No. 829,566. PATENTED AUG. 28, 1906.

J. BEAKBANE.

CASTING APPARATUS.

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Fig. 1.

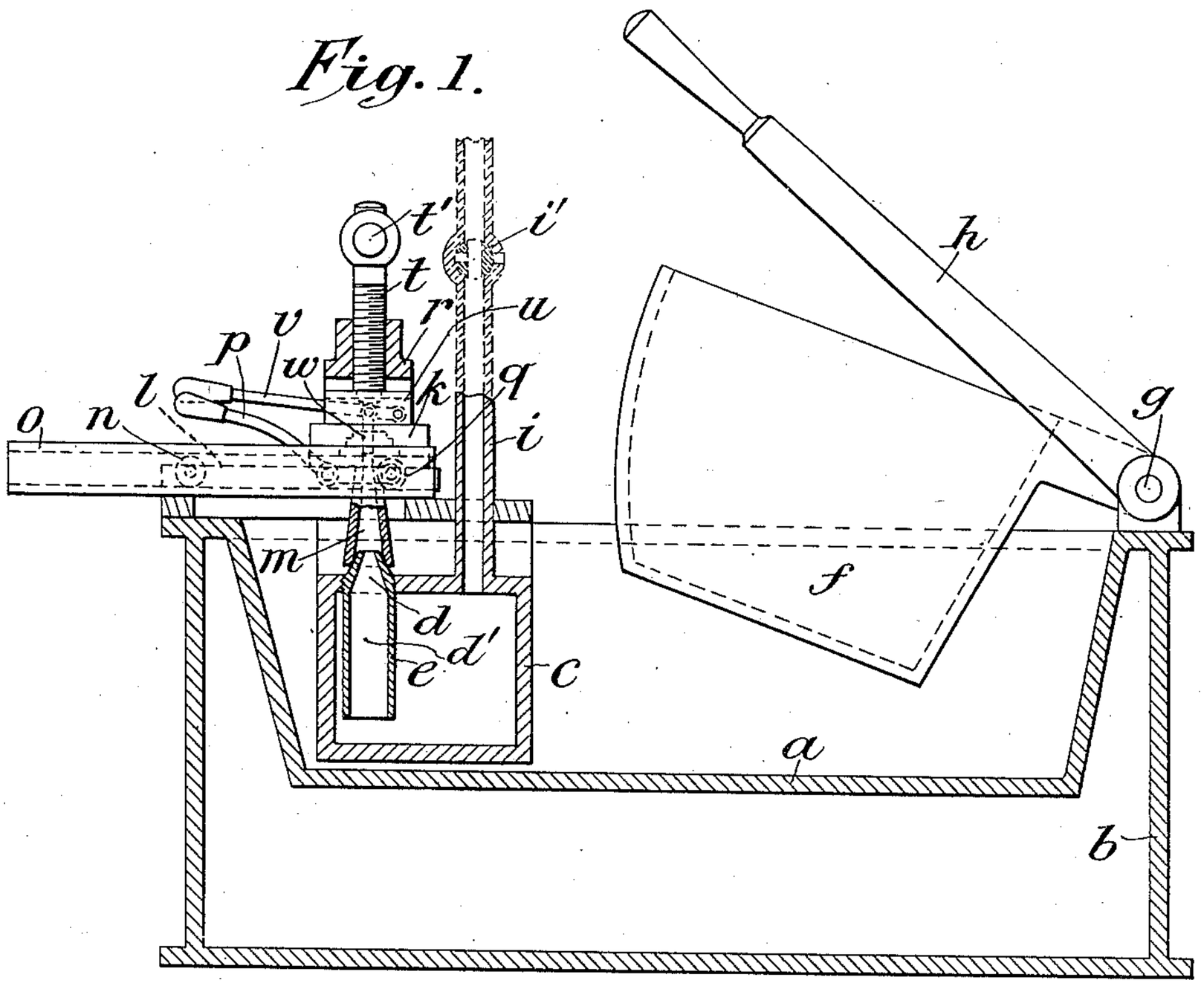
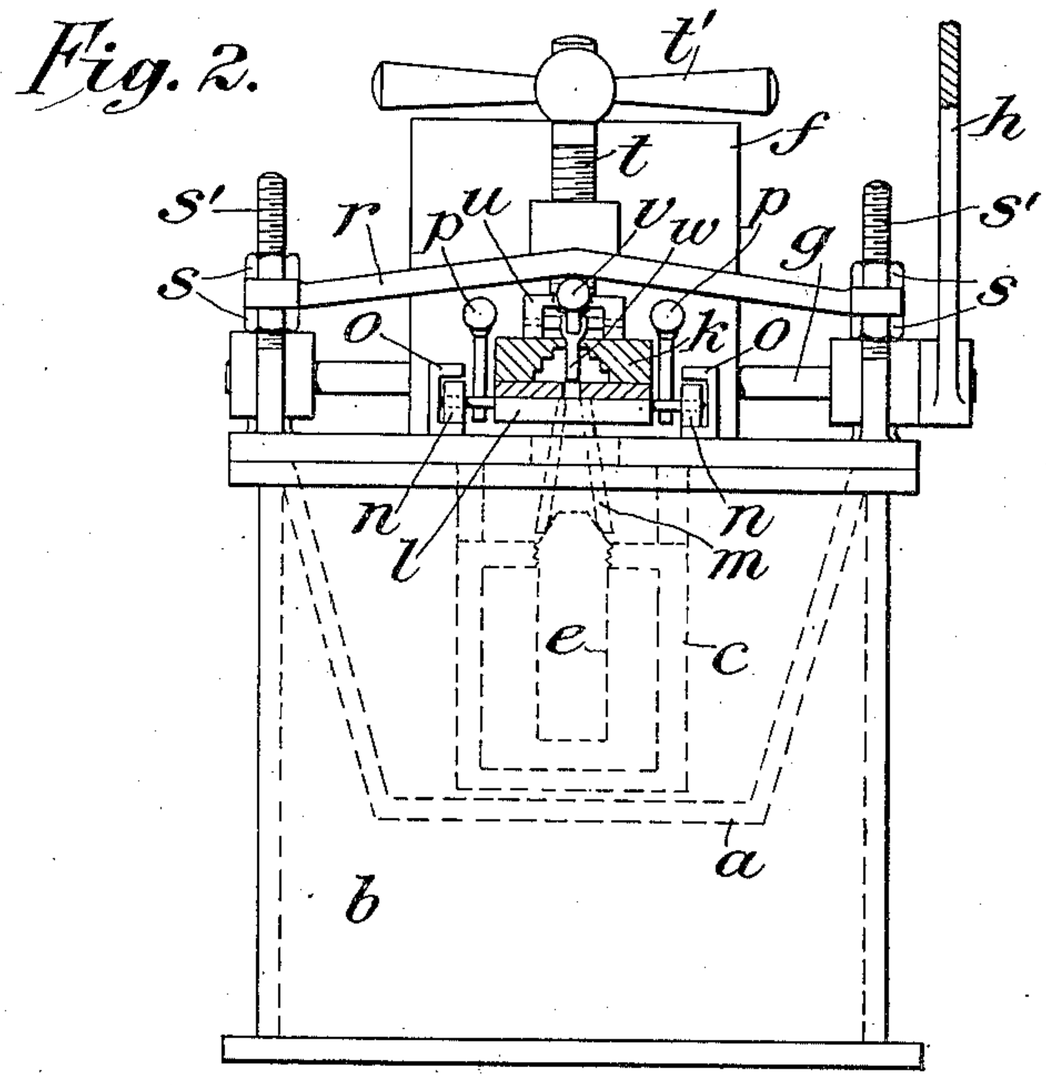


