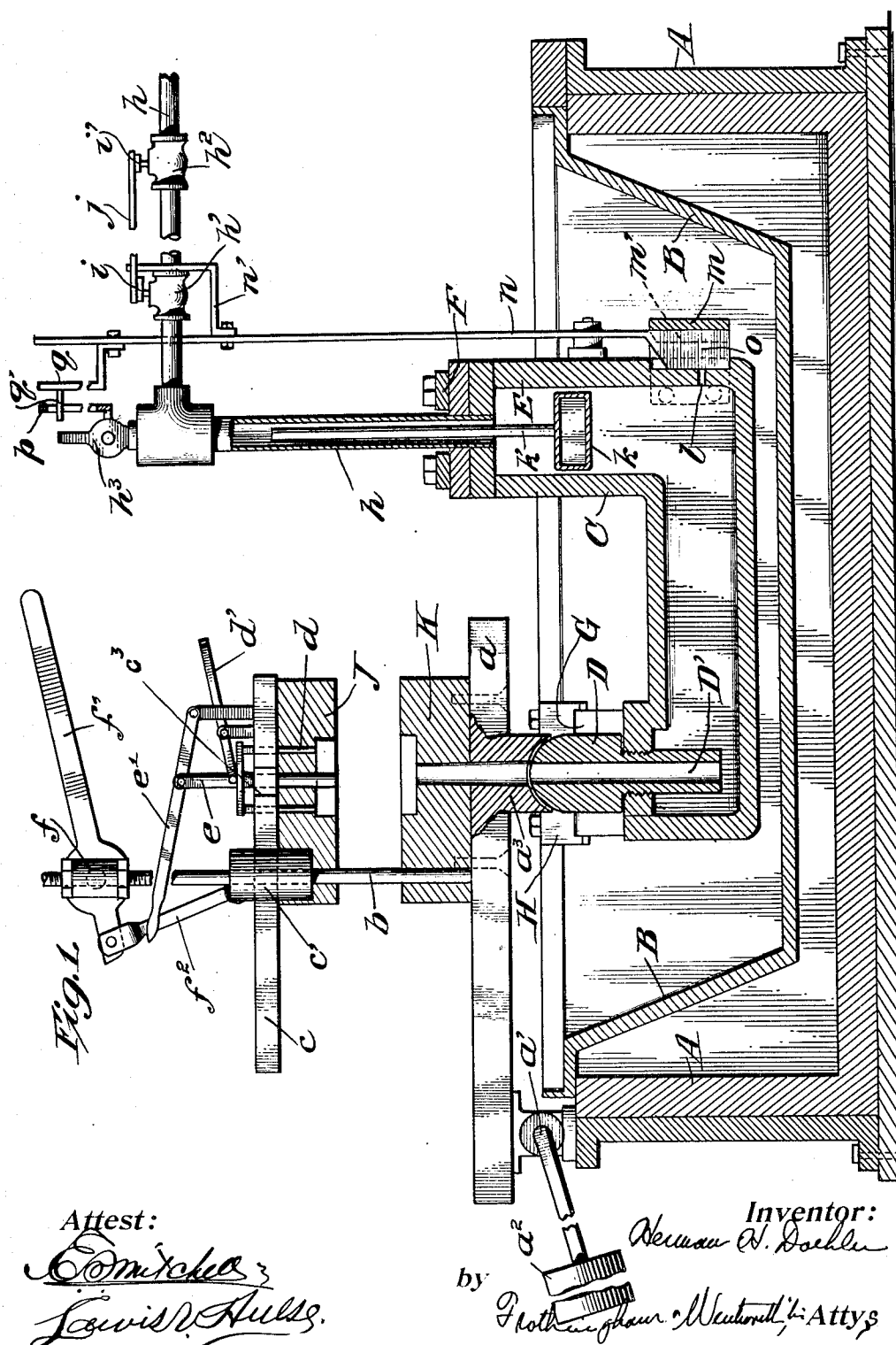


No. 856,772.

PATENTED JUNE 11, 1907.

H. H. DOEHLER.
CASTING APPARATUS.
APPLICATION FILED OCT. 18, 1906.

2 SHEETS—SHEET 1.



UNITED STATES PATENT OFFICE.

