

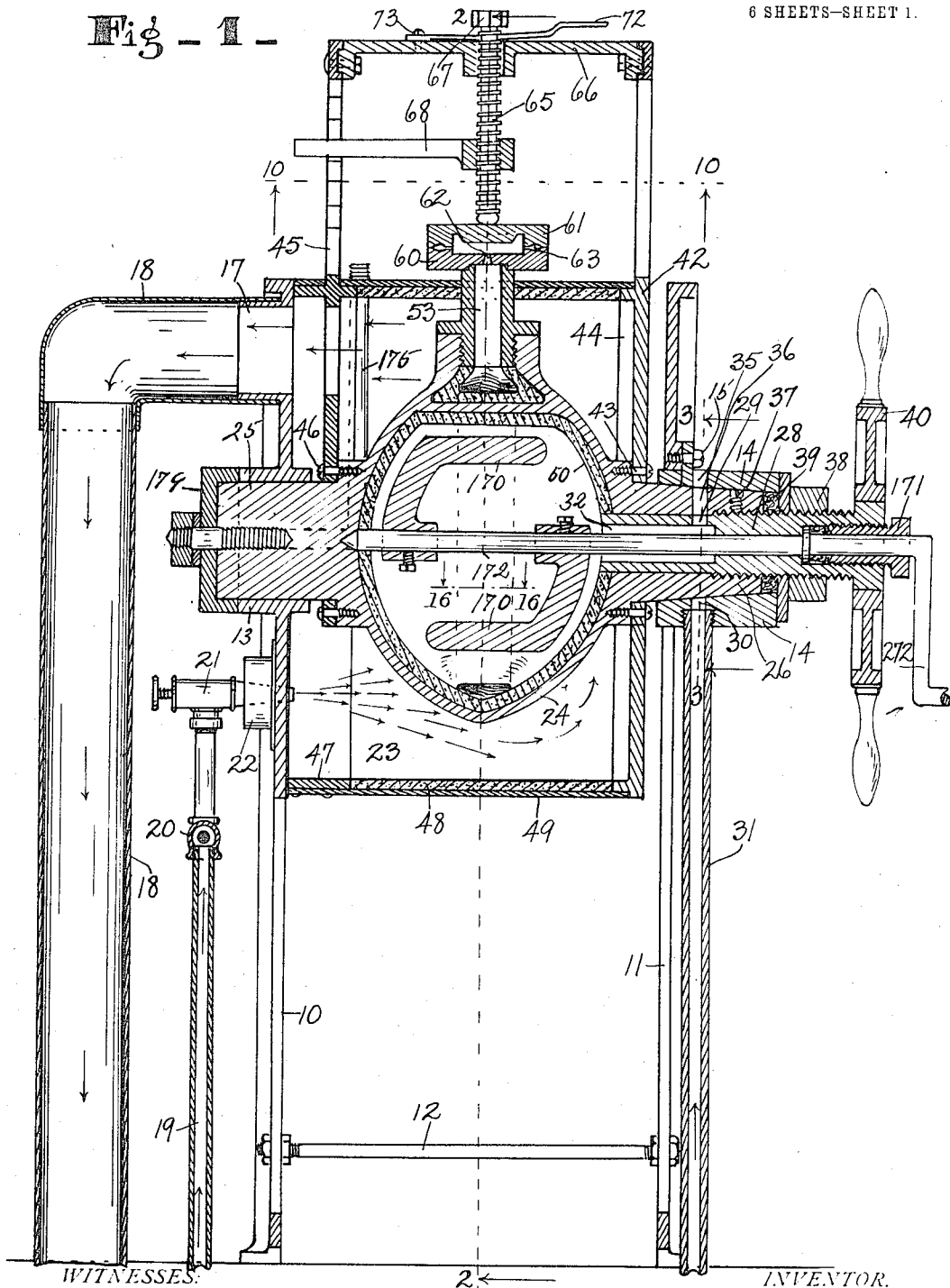
L. M. PARKHURST.
DIE CASTING MACHINE.
APPLICATION FILED FEB. 23, 1911.

1,053,132.

Patented Feb. 11, 1913.

6 SHEETS-SHEET 1.

Fig - 1 -



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2 ←

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1,053,132.

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6 SHEETS—SHEET 2.