Fig. 2.



Attest:
Edgworth Bruen
A. N. Jesbera

Inventor:
James Beakbane
by Redding, Kiddle & Greeley
Attys.

UNITED STATES PATENT OFFICE.

JAMES BEAKBANE, OF KINGSTON, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO DOEHLER & BEAKBANE MANUFACTURING CO., A CORPORATION OF NEW YORK.

CASTING APPARATUS.

No. 829,566. Specification of Letters Patent. Patented Aug. 28, 1906.

Application filed April 29, 1905. Serial No. 258,041.

To all whom it may concern:

Be it known that I, JAMES BEAKBANE, a citizen of the United States, residing at Kingston, in the county of Ulster 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 hereof.

This invention relates to apparatus designed for rapid casting of metals in hard molds under pressure, and has for its object to provide an apparatus wherein the molten metal may be delivered to the mold in volume and under that pressure required for each mold and wherein the pressure may be quickly applied and removed to facilitate the handling of the apparatus and the mold and avoid the congealing or "freezing" of the metal before the mold is properly filled.

A further object is to provide an apparatus wherein there are no working parts coming into direct contact with or submerged in the molten metal, which can be so affected by such contact as to interfere with the operation of the apparatus or limit the grade of metal used therein.

A still further object is to provide an apparatus wherein the relation of the mold-support to the other parts will be such as to maintain the mold at a low temperature compared to the parts of the apparatus attached directly to the melting-pot.

A still further object is to provide an apparatus wherein the mold may be quickly and conveniently placed with relation to the other parts of the apparatus to permit the metal to be delivered thereto and removed from such relation to permit the casting to be rapidly and conveniently removed therefrom to increase the capacity of the apparatus.

A still further object is to provide an apparatus wherein the metal delivered to the mold will not be materially oxidized and will be so drawn from the melting-pot as to be practically free from impurities.

A still further object is to provide an apparatus wherein the metal may be melted in one pot and delivered therefrom and subsequently maintained at the proper temperature to a second auxiliary or pressure pot to be delivered from said second pot or vessel to the mold.

A still further object is to provide an apparatus wherein the molten metal may be flowed directly from the melting-pot into the auxiliary or pressure pot without materially interfering with the capacity of the apparatus or permitting the molten metal to partially congeal during this operation.

The invention consists, primarily, in the combination in a casting apparatus of a pot adapted to receive molten metal, means maintaining the same at the required temperature, means whereby molten metal may be introduced into said pot, means whereby metal may be discharged from said pot into a mold, means whereby fluid-pressure may be supplied to said pot, and means controlling said pressure, 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 view, partly in side elevation and partly in vertical section, of a casting apparatus constructed in accordance with the invention; and Fig. 2 is a view thereof in end elevation, the operating-lever for the displacer and the mold being shown in section.

Like letters refer to like parts in both said views.

In the embodiment of the invention represented in the drawings a melting-pot *a* is shown located in a gas-furnace *b*, by which metal in said pot is brought to and maintained at a suitable temperature and in a molten state. Located in this melting-pot, and preferably so supported and arranged with relation thereto as to cause the molten metal in the melting-pot to maintain the proper temperature in and about it, is an auxiliary or pressure pot *c*, which is adapted to have molten metal delivered thereinto from said melting-pot, preferably by means of an open port therein through which the metal in the main pot is caused to flow by raising the level of the metal in said pot.

The auxiliary or pressure pot *c* is made air-tight, with the exception of an inlet or discharge port *d* in a nozzle *e*, projecting above the said pot *c*, which port is in direct communication or made integral with a duct *d'* within said pressure-pot *c* and extending downwardly to a point near the bottom thereof to insure metal passing to the nozzle being taken from the bottom of said pot,

where the metal will not be frothy and will be free from dross and at the highest temperature. The port *d* being of small diameter, I preferably taper the nozzle *e* both interiorly and exteriorly to give the metal not discharged into the mold sufficient clearance to cause it to drop back into the duct *d'* when the pressure on the pot is relieved and to permit the connection with the mold-support to be similarly tapered to secure a good joint and provide a similar clearance as in the discharge-nozzle.