HERMAN H. DOEHLER, OF NEW YORK, N. Y.

CASTING APPARATUS.

No. 856,772.

Specification of Letters Patent.

Patented June 11, 1907.

Application filed October 18, 1906. Serial No. 339,472.

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 improvements in casting apparatus and more particularly to a class thereof wherein molten metal is charged under air pressure.

The main object of the invention is to provide apparatus of this character wherein the deterioration of metal within the pressure pot through oxidation or agitation from the air admitted thereto under pressure, will be reduced to a minimum.

A further object is to provide an apparatus of this character wherein the air will be inducted to the pressure pot in a manner to prevent the air jet so dashing or spraying the molten metal as to partially or wholly obstruct the air passages through particles adhering to and chilling on, the walls adjacent to the discharge thereof.

A still further object is to provide an apparatus of this character employing an air shield so interposed between the molten metal and the air inlet as to receive the impact of the air jet and protect the metal therefrom, while permitting a quick responsive discharge of said metal into the mold or die.

A still further object is to provide an apparatus embodying such a shield which will move under such jet and the subsequent expansion of the compressed air in a manner to avoid a binding or displacement of the shield and a return to the proper position when the pressure is relieved and the pot is recharged with metal.

A still further object is to provide a melting pot, a pressure pot and a mold holder or carrier, or rigging, so constructed and arranged relative to each other as to cause the holder or carrier and the pressure pot to be drawn together in closing the mold, thus avoiding a likelihood of a void being formed between the discharge nozzle of the pressure pot and the co-operating nozzle of the mold holder.

A still further object is to provide means closing the mold which may be adjusted to

accommodate the holder to molds of different dimensions.

A still further object is to provide a charging port so arranged in the pressure pot as to fill said pot at a point which will prevent the oxidized metal or sediment entering said pot, and means closing same and forming a joint which will resist the pressure within the pot during the interval when the metal therein is under pressure.

A still further object is to provide a gate which when open will not be in such contact with the seat on the pressure pot or other parts of the apparatus as will permit the soldering of these parts by the molten metal; and which when closed, will be firmly set against its seat, without the exercise of great force.

A still further object is to provide various safety appliances controlling the air pressure in the pot with relation to the charging means, whereby the charging mechanism cannot be operated while the metal in the pot is under pressure, or said metal cannot be put under pressure while the charging mechanism is in operation.

A still further object is to provide an apparatus employing a submerged charging port in the pressure pot and means closing same, wherein the exhaust valve will be controlled in conjunction with said means, thereby preventing the opening of said charging port while the pressure is within the pot.

A still further object is to so arrange the controlling valve or valves in the air line in conjunction with the means controlling the charging port, that the pressure cannot accidentally or otherwise, be put on while said port is open.

A still further object is to provide an apparatus of this character wherein the pressure pot may be emptied readily to remove an accumulation of impure metal, or prevent the solidification of metal therein when the melting pot is cooled or emptied. And a still further object is to provide an apparatus of this character which may be operated rapidly and continuously without serious impairment of the quality of the metal of the castings, without danger to the operator and with such ease and convenience as will permit the continued operation of the machine without unduly taxing the endurance of the operator.

The invention consists primarily in the

combination in casting apparatus of a melting pot, means heating same, an auxiliary or pressure pot, a discharge nozzle therefor whereby molten metal may be discharged therefrom, means in communication with said nozzle whereby a die may be supported adjacent thereto, an air line discharging into said pressure pot, an air shield disposed opposite the discharge of said air line whereby the air jet is prevented from impinging directly on the molten metal in said pot, means controlling the flow of air through said air line and means venting said auxiliary pot; 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 longitudinal section of an apparatus embodying my invention; Fig. 2 is a section through one end of the furnace and melting pot with the air line broken away, the valve bridge also broken away to disclose the gate arrangement, and the die or mold and ejector mechanism removed, and Fig. 3 is a plan view on a larger scale of the inlet or charging port and the gate mechanism.

Like letters refer to like parts throughout the several views.