Fig - 2 -

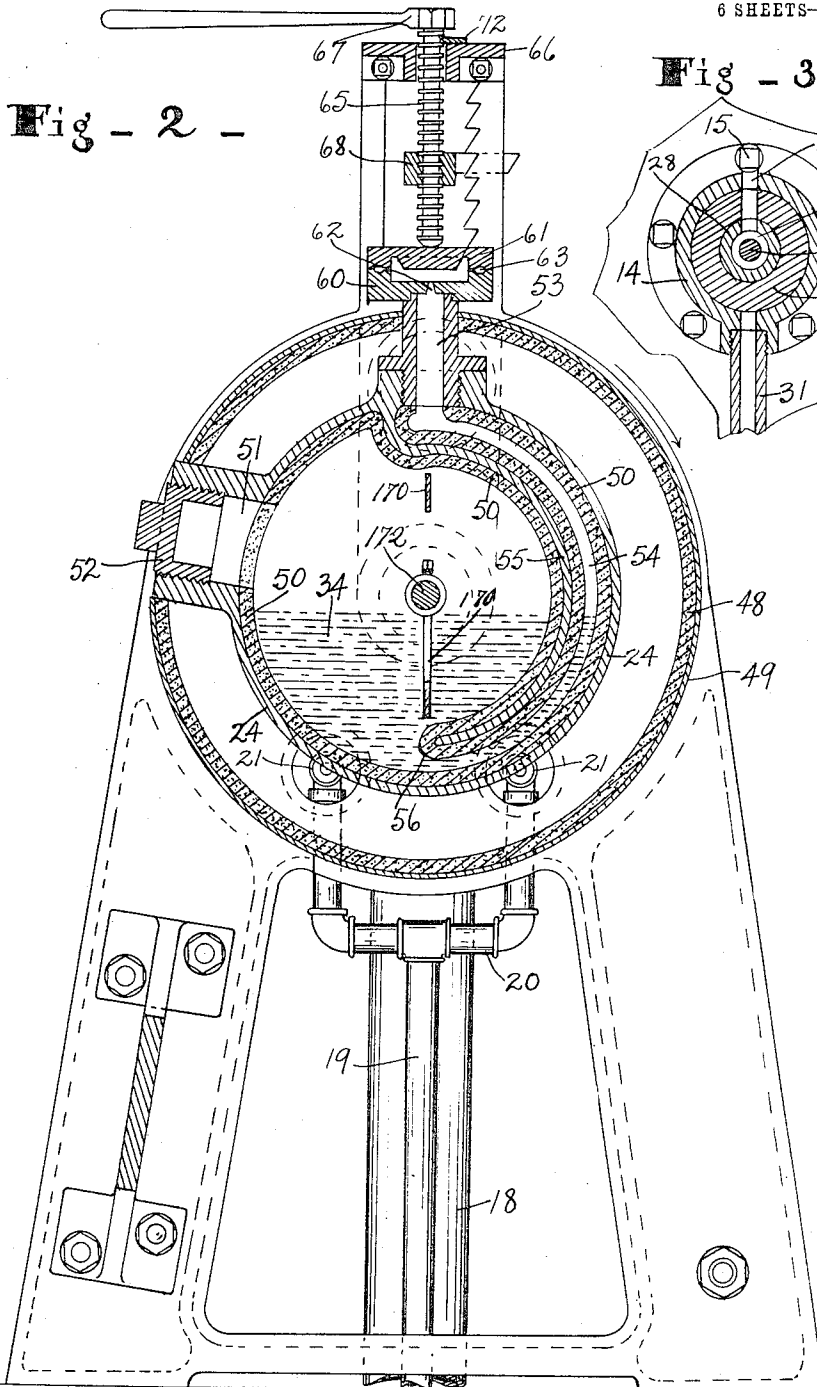
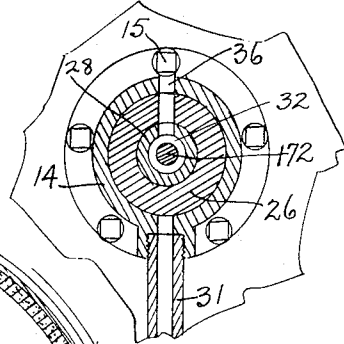


Fig - 3 -



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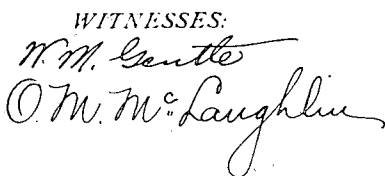
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6 SHEETS—SHEET 3.

Fig. 4.