To charge the auxiliary or pressure pot *c*, I preferably use the port *d* to avoid unnecessary fittings or an increase of openings or the use of any movable or working parts in or near the molten metal and accomplish this purpose by providing means changing the level of the said port relative to the level of the molten metal in the melting-pot *a*, thus overflowing the metal in the melting-pot into said pressure-pot. This is preferably accomplished by displacing the molten metal in the melting-pot *a* by a displacer *f*, which is carried by a shaft *g*, mounted in suitable bearings on or adjacent to the said melting-pot, and is controlled by a suitable operating lever or handle *h*. To avoid the accidental raising of the level of the metal in the melting-pot *a*, I preferably make this displacer hollow, so that its specific gravity will be less than that of the molten metal and yet displace a material quantity thereof when operated. I also preferably make this displacer of a material having no affinity for the metals used in the apparatus.

For the discharge of the molten metal from the pressure-pot *c* an air connection is made with a source of air or gas under pressure which is constant, as by the pipe *i*, leading into the pot *c*, so as to place fluid-pressure on the top of the molten metal therein contained. Inasmuch as the use of this pressure is required only during the interval of charging and is preferably variable to meet the requirements of different molds and metals or the quantity of metal in the pot, means controlling this pressure, as a three-way valve *i'*, is provided. This may be supplemented, if desired, by a pressure-regulator on the pressure-tank to enable the pressure of the air or gas passing through the connection *i* to be regulated.

For convenience in filling the mold from the pot *c* the mold, (indicated at *k*,) is supported upon a carrier *l*, its ingate registering with the bore of a short conductor *m*, which depends from the under side of the carrier to coöperate with the extremity of the nozzle *e*. The carrier is arranged to move freely to and fro and also to be raised to disengage the conductor *m* from the nozzle *e*, and for this purpose it may be provided near its forward end with wheels or rollers *n*, arranged to travel in suitable channel-irons *o*. Toward its rear end the carrier has pivoted thereto at each side a lever *p*, which is provided with a roller *q*, likewise adapted to travel in the corresponding channel-iron *o*. The levers *p* have such form as to give their handles locations suitable for operation, and it will be seen that upon raising such handles the rear end of the carrier *l* can be raised sufficiently to disengage the conductor *m* from the nozzle *e*, whereupon the carrier can be drawn forward, its wheels or rollers *n* and *q* traveling in the channel-irons *o*.

Suitable means are provided for exerting pressure upon the mold while it is being filled for the purpose of holding the parts tightly together and also of securing a tight joint between the mold and the conductor *m*, as well as between such conductor and the nozzle *e*. As shown in the drawings, a bridge-piece *r*, mounted adjustably by means of nuts *s* upon the screw-threaded standards *s'*, receives a press-screw *t*, provided with a suitable handle *t'*, whereby the necessary pressure can be exerted upon the mold. The lower end of the screw preferably bears upon a block *u*, through which the pressure is transmitted to the mold, and such block may have pivoted therein a lever *v*, which may carry a plunger *w*, passing through the mold and adapted to close the ingate thereof.

In the operation of the apparatus metal, preferably at or near its fusing-point, is placed in the melting-pot *a* and brought to and maintained at a temperature required for thoroughly fusing the mass by the furnace *b*. The auxiliary or pressure pot *c* is then filled or partially filled by forcing the displacer *f*, by means of its lever-handle *h*, into the molten metal, thus raising the level of the metal to a point considerably above the discharge-nozzle *e*, overflowing the pot *a* into the auxiliary or pressure pot *c*. Prior to this charging of the pot *c* care must be taken to so turn the valve *i'* as to relieve the pot *c* of all pressure and to give a vent to air therein. When the pressure-pot is so charged, the molten metal in the melting-pot *a* surrounding it will maintain the temperature of the metal at or near the fusing-point, thus enabling the metal therein to be discharged by successive applications of pressure thereon without recharging the pot, if desired. The pot *c* having been charged, the displacer *f* is released and the metal in the melting-pot will immediately sink to its former level, exposing the nozzle *e*. The mold-carrier, which during the charging interval has been drawn forward to leave the port of the nozzle *e* unobstructed, is then moved on the irons or tracks *o*, the levers *p* being raised to give the conductor *m* clearance of the nozzle *e* and permitting it to be dropped into place thereon. The pivoting of the levers *p* upon the sides of the carrier, while the wheels or rollers *q* rest on the tracks *o*, permits the nec-