In the embodiment of my invention shown in the drawings, A indicates a furnace of ordinary construction in which is arranged a melting pot B adapted to contain metal in a molten state. Located in the pot B so as to be surrounded by the molten metal and maintained at a temperature at or above the fusing point of the metal being cast, is an auxiliary or pressure pot C provided with a discharge nozzle D and an upwardly projected pressure chamber E. This pot is supported by the cross bars F carried by the furnace A which are bolted to the head of the chamber E, and by the angular lugs G on each side of the discharge nozzle D which rest upon brackets H secured to the said furnace in a manner to permit a slight vertical play thereof.

The nozzle D is in communication with a duct D' projecting into the auxiliary or pressure pot C to a point adjacent to the bottom thereof, an arrangement which tends to permit only that portion of the metal having the greatest specific gravity to be discharged through said nozzle, thus preventing the metallic oxides or other dross entering the die or mold. The portion of the auxiliary pot between the discharge nozzle and the pressure chamber is elongated and of small dimensions, thus increasing the heating area and diminishing the volume of metal therein.

The mold carrier comprises a plate *a* hinged to the furnace A at *a'* and having a counterweight *a''* projected beyond the axis of said hinge in a manner to minimize the labor

of raising and lowering the mold plate. Adjacent to the free end of said plate *a* is a female nozzle A³ adapted to register with and fit upon the discharge nozzle D.

The plate *a* carries two oppositely disposed upright rods *b* screw threaded toward the end thereof. Mounted on said rods by means of the sliding collars or sleeves *c'* *c''* is the upper die plate, *c*, which carries the ejector pins *d* and their lever *d'*, and the sprue cutter *e* and its lever *e'*, which pins and which cutter, pass through the mold in the usual and well known manner.

The plate *c* is supported from the cross head *f* adjustably mounted on the rods *b* by means of the screw threads thereon and nuts as shown, a lever *f'* pivotally mounted on said cross-head, and a link pivotally connected to the short arm of said lever and said plate, as *f''*. The upper end of said link is forked as shown, and one side of the end of the short arm of said lever is curved to permit the movement of the lever relative to said fork while presenting a positive stop to prevent the lever and link passing the center. The long arm of the said lever acts as a handle, by means of which the top plate *c* may be raised and lowered.

I have shown the parts of a mold at J and K.

Pivotally mounted on each bracket H is a tie rod *g*, to the upper end of which is pivotally mounted an eccentric *g'* having a suitable lever handle *g''*. To make the tie rods *g* adjustable, I make them in two sections, and connect them by a turn-buckle *g'''*. These rods *g* are adapted to enter a recess *c''* in each side of the plate *c* the direction of which recesses is shown in Fig. 2, where broken away on one side, and where indicated in dotted lines on the other side, and the eccentrics *g'* are adapted to engage said plate and bind it firmly in place relative to the furnace and the plate *a*. By providing slight play of the brackets H, these rods may be utilized for this purpose and the further purpose of bringing the discharge nozzle D into such intimate contact with the female nozzle *a''* as to prevent leakage or loss of pressure at the joint between these nozzles. The turn buckles *g'''* permit the adjustment of the mold carrier to molds of different dimensions and also the regulation of the pressure exerted by the eccentrics *g'*.

Leading from an air tank, or other source of fluid pressure, not shown, is an air line *h* including therein two valves *h'* *h''* and a pet cock *h'''*. The portion of said air line leading to said pressure pot is perfectly straight and enters the air chamber E between the bars F. Two valves *h'* *h''* are used to minimize the dangers of accident in operating the apparatus due to a leakage of air when the mold carrier is off the pressure pot.

To insure the substantially simultaneous

operation of both valves h' h^2 I provide each with a lever handle i' and connect these with a link j . The pet cock h^3 is operated by means independent of said levers and lever actuating means.