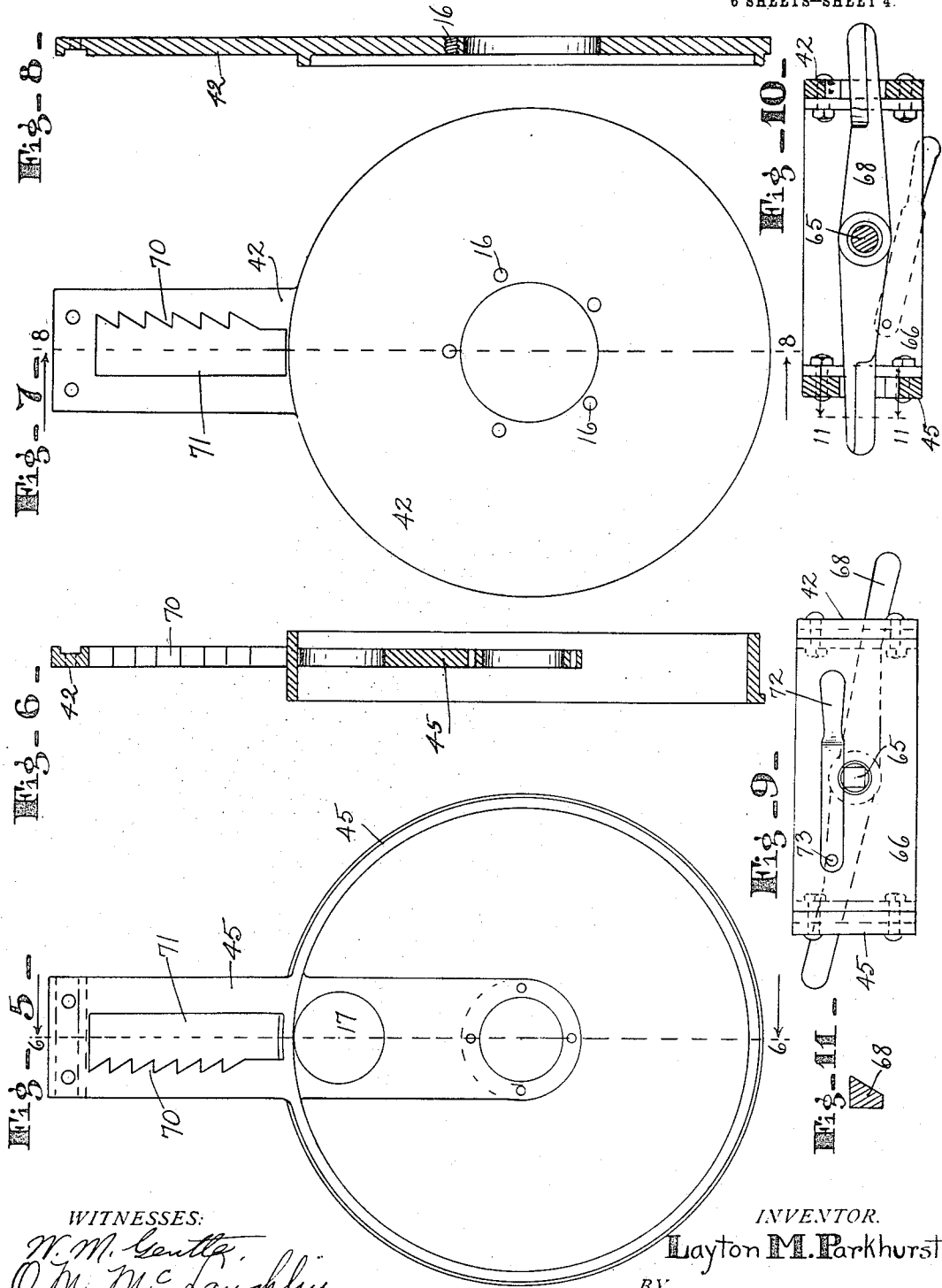
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6 SHEETS—SHEET 4.



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6 SHEETS—SHEET 5.

Fig - 12 -

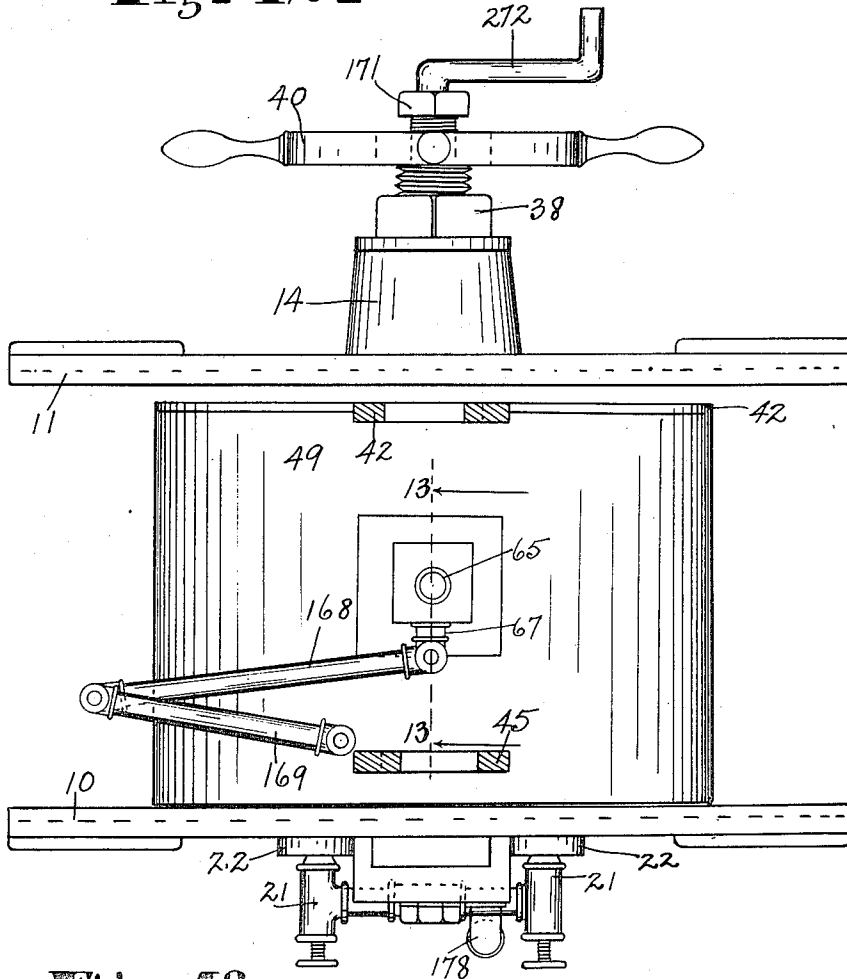
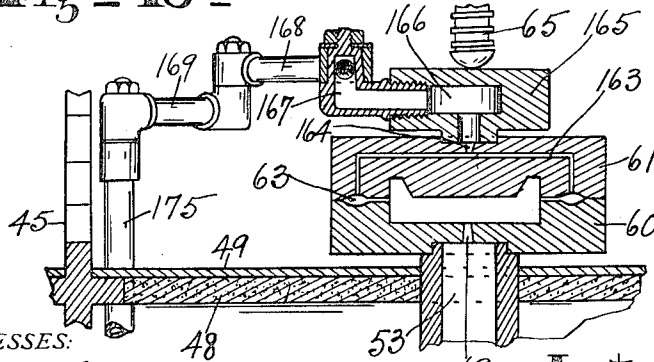