essary pressure to be transferred to the joint between the conductor *m* and the nozzle *e* without bending or rupturing the support of the carrier. The block *u* is then pressed upon the mold on the carrier to substantially close the joints of the mold and prevent the discharge of the metal between the conductor and the nozzle. The lever *v*, with the plunger *w* actuated thereby is then raised to open the ingate to the mold and the valve *i'* opened to place the metal in the pressure-pot under pressure, forcing a portion of the charge therein through the duct *d'* and the discharge-nozzle *e* through the conductor *m* into the mold. Owing to the parts of the mold-carrier and the mold itself being relatively cooler than the metal flowing thereinto, this discharge is accompanied by a tendency of the metal to congeal before being forced into all the interstices of the mold. To obviate this difficulty, it is essential that the interval of charging of the mold be reduced to a minimum and that the air or gas be applied to the pressure-pot at its maximum pressure with each casting from the same mold. When the mold is filled, pressure must at once be removed from said pot to avoid the congealing of the metal in and about the nozzle *e* and to permit the surplus metal in the said nozzle and its duct and also in the connection *m* to drop back into the pressure-pot. A further necessity for relieving the pressure-pot of this pressure is that with the removal of the mold-carrier this pressure and that caused by the expansion of the gases or air from the heat within the pot, unless there is a vent provided, would force the molten metal from the nozzle, endangering the person or persons operating the apparatus. The plunger *w* is then operated to close the ingate. The screw-pressure is released and the carrier is drawn forward to permit the mold to be opened and the casting removed. The mold is then closed and the carrier returned for the refilling of the mold as before, and this operation is repeated until the metal in the auxiliary or pressure pot becomes exhausted, or substantially so, whereupon it is necessary to again use the displacer to recharge said pot.

It will be observed that in charging and recharging the pressure-pot the dross in the melting-pot will be raised above the port *d*, thus insuring only clean metal entering the pressure-pot *c*, and, further, that as this metal enters the said pot *c* it will either force any dross or frothy metal which may have accumulated in the pot *c* out of the duct *d'* or float it into the melting-pot, thus insuring a constant supply of clean metal to the mold.

This construction not only admits of the casting of the metal under conditions which insures such rapidity of its discharge as to introduce the metal into the mold without its congealing to an extent to result in imperfections or inaccuracies in the casting, but uniformity in all the castings made both as to the quality of the metal and its density. This results in an apparatus which has great capacity and small waste of labor and material in its operation.

It is obvious that various changes may be made in the details of construction and arrangement of the apparatus, according to the varied necessities of its practical use, without departing from the spirit of the invention.

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

1. In a casting apparatus, a melting-pot, a pressure-pot having an open port in its upper portion normally above the level of metal in said melting-pot, means for maintaining metal in said pots at the required temperature, means whereby the level of the metal in said melting-pot, relatively to said port, may be changed to flow metal into said pressure-pot through said port, means whereby fluid-pressure may be supplied to said pressure-pot to discharge metal therefrom into a mold, and means controlling said pressure.

2. In a casting apparatus, a melting-pot, a pressure-pot having an open port in its upper portion normally above the level of metal in said melting-pot, means for maintaining metal in said pots at the required temperature, a duct extending downwardly to a point near the bottom of said pressure-pot, means whereby the level of the metal in said melting-pot, relatively to said port, may be changed to flow metal into said pressure-pot through said port, means whereby fluid-pressure may be supplied to said pressure-pot to discharge metal therefrom through said duct into a mold, and means controlling said pressure.

3. In a casting apparatus, a melting-pot, a pressure-pot located in said melting-pot and having an open port in its upper portion normally above the level of metal in said melting-pot, means for maintaining metal in said pots at the required temperature, means whereby the level of the metal in said melting-pot, relatively to said port, may be changed to flow metal into said pressure-pot through said port, means whereby fluid-pressure may be supplied to said pressure-pot to discharge metal therefrom into a mold, and means controlling said pressure.