In practice, I have found that as the air jet enters the pressure chamber, it impinges on the surface of the molten metal within the pressure pot with sufficient force to so splash the metal as to cause small particles to fly into and about the discharge of the air line h in quantities sufficient to not only obstruct the flow of air or other fluid under pressure, but to finally entirely close said line, thus placing the apparatus out of commission. This splashing also tends to bring the air or other fluid into such intimate contact with the metal to be immediately cast, as to rapidly oxidize same and thus weaken the castings through deterioration of the metal. To obviate this difficulty, I locate a solid deflector or shield within the air chamber opposite the discharge of the air line, thus breaking up this jet and causing the metal to be discharged largely under pressure from the expansion of the fluid. To preserve as much as possible the beneficial advantages of the force of the jet, I preferably make this shield in the form of a buoyant metallic float k having a stem k' projecting into the air line in a manner to cause said float to move in a substantially straight line and thus prevent its becoming jammed in the pressure chamber. To permit a free movement of this float, I allow clearance on all sides thereof, and round the corners on an arc which will prevent diagonally opposite corners or edges from simultaneously engaging the walls of the pressure chamber should the float be thrown out of true at any stage of its descent. The stem k' also affords convenient means for dislodging the float if for any reason, it should fail to return to normal.

Another difficulty I have found in practice, is to prevent the charging of the pressure pot with metal oxids, or metal containing such and dross. It has been endeavored to provide a self filling pot (which is reasonably necessary to permit an economical operation of the machine) by having the molten metal flow through a port in the top of the pressure pot, or through submerged ports controlled by automatic valves. The first of these has been found unsatisfactory as it is impracticable to preserve a perfect fitting valve seat and valve when such are constantly submerged in the molten metal and subjected constantly to high pressures, the slightest oxid on either the seat or the valve permitting the metal to escape and the pres-

sure to run down, not only spoiling the casting, but endangering the operator.

It is desirable to charge and recharge the pressure pot from metal at a point intermediate the bottom of the melting pot B and the normal level of molten metal therein, such metal being good flowing and free from impurities. With this in view, I provide the pressure pot C with a port, as at l , the surface of the pot adjoining such port being faced off and given a smooth finish. Secured to said pot opposite said faced portion and spaced away therefrom, is a bridge m having a beveled abutment m' substantially opposite said port. Said bridge should be secured to the pot with due regard to the pressure which must be sustained thereby.

Pivotaly mounted on the pot C above the bridge m is a long lever handle n having a gate o presenting a flat surface adapted to bear upon the finished or faced portion of the pot adjoining the charging port, and an inclined surface adapted to engage the abutment m' . The forward edge of the gate o acts more or less as a scraper to free the said faced portion from oxids or other deposits.

Inasmuch as the putting on of pressure while this port is open would be extremely dangerous, I preferably provide the handle n with an extension n' adapted to pass the lever handle i and rest in such close proximity thereto when the port is open as to prevent the opening of the valves h' h^2 in the air line.

To make the venting of the pressure pot automatic and to insure the vent being closed when the valves h' h^2 are released, I provide the pet cock h^3 with an elongated slotted handle p which is operated by a pin q' carried by an extension q on the handle n .

The operation of the herein described apparatus is substantially as follows, the metal in the melting pot B first having been brought to the necessary temperature to fuse it and make it flow readily, by the furnace A. The lever handle n is forced away from the operator, thus causing the gate o to move away from the abutment m' , the extension n' to lock the valve in the air line h , and the extension q and pin q' to open the pet cock h^3 to vent the pressure pot prior to the opening of the said port. When so opened, the molten metal will flow freely into the said pressure pot. As the pressure pot fills, the air shield or reflector plate or float k will rise within the pressure chamber of the auxiliary or pressure pot C, the stem k' guiding it more or less in its rise. It will be observed that the pressure pot is thus filled with metal taken below the surface level of the metal in the melting pot, at which level the metal is apt to contain much oxid, and above the bottom of the said pot, where burned metal or a sediment is frequently present. When so filled the normal metal levels in the melting pot will be such as to submerge all parts of the pressure