Fig - 13 -



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1,053,132.

Patented Feb. 11, 1913.

6 SHEETS—SHEET 6.

Fig - 14 -

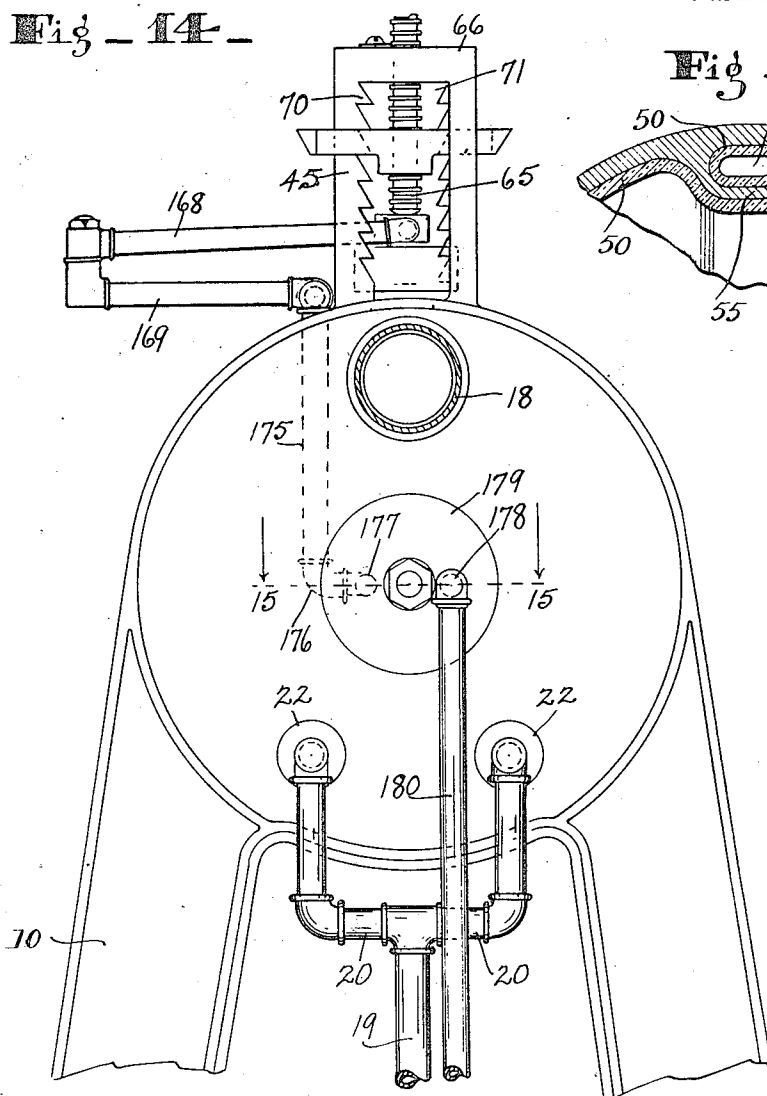


Fig - 16 -

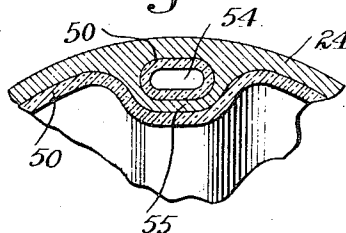
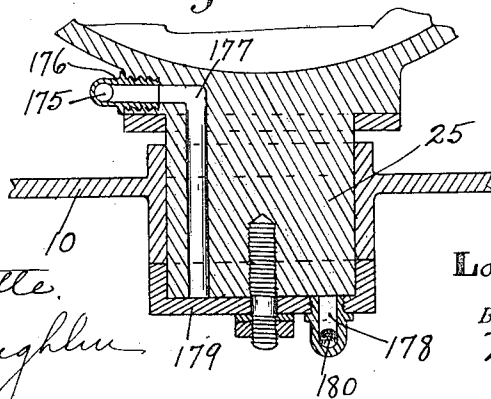


Fig - 15 -



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UNITED STATES PATENT OFFICE.

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DIE-CASTING MACHINE.

1,053,132.

Specification of Letters Patent.

Patented Feb. 11, 1913.

Application filed February 25, 1911. Serial No. 610,931.

To all whom it may concern:

Be it known that I, LAYTON M. PARKHURST, a citizen of the United States, and a resident of Anderson, county of Madison, and State of Indiana, have invented a certain useful Die-Casting Machine; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings.

The object of this invention is to provide an improved die-casting machine extremely simple in construction, formed relatively of few parts and easily operated so that skilled mechanics are not required. It is capable of making castings rapidly and dies may be placed and removed as the machine operates, and it automatically agitates the metal in the melting pot, and is capable of making dies from a wide range of metals, and is valveless, and has other features and advantages which will hereafter appear.

The chief feature of the invention whereby many of the above results are brought about, is in making a movable or tilting, oscillatable or invertible melting pot, and making it all of one piece practically and the wall thereof free from valves so that it can be lined with graphite or other materials ordinarily used in making crucibles whereby various metals and alloys can be melted and cast without difficulty. Along with the oscillatable melting pot is an arrangement for supplying a gaseous fluid under pressure, such as atmospheric air or other gas therein for forcing the metal into the die, which compressed air is turned off and on by the mere movement of the pot. And likewise, the die is attached to the pot so that the metal will enter the die when the pot is inverted, and readily operable means is provided for clamping the die in place, whereby dies may be substituted during the operation of the machine and castings of various sizes and forms made successively. Furthermore, within the pot an internal conduit is provided for preventing any scruff or foreign substance passing from the pot into the die.

The nature of the invention will be understood from the accompanying drawings and the following description and claims.

In the drawings Figure 1 is a central vertical section through the device. Fig. 2 is a central vertical section on the line 2—2 of

Fig. 1. Fig. 3 is a section on the line 3—3 of Fig. 1. Fig. 4 is the upper part of what appears in Fig. 2, on a larger scale and with the parts of the device in position for pouring metal and casting the die. Fig. 5 is a side elevation of a part of the revoluble frame in which the melting pot and furnace are mounted. Fig. 6 is a section on the line 6—6 of Fig. 5. Fig. 7 is a side elevation of the other side of said revoluble frame. Fig. 8 is a section on the line 8—8 of Fig. 7. Fig. 9 is a plan view of the upper part of the revoluble frame. Fig. 10 is a section on the line 10—10 of Fig. 1. Fig. 11 is a section on the line 11—11 of Fig. 10. Fig. 12 is a plan view of a modified form of the device with part of the upper portion cut away. Fig. 13 is a section on the line 13—13 of Fig. 12. Fig. 14 is an end elevation of said modified form, the lower part being broken away. Fig. 15 is a section on the line 15—15 of Fig. 14. Fig. 16 is a section on the line 16—16 of Fig. 1.

A stationary frame is provided consisting of side portions 10 and 11 with cross bars 12 near the bottom. The side 10 of said frame has a bearing 13 integral with it. The side 11 of said stationary frame has a bearing 14 secured thereto by screws 15 through holes 16, see Fig. 7. The upper end of the side 10 of the frame has a flue outlet 17 from which a flue 18 extends downwardly. A fuel supply pipe 19 leads from the source of gas or other like fuel to the divided pipes 20, on the upper end of each of which there is a fuel nozzle 21 which extends through a mixer 22 and the wall of the side 10 for supplying fuel, as indicated by arrows in Fig. 1, to a furnace chamber 23 which surrounds a melting pot 24.

The melting pot is made of one casting and is cylindrical in one direction and elliptical in the other, as shown in Figs. 1 and 2, and has a trunnion 25 which operates in the bearing 13 and a trunnion 26 which operates in the bearing 14, both spindle and trunnion being integral with the pot and the trunnion tapering and hollow and internally threaded to receive a tube 28, which has in it a port 29 adapted to register with a port 30, which is in communication with a compressed air tube 31 leading from any suitable source of compressed air. The tube 28 has an opening 32 partially through it which communicates

with the port 29 and also with the interior of the melting pot. Hence, when the melting pot is turned over from the position shown in Fig. 1 to the position shown in Fig. 4, compressed air will enter the melting pot for the purpose of forcing the molten metal 34 out of the melting pot into the die. When the melting pot is in the position shown in Fig. 1, the port 29 is in communication with a port 35 through the trunnion 26 and a port 36 through the bearing 14, and this constitutes the exhaust from the melting pot. The relation of the tube 28 within the spindle 14 is fixed by a set screw 37 and leakage is prevented by a nut 38, washer 39, and suitable packing. The tube 28 is operated by turning a hand-wheel 40 to bring the port 29 into communication with the ports 30 and 35 respectively.

The furnace chamber is formed at one side by the closed portion of the frame 10 which is stationary and a composite chamber wall which is revoluble along with the melting pot. This composite chamber wall is formed of a side frame 42 which has a closed portion secured to the melting pot by screws 43, said portion surrounding the spindle 26 and having on its inner side an annular flange 44. There is another frame 45 opposite the frame 42 which is secured to the spindle 25 of the melting pot by screws 46, and it has an annular portion 47 which is in alignment with the annular ring 44 of the other frame 42, and the ring 47 lies against the closed portion of the fixed frame 10. Between the parts 42 and 45 an annular furnace wall 48 is located and an annular plate 49 surrounds said wall 48, annular ring 44 and annular ring 47 so as to make a connection with the stationary frame and close the furnace chamber surrounding the melting pot into which fuel enters through the nozzle 21 and from which the fumes pass through the flue outlet 17. This furnace chamber, therefore, revolves with the melting pot. It is observed that in this construction of heater the flame or heat is not directed against the pot containing the metal to be cast so that the pot will not become burned at the point where the heat strikes it and the metal will not be chilled at other points. With a movable pot and also the associated movable or invertible furnace chamber, the points of heat contact are being continually changed over the entire surface of the pot, thereby spreading on the pot and not chilling the metal to be cast.

The interior of the melting pot is lined with graphite 50 or other suitable material ordinarily used in making crucibles. This enables castings to be made from various alloys which could not be melted in pots composed of other metals unless so lined. This is because of the chemical actions resulting from the contact of the molten metals with the

linings of the pot, but since the melting pot herein is not provided with valves, it is rendered possible to line or coat the interior of the pot with crucible material, as above stated. This also permits of the application of great heat to the pot.

The pot has an inlet opening 51 which projects through the furnace chamber, as shown in Fig. 2, and is closed by a removable cap 52. The metal is introduced through this opening. The metal flows from the melting pot through an outlet nozzle 53, see Fig. 2. This nozzle screws into an outlet opening from the melting pot and projects through the furnace wall, as shown in Figs. 1 and 2. It is in communication with an internal conduit 54 within the melting pot formed by the partial partition 55, which also has lining 50. The inlet to said chamber 54 is at the point 56 which is located diametrically opposite the outlet nozzle 53.

With this construction of melting pot it is observed that valves are omitted and are unnecessary as in other die-casting machines where the pot is fixed. In such instance a valve or gate is necessary in order to start and stop the flow of metal from the pot into the die. It is practically impossible to make a valve that will absolutely prevent leakage of the molten metal, and that causes the loss of a great many castings which prove to be imperfect. This difficulty is obviated with my invention because no valve is necessary or anything of like nature in order to stop the flow of metal from the pot to the die. Furthermore, the art of making castings under pressure in steel dies depends for its success upon the quantity of metal which may be introduced into the die in the quickest possible time. In the valve-controlled stationary pot, when the valve stem is lifted to allow the metal to pass, there is a quick flow of metal through the very small opening made by the lifting of the valve stem, so that a part of the metal is blown into the die, and it is followed later by a heavier flow which prevents the casting from being of even strata or perfectly incorporated. In my machine the entire opening of the nozzle or port is free which allows the full flow of metal instantaneously into the die when the pot is moved or inverted.

The internal conduit 54 in a sense skims the metal or, in other words, prevents any scruff or substance foreign to the metal being cast from passing from the pot into the die. This is because when in normal position, as shown in Fig. 2, the end of the conduit 54 is embedded down in the molten metal below the surface. As the pot is turned to the position shown in Fig. 4, it is obvious that the conduit 54 is entirely filled with metal while it is below the surface of the metal, and, therefore, does not receive the scruff on top of the body of molten metal. This con-

duit also prevents air or gas, which is used as pressure in the pot and to force the metal into the die, from getting between or passing into the die ahead of the metal which is to form the casting.

The die is formed of two gates 60 and 61, the former having a recess which fits over the end of the nozzle 53 and has a small inlet port 62 leading into the die. A compressed air chamber 63 is formed between the gates of the die surrounding and at intervals in communication with the interior of the die so that the atmosphere in the die will pass out of the die chamber into the compressed air chamber 63 until the die is open.

The die is held in place by a screw-bolt 65 which operates through a cross-bar 66 on top of the frames 42 and 45. It is turned or operated by a wrench 67 and when in its down-most position is held in such position by a double-ended bar 68 which screws on the bolt 65, and its ends are beveled oppositely, as shown in Figs. 10 and 11, so as to make sharp edges adapted to catch in the notches 70 on the frames 42 and 45. The upper part of these frames are centrally cut out at 71 so as to form two parallel bars between which the bar 68 extends, and the edge of one of the side bars of each frame 42 and 45 is provided with notches 70. When the screw bolt 65 is in its upper position, it is held up by a latch 72 pivoted at 73 on the bar 66, see Fig. 9, so that it can be slipped in between the threads of the screw-bolt 65 and hold it up out of the way of the die while the die is being arranged in place.

In stationary pots it is necessary to adjust the machine to accommodate one certain size of die, and, therefore, it causes the machine to lie idle while the die is ejecting its casting, being closed and again placed in position on the machine to be filled again. In my machine, by reason of the movable melting pot, I am enabled to use clamps for holding the die against the pot which are instantly adjustable to any and all sizes of dies from the smaller to the full capacity of the machine. In other words, a number of dies, each of a different size, may be cast successively and the machine be kept in continuous operation while dies which have already been cast are being operated. This increases the output per machine about four times that of the stationary machine.

The metal is agitated in the melting pot by curved agitators 170 which are secured on a shaft 172 extending transversely of the melting pot with its end projecting in the spindle 25 as a bearing, and it also has a bearing in the tube 28 and held in place therein by a screw 171 and operated by a crank 272. Therefore, merely the inversion or oscillation of the melting pot by a hand wheel 40 will cause the agitation without

any independent oscillation of the agitators. This arises because of the movement of the molten metal under the influence of gravity while the pot is being turned.

The operation is as follows: Molten metal is maintained during the casting operation in the melting pot. A suitable die is secured in place on top of the nozzle 53 when in its upper position. Then the melting pot and furnace chamber are given a half revolution in the direction of the arrow in Fig. 2, thus moving the parts to the position shown in Fig. 4. This movement causes the conduit 54 within the melting pot to fill with metal, and when the parts are in the position shown in Fig. 4, the compressed air will enter the melting pot and force the metal down in the conduit 54 and into the die, as shown in said figure. The air will be forced out of the die into the chamber 63. After the casting has been made, the device is turned to the upper position, as shown in Fig. 2, and the die removed.

It is observed that any kind of a die may be used and the gates of the die are not secured to anything rigidly and are readily put in place and taken away. The admission of compressed air is effected by the mere revolution of the melting pot—in fact, all is accomplished by turning the hand-wheel 40. That turns on the compressed air or exhausts the same from the melting pot. It turns the die and melting pot into the casting position or into position for filling the melting pot or handling the die. None of these things interfere with the operation of the fuel.

The parts of this machine are quickly interchangeable because they are accessible even when the machine is under heat and ready for operation. By reason of the movable pot construction, all movable parts of the machine are automatically operated by simply putting the machine in motion or oscillating the pot, and thereby doing away with the numerous air levers, exhaust levers, etc., used in many like constructions and making this machine a simple one in both construction and operation, and renders the need of skilled mechanics unnecessary to insure its operation, for the operator need only know how to tighten down the clamp screws and turn the hand-wheel, and hence the expense of operating the machine is considerably reduced.

I claim as my invention:

1. A die-casting machine including a frame, a melting pot with a metal outlet nozzle and mounted in said frame so as to be tilted from a position with the nozzle uppermost to a die-casting position when the nozzle is below the level of the metal in the pot, and means operated by the tilting movement of the pot for causing the introduction of a gaseous fluid into the pot as it ap-

proaches the die-casting position and cutting off the gaseous fluid as the pot leaves the die-casting position.

2. A die-casting machine including a frame, a melting pot with a metal outlet nozzle and a gas inlet port and mounted so as to move to and from a die-casting position and having a gas conduit therein adapted to register with the gas port in the pot when it approaches the die-casting position and not to register therewith when the pot is not in the die-casting position, whereby the pot may be charged with gas when in the die-casting position.

3. A die-casting machine including a melting pot provided with a suitable outlet nozzle and adapted to be tilted, means for removably securing a die on said nozzle, and a single means for tilting the melting pot and causing the introduction and exhaust of a compressed gaseous fluid.

4. A die-casting machine including a melting pot provided with a suitable outlet nozzle, means for mounting said melting pot so it may be tilted, means connected with the mounting of said melting pot for conveying compressed gaseous fluid thereto when the melting pot is tilted and which is closed at all other times, an exhaust passageway from the interior of the melting pot being provided which is open when the melting pot is upright and closed at all other times by the movement of the melting pot, and means for securing a die on the outlet nozzle.

5. A die-casting machine including a melting pot provided with a suitable outlet nozzle, spindles extending from the sides of said pot whereby it is mounted so it may be tilted, one of said spindles being hollow and provided with a radial port therethrough in communication with the interior of the melting pot, a bearing for said latter spindle with gaseous fluid inlet port on the underside of the pot, a gas exhaust port through the opposite side of said bearing, a port through the spindle being adapted to register with said ports in the bearing when the melting pot is in an upright position or an inverted position, a compressed gaseous fluid tube leading to the lower port in said bearing whereby when the melting pot is inverted compressed gaseous fluid will enter the melting pot and when the pot is upright compressed gaseous fluid will be cut off and the exhaust port opened, and means for clamping a mold on the outlet nozzle of the melting pot.

6. A die-casting machine including a melting pot provided with a suitable outlet nozzle, an internal conduit in said melting pot which extends from the outlet nozzle in substantially a semi-circle to a point opposite the outlet nozzle and leading to the outlet nozzle from a point substantially opposite thereto, the inlet opening to said conduit

being normally downward, means for inverting said melting pot so as to move the opening of said conduit forwardly to an upright position whereby the molten metal will enter said conduit as the pot is inverted and therefrom enter said outlet nozzle, means for securing a mold to the outlet nozzle, and means for introducing compressed gaseous fluid into the melting pot.

7. A die-casting machine including a melting pot provided with a suitable outlet nozzle, a stationary frame in which said melting pot is mounted so it may be given a tilting movement, a furnace chamber secured to said melting pot and movable therewith, means mounted in connection with the stationary frame for supplying fuel to said furnace chamber, and means secured to said frame for detachably securing a die on said nozzle.

8. A die-casting machine including a melting pot provided with a suitable outlet nozzle, a stationary frame in which said melting pot is revolvably mounted, a chamber secured to said melting pot and surrounding the same excepting on one side and at that side slidably cooperating with the stationary frame for forming a furnace chamber, means mounted in connection with the stationary frame for supplying fuel to said furnace chamber, a flue outlet from said furnace chamber through the stationary frame, and means secured to said frame for removably securing the same on said nozzle.

9. A die-casting machine including a melting pot provided with a suitable outlet nozzle, a stationary frame in which said melting pot is mounted so as to be tilted, a chamber secured to said melting pot and surrounding the same excepting on one side and at that side slidably cooperating with the stationary frame for forming a furnace chamber, means mounted in connection with the stationary frame for supplying fuel to said furnace chamber, a flue outlet from said furnace chamber through the stationary frame, parallel extensions from the revoluble furnace chamber, a cross bar on the outlet end of said extensions, a screw-bolt screwing through said cross bar for holding the die on the outlet nozzle of the melting pot, and means for locking said screw bolt so as to hold the die in such position.

10. A die-casting machine including a melting pot provided with a suitable outlet nozzle, a stationary frame in which said melting pot is mounted so as to be tilted, a furnace chamber secured to said melting pot and surrounding the same excepting on one side and at that side slidably cooperating with the stationary frame for forming a furnace chamber, means mounted in connection with the stationary frame for supplying fuel to said furnace chamber, a flue

outlet from said furnace chamber through the stationary frame, parallel extensions from the revoluble furnace chamber, a cross bar on the outlet end of said extensions, a screw bolt screwing through said cross bar for holding the die on the outlet nozzle of the melting pot, and a bar screw-threaded on said bolt and extending in opposite directions therefrom with the ends beveled, said extensions being provided with notches adapted to be engaged by the beveled edges of said bar for holding it and said screw-bolt in position when the die is secured in place.

11. A die-casting machine including an oscillating melting pot provided with a suitable outlet nozzle, means for removably securing a die on said nozzle, means for introducing compressed gaseous fluid into the melting pot when the melting pot is inverted for forcing the metal in the die, revoluble means extending axially into said melting pot, and an agitator secured on said means within the melting pot for stirring the metal.

12. A die-casting machine including a melting pot provided with a suitable outlet nozzle, spindles extending from each side of said pot whereby it is rotatably mounted, one of said spindles being hollow and provided with a radial port therethrough in communication with the interior of the melting pot, a bearing for said latter spindle with a gaseous fluid inlet port on the underside of the pot, a gas exhaust port

through the opposite side of said bearing, the port through the spindle being adapted to register with said ports in the bearing as the melting pot is turned from an upright position to an inverted position, a compressed gaseous fluid tube leading to the lower port in said bearing whereby when the melting pot is inverted compressed gaseous fluid will enter the melting pot and when the pot is upright compressed gaseous fluid will be cut off and the exhaust port open, means for clamping a die on the outlet nozzle of the melting pot, a shaft extending through the hollow spindle into the melting pot, an agitator secured on said rod in the melting pot, and means outside of the melting pot for turning said agitator.

13. A die-casting machine including a melting pot provided with a suitable outlet nozzle, an internal conduit in said melting pot which extends from the outlet nozzle to a point substantially opposite thereto, the inlet opening to said conduit being normally downward, and means for turning said pot to move the opening of said conduit in an upward direction.

In witness whereof, I have hereunto affixed my signature in the presence of the witnesses herein named.

LAYTON M. PARKHURST.

Witnesses:

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DALE EPPARD.