4. In a casting apparatus, a melting-pot, a pressure-pot, having therein a duct extending downwardly to a point near the bottom thereof, and a nozzle projecting from said pot and in communication with said duct through an open port, said nozzle being normally above the level of the metal in said melting-pot, means for maintaining metal in said pots at the required temperature, means whereby the level of the metal in said melting-pot, relatively to said nozzle, may be changed to flow metal into said pressure-pot

through said nozzle and said duct, means whereby fluid-pressure may be supplied to said pressure-pot to discharge metal therefrom through said duct and said nozzle into a mold, and means controlling said pressure.

5. In a casting apparatus, the combination of a melting-pot, a pressure-pot located in said melting-pot and having an open port in its upper portion normally above the level of metal in said melting-pot, a displacer whereby the molten metal in said melting-pot may be overflowed into said pressure-pot, means whereby fluid-pressure may be supplied to said pressure-pot to discharge metal therefrom into a mold, and means controlling said pressure.

6. In a casting apparatus, a melting-pot, a pressure-pot having an open port in its upper portion and normally above the level of metal in said melting-pot, means maintaining metal in said pots at the required temperature, means whereby the level of the metal in said melting-pot relative to said port, may be changed to flow metal into said pressure-pot through said port, a movable mold-carrier, means carried thereby whereby communication may be established between said port and a mold supported on said carrier, means whereby fluid-pressure may be supplied to said pressure-pot to discharge metal therefrom into a mold, and means controlling said pressure.

7. In a casting apparatus, a melting-pot, a pressure-pot having therein a duct extending downwardly to a point near the bottom thereof, and a nozzle projecting from said pot and in communication with said duct through an open port, said nozzle being normally above the level of the metal in said melting-pot, means maintaining metal in said pots at the required temperature, means whereby the level of the metal in said melting-pot relative to said nozzle may be changed to flow metal into said pressure-pot through said nozzle and said duct, a movable mold-carrier, means carried thereby whereby communication may be established between said nozzle and a mold supported on said carrier, means whereby fluid-pressure may be supplied to said pressure-pot to discharge metal therefrom through said duct and said nozzle into a mold and means controlling said pressure.

8. In a casting apparatus, the combination of a melting-pot, a pressure-pot located in said melting-pot and having an opening in its upper portion, a duct within said pressure-pot, and a discharge-nozzle projecting beyond the duct through said opening, a movable mold-carrier, means carried thereby whereby communication may be established between said nozzle and a mold supported on said carrier, a displacer whereby the molten metal in said melting-pot may be overflowed into said pressure-pot, means whereby fluid-pressure may be supplied said pressure-pot, and means controlling same.

9. In a casting apparatus, the combination of a melting-pot, a pressure-pot located in said pot and having a nozzle in its upper portion, a displacer to cause the molten metal in said melting-pot to overflow into said pressure-pot, means to force metal from said pressure-pot, a movable mold-carrier provided with a conductor to coöperate with said nozzle, and means whereby said carrier may be pressed toward said pressure-pot to make a tight joint between said conductor and said nozzle.

10. In a casting apparatus, the combination of means to deliver molten metal under pressure, a movable mold-carrier to coöperate with said means, a lever pivoted on said carrier, and a stationary bearing-surface upon which said lever has a movable bearing whereby said carrier may be moved to disconnect the mold thereon from said means to deliver metal.

11. In a casting apparatus, the combination of a pot adapted to contain molten metal and provided with a nozzle, means to discharge the metal from said pot, a movable mold-carrier to coöperate with said nozzle, a lever pivoted upon said mold-carrier and a stationary bearing-surface upon which said lever has a movable bearing whereby said mold-carrier may be disengaged from said nozzle.

12. In a casting apparatus, the combination of a pot adapted to contain molten metal and provided with an outlet, means to discharge the metal from said pot, a movable mold-carrier, tracks in which said carrier is movable to bring the ingate of the mold in line with said outlet, tracks to support said carrier, and levers pivoted upon said carrier and having bearing-points on said tracks.

This specification signed and witnessed this 27th day of April, 1905.

JAMES BEAKBANE.

In presence of—
SAMUEL F. CHAPPELL,
HAROLD S. BRIGHAM.