein a melting pot, a cylinder within said melting pot having a discharge port opening outwardly of the bottom of said melting pot and an intake port within said melting pot, said cylinder having an elongated bore of small dimensions, a reciprocatory piston in said cylinder adapted to normally close said intake port, means adapted to actuate said piston, a main power shaft, differentially operative connections between said power shaft and said means whereby said piston may be actuated at different speeds and manually actuated controlling means whereby the said connections may be made inoperative or operative with relation to said first named means.

8. A casting apparatus embodying therein a melting pot, a cylinder within said melting pot having a discharge port opening outwardly of the bottom of said melting pot and an intake port within said melting pot, said cylinder having an elongated bore of small dimensions, a reciprocatory piston in said cylinder adapted to normally close said intake port, means whereby said piston is reciprocated at varying speeds with each stroke thereof, the lowest speed of said piston being at the end of the down and of the up-stroke, a main power shaft, operative connections between said power shaft and said means, and manually actuated controlling means whereby the said connections may be made inoperative or operative with relation to said first named means.

9. A casting apparatus embodying therein a melting pot, a cylinder within said melting pot having a discharge port opening outwardly of the bottom of said melting pot and an intake port within said melting pot, said cylinder having an elongated bore of small dimensions, a reciprocatory piston in said cylinder adapted to normally close said intake port, a crank shaft and a connecting rod between the said shaft and said piston whereby said piston is reciprocated at varying speeds with each stroke thereof, the lowest speed of said piston being at the end of the down and of the up-stroke, a main power shaft, operative connections between said power shaft and said crank shaft, and manually actuated controlling means whereby the said connections may be made inoperative or operative with relation to said first named means.

10. A casting apparatus embodying therein a melting pot, a cylinder within said melting pot having a discharge port opening outwardly of the bottom of said melting pot

and an intake port within said melting pot, said cylinder having an elongated bore of small dimensions, a reciprocatory piston in said cylinder adapted to normally close said intake port, a crank shaft and a connecting rod between the said shaft and said piston whereby said piston is reciprocated at varying speeds with each stroke thereof, the lowest speed of said piston being at the end of the down and of the up-stroke, a main power shaft, a friction clutch mechanism, the parts of which are carried by said power shaft and said crank shaft respectively and manually actuated controlling means whereby said friction clutch mechanism may be made inoperative or operative as desired.

11. A casting apparatus embodying therein a melting pot, a cylinder within said melting pot having a discharge port opening outwardly of the bottom of said melting pot and an intake port within said melting pot, said cylinder having an elongated bore of small dimensions, a reciprocatory piston in said cylinder adapted to normally close said intake port, means adapted to actuate said piston, a main power shaft, differentially operative connections between said power shaft and said means whereby said piston may be actuated at different speeds, means controlling the force applied through said piston, and manually actuated controlling means whereby the said connections may be made inoperative or operative with relation to said first named means.

12. A casting apparatus embodying therein a melting pot, a cylinder within said melting pot having a discharge port opening outwardly of the bottom of said melting pot and an intake port within said melting pot, said cylinder having an elongated bore of small dimensions, a reciprocatory piston in said cylinder adapted to normally close said intake port, a crank shaft and a connecting rod between the said shaft and said piston whereby said piston is reciprocated at varying speeds with each stroke thereof, the lowest speed of said piston being at the end of the down and of the up-stroke, a main power shaft, a friction clutch mechanism, the parts of which are carried by said power shaft and said crank shaft respectively, regulating means whereby the power of said friction clutch may be determined and manually actuated controlling means whereby said friction clutch mechanism may be made inoperative or operative as desired.

13. A casting apparatus embodying therein a melting pot, a cylinder within said melting pot having a discharge port opening outwardly of the bottom of said melting pot and an intake port within said melting pot, said cylinder having an elongated bore of small dimensions, a reciprocatory piston in said cylinder adapted to normally close said intake port, a crank shaft and a connecting

rod between the said shaft and said piston whereby said piston is reciprocated at varying speeds with each stroke thereof, the lowest speed of said piston being at the end of the down and of the up-stroke, a main power shaft, operative connections between said power shaft and said crank shaft, a clutch mechanism whereby said connections may be made operative or inoperative, a pedal and connections between said pedal and said clutch mechanism.

14. A casting apparatus embodying therein a melting pot, a cylinder within said melting pot having a discharge port opening outwardly of the bottom of said melting pot and an intake port within said melting pot, said cylinder having an elongated bore of small dimensions, a reciprocatory piston in said cylinder adapted to normally close said intake port, means adapted to actuate said piston, a main power shaft, operative connections between said power shaft and said means, a stirrer located in said melting pot and connections between said stirrer and said means actuating the piston whereby the metal in said pot will be agitated with each piston stroke and independently of said piston, and manually actuated controlling means whereby the said connections may be made inoperative or operative with relation to said first named means.

15. A casting apparatus embodying therein a melting pot, a cylinder within said melting pot having a discharge port opening outwardly of the bottom of said melting pot and an intake port within said melting pot, said cylinder having an elongated bore of small dimensions, a reciprocatory piston in said cylinder adapted to normally close said intake port, means adapted to actuate said piston, a main power shaft, operative connections between said power shaft and said means, manually actuated controlling means whereby the said connections may be made inoperative or operative with relation to said first named means, a reciprocatory die support, a crank shaft, a driving pulley, a clutch mechanism whereby said crank shaft may be connected to said power pulley during a one half revolution thereof only, connections between the crank of said crank shaft and said die support and manually operative means controlling said clutch.

16. A casting apparatus embodying therein a melting pot, a cylinder within said

melting pot having a discharge port opening outwardly of the bottom of said melting pot and an intake port within said melting pot, said cylinder having an elongated bore of small dimensions, a reciprocatory piston in said cylinder adapted to normally close said intake port, means adapted to actuate said piston, a main power shaft, operative connections between said power shaft and said means, manually actuated controlling means whereby the said connections may be made inoperative or operative with relation to said first named means, tracks extending under and below the discharge port of said melting pot, an adjustable stop adjacent said tracks and said port, a movable die support mounted upon said tracks, power actuated means adapted to reciprocate said stop including therein an adjustable connection whereby the die may be accurately positioned with relation to said port and manually operative means for controlling said power mechanism.

17. A casting apparatus embodying therein a melting pot, a cylinder within said melting pot having a discharge port opening outwardly of the bottom of said melting pot and an intake port within said melting pot, said cylinder having an elongated bore of small dimensions, a reciprocatory piston in said cylinder adapted to normally close said intake port, means adapted to actuate said piston, a main power shaft, operative connections between said power shaft and said means, manually actuated controlling means whereby the said connections may be made inoperative or operative with relation to said first named means, tracks extending under and below the discharge port of said melting pot, an adjustable stop adjacent said tracks and said port, a movable die support mounted upon said tracks, power actuated means adapted to reciprocate said stop including therein a yieldable connection whereby the die may be automatically and accurately positioned with relation to said port and manually operative means for controlling said power mechanism.

In witness whereof, I hereunto affix my signature in the presence of two subscribing witnesses this 17th day of March, 1915.

HERMAN H. DOEHLER.

Witnesses:

O. A. SCHROEDER,
W. BAUERSCHMIDT.