pot containing metal thus preventing the chilling of same. The top plate *c* is then lowered or advanced by the lever *f'*, the curved end of the short arm thereof moving freely in the fork of the link *f*² until the tangential extension thereof engages therewith and positively locks the link in a manner to absorb any strains thereon from the top plate. This movement closes the mold. If it be found that the mold is not closed properly, or that the link *f*² is off center materially, the cross head *f* may be shifted toward or from the plate *a*, and reset in the proper position. The sleeves *c'* preserve the alignment of the plate *c* and the mold part *K* thereon. The mold carrier is then brought over on its hinge until the female nozzle *a*³ rests upon or above the discharge nozzle *D*, and the tie rods *g* inserted in the recesses *c*³ in the plate *c*, the eccentrics *g'* being so turned as to tend to draw the entire mold holder toward the pressure pot. The power exerted by these eccentrics being great, this would place a great strain upon the furnace, the structure of which is unsuited to withstand such, were it not that the brackets *H* have slight vertical play. This play though slight, relieves the furnace from this strain and at the same time draws the discharge end of the pressure pot upward insuring a perfect joint between the two nozzles, and closing the mold. If it be found that these parts are not drawn together properly, the turnbuckles *g*³ may be used to lengthen or shorten the tie rods so as to secure the desired result. The various parts being positioned as described, the handle *n* is drawn toward the operator, the gate *o* being caused thereby to close the port *l*. The incline thereon coming into contact with the beveled abutment *m'* wedges the said gate between the bridge *m* and the faced portion of the pressure pot adjoining said port. This movement of the said lever also closes the pet cock *h*³ and releases the valves *h'* *h*². The pressure pot being thus made perfectly air tight, excepting as to the discharge nozzle, the valves *h'* *h*² are opened by reciprocating the link *j*, simultaneously moving both valve stems in the same direction to open both valves to the same extent at the same instant. Air or other fluid under pressure, follows the air line into the pressure chamber *E* the jet of air striking the shield, deflector or float *k* and being broken up thereby. The force exerted thereby will, however, force said float downwardly, placing the metal under pressure, the air in said chamber preventing more or less, a back pressure about said float. The molten metal will thus be forced into the mold through the duct *D'* and nozzle *D*. If any air should pass through the elongated portion of the pressure pot, it would rise to the top of the said pot and thus still serve to charge the mold.

The various operations are then reversed to relieve the pressure within the pot *C*, refill said pot, relock the valve control and remove the casting. To do the last, the various tie rods and locks are released, and the whole carrier then turned upon its hinge to remove it as much as possible from the furnace and give it a convenient position for ejecting and cleansing, the counterweight facilitating this operation.

It is to be observed that the shield or float *k* is provided primarily to prevent the air entering the pressure pot in a jet and by splashing the metal not only rapidly oxidizing same, but choking the air line. The churning action of the jet is also so injurious as to be avoided if possible. It will also be observed that as the gate *o* is closed, the forward edge thereof will scrape the seat about the port *l*, and that when it is not closed, it will be free from both the pot and the bridge *m*, thus minimizing the likelihood of its becoming soldered thereto.

It is not my intention to limit the invention to the precise details of construction herein shown and described, it being apparent that such is merely one embodiment of the invention and may be departed from without departing from the spirit and scope of the invention.

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

1. In casting apparatus, the combination of a melting pot, means heating same, an auxiliary or pressure pot, a discharge nozzle therefor whereby molten metal may be discharged therefrom, means in communication with said nozzle whereby a mold may be supported adjacent thereto, an air line discharging into said pressure pot, an air shield disposed opposite the discharge of said air line and affording channels thereabout whereby the compressed air is permitted to pass about said shield and act directly on the surface of the molten metal and the air jet is prevented from impinging directly thereon, means controlling the flow of air through said air line and means venting said auxiliary pot.

2. In casting apparatus, the combination of a melting pot, means heating same, an auxiliary or pressure pot, a discharge nozzle therefor whereby molten metal may be discharged therefrom, means in communication with said nozzle whereby a mold may be supported adjacent thereto, an air line discharging into said pressure pot, a buoyant metallic shield of smaller diameter than said pressure pot disposed opposite the discharge of said air line whereby the compressed air is permitted to pass about said shield and act directly on the surface of the molten metal and the air jet is prevented from impinging

directly thereon, means guiding same, means controlling the flow of air through said air line and means venting said auxiliary pot.

3. In casting apparatus, the combination
5 of a melting pot, means heating same, an auxiliary or pressure pot having a pressure chamber therein, a discharge nozzle for said pressure pot whereby molten metal may be discharged therefrom, means in communica-
10 tion with said nozzle whereby a mold may be supported adjacent thereto, an air line discharging into said pressure chamber, a buoyant metallic shield of smaller diameter than said chamber located in said pressure cham-
15 ber and disposed opposite the discharge of said air line whereby the compressed air is permitted to pass about said shield and act directly on the surface of the molten metal and the air jet is prevented from impinging di-
20 rectly thereon, a stem for said shield projecting into said air line whereby said shield is guided in its movements, means controlling the flow of air through said air line, and means venting said pressure pot.

25 4. In casting apparatus, the combination of a melting pot, means heating same, an auxiliary or pressure pot, a discharge nozzle therefor whereby molten metal may be dis-
30 charged therefrom, means in communication with said nozzle whereby a mold may be supported adjacent thereto, an air line discharging into said pressure pot, means controlling the flow of air through said air line, means venting said pressure pot, and means charging
35 and re-charging said pot comprising a submerged port in said pot adjacent to the bottom thereof, a valve pivoted relative to said pot and adapted to close said port, means whereby said valve when operated will be
40 forced against said pot in a manner to form a metal tight joint and a lever handle carrying said valve.

5. In casting apparatus, the combination of a melting pot, means heating same, an
45 auxiliary or pressure pot, a discharge nozzle therefor whereby molten metal may be discharged therefrom, means in communication with said nozzle whereby a mold may be supported adjacent thereto, an air line discharging
50 into said pressure pot, means controlling the flow of air through said air line, means venting said pressure pot, means charging and recharging said pot comprising a sub-
55 merged port in said pot adjacent to the bottom thereof, a valve pivoted relative to said pot and adapted to close said port, means whereby said valve when operated will be forced against said pot in a manner to form a metal tight joint, and a lever handle carrying
60 said valve, and means actuated by said lever handle whereby said venting means will be actuated before said port is opened.

6. In casting apparatus, the combination of a melting pot, means heating same, an
65 auxiliary or pressure pot, a discharge nozzle

therefor whereby molten metal may be dis-
charged therefrom, means in communication with said nozzle whereby a mold may be sup-
ported adjacent thereto, an air line dis-
charging into said pressure pot, means con-
70 trolling the flow of air through said air line, means venting said pressure pot, and means charging and re-charging said pot compris-
ing a submerged port in said pot adjacent to the bottom thereof, a wedge shaped valve
7 presenting a plane surface toward said pot, pivoted relative to said pot and adapted to close said port, a bridge carried by said pot, an abutment thereon adapted to engage said valve and a lever handle for said valve. 8.

7. In casting apparatus, the combination of a melting pot, means heating same, an auxiliary or pressure pot, a discharge nozzle therefor whereby molten metal may be dis-
8: charged therefrom, means in communication with said nozzle whereby a mold may be sup-
ported adjacent thereto, an air line discharging into said pressure pot, means controlling the flow of air through said air line, means
90 venting said pressure pot, and means charging and re-charging said pot comprising a submerged port, in said pot adjacent to the bottom thereof, a valve pivoted relative to said pot and adapted to close said port, means whereby said valve when operated
95 will be forced against said pot in a manner to form a metal tight joint, and a lever handle carrying said valve, and means actuated by the said lever handle whereby the means controlling the air flow, is locked when said port
10 is open.

8. In casting apparatus, the combination of a melting pot, means heating same, an auxiliary or pressure pot, a discharge nozzle therefor whereby molten metal may be dis-
105 charged therefrom, means in communication with said nozzle whereby a mold may be supported adjacent thereto, an air line discharging into said pressure pot, a plurality of valves arranged in said air line, lever handles
110 therefor, a link connecting said lever handles, means venting said pressure pot and means charging and re-charging said pot comprising a submerged port in said pot adjacent to the bottom thereof, a valve pivoted rela-
115 tive to said pot and adapted to close said port, means whereby said valve when operated will be forced against said pot in a manner to form a metal tight joint and a lever handle carrying said valve, and an extension
120 on said lever handle adapted to be interposed in the path of the lever handle of any said valve in said air line whereby said valves are locked when the port is open.

9. In casting apparatus, the combination
125 of a melting pot, means heating same, an auxiliary or pressure pot, a discharge nozzle therefor whereby molten metal may be dis-
charged therefrom, means in communication with said nozzle whereby a mold may be sup-
130

ported adjacent thereto, an air line discharging into said pressure pot, means controlling the flow of air through said air line, a pet cock venting said pressure pot, a lever handle therefor, means charging and re-charging said pot comprising a submerged port in said pot adjacent to the bottom thereof, a valve pivoted relative to said pot and adapted to close said port, means whereby said valve when operated will be forced against said pot in a manner to form a metal tight joint, and a lever handle carrying said valve, an extension carried by said lever handle and connections between said extension and said pet cock lever handle whereby said pet cock will be opened before said port.

10. In casting apparatus, the combination of a melting pot, means heating same, an auxiliary or pressure pot, a discharge nozzle therefor whereby molten metal may be discharged therefrom, means in communication with said nozzle whereby a mold may be supported adjacent thereto, an air line discharging into said pressure pot, a plurality of valves arranged in said air line, lever handles therefor, a link connecting said lever handles, a pet cock venting said pressure pot, a lever handle therefor, means charging and re-charging said pot comprising a submerged port in said pot adjacent to the bottom thereof, a valve pivoted relative to said pot and adapted to close said port, means whereby said valve when operated will be forced against said pot in a manner to form a metal tight joint, and a lever handle carrying said valve, an extension on said lever handle adapted to be interposed in the path of the lever handle of any said valve in said air line whereby said valves are locked when the port is open, a second extension carried by said lever handle and connections between said extension and said pet cock lever handle whereby said pet cock will be opened before said port.

11. In casting apparatus, the combination of a melting pot, a furnace thereabout, brackets carried by said pot and said furnace having slight vertical play, an auxiliary or pressure pot having one end supported from said furnace or melting pot, angular lugs carried by the other end resting upon said brackets, a discharge nozzle for said pressure pot whereby molten metal may be discharged therefrom, a mold carrier, a nozzle thereon adapted to fit said discharge nozzle, and means carried by said brackets and adapted to engage said carrier whereby said nozzles will be drawn together.

12. In casting apparatus, the combination of a melting pot, a furnace thereabout, brackets carried by said pot and said furnace having slight vertical play, an auxiliary or pressure pot having one end supported from said furnace or melting pot, angular

lugs carried by the other end engaging said brackets, a discharge nozzle for said pressure pot whereby molten metal may be discharged therefrom, a mold carrier comprising a base plate, and a top plate, means whereby said top plate may be advanced toward or drawn from said base plate, a nozzle on said base plate adapted to fit said discharge nozzle, tie rods pivotally connected to said brackets respectively, eccentrics carried thereby adapted to engage said top plate and a lever handle for each of said eccentrics.

13. In casting apparatus, the combination of a melting pot, a furnace thereabout, brackets carried by said pot and said furnace having slight vertical play, an auxiliary or pressure pot having one end supported from said furnace or melting pot, angular lugs carried by the other end engaging said brackets, a discharge nozzle for said pressure pot whereby molten metal may be discharged therefrom, a mold carrier comprising a base plate and a top plate, means whereby said top plate may be advanced toward or drawn from said base plate, a nozzle on said base plate adapted to fit said discharge nozzle, tie rods pivotally connected to said brackets respectively, means whereby said tie rods may be adjusted as to their length, eccentrics carried thereby adapted to engage said top plate and a lever handle for each of said eccentrics.

14. In casting apparatus, the combination of a melting pot, a furnace thereabout, brackets carried by said pot and said furnace having slight vertical play, an auxiliary or pressure pot having one end supported from said furnace or melting pot, angular lugs carried by the other end engaging said brackets, a discharge nozzle for said pressure pot whereby molten metal may be discharged therefrom, a mold carrier comprising a base plate, uprights carried thereby, a top plate having sleeves encircling said uprights, a cross head adjustably mounted on said uprights, a lever carried by said adjustable cross head, a link connection between said lever and said top plate, a nozzle on said base plate adapted to fit said discharge nozzle, tie rods pivotally connected to said brackets respectively, means whereby said tie rods may be adjusted as to their lengths, eccentrics carried thereby adapted to engage said top plate and a lever handle for each of said eccentrics.

In witness whereof, I have hereunto affixed my signature this 13th day of October, 1906, in the presence of two witnesses.

HERMAN H. DOEHLER.

Witnesses:

F. T. WENTWORTH,
ELEANOR F. MINEGUE.