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MELTING POT AND METAL INJECTING MECHANISM FOR TYPE CASTING MACHINES.

APPLICATION FILED APR. 13, 1920.

1,346,077.

Patented July 6, 1920.

5 SHEETS—SHEET 1.

Fig. 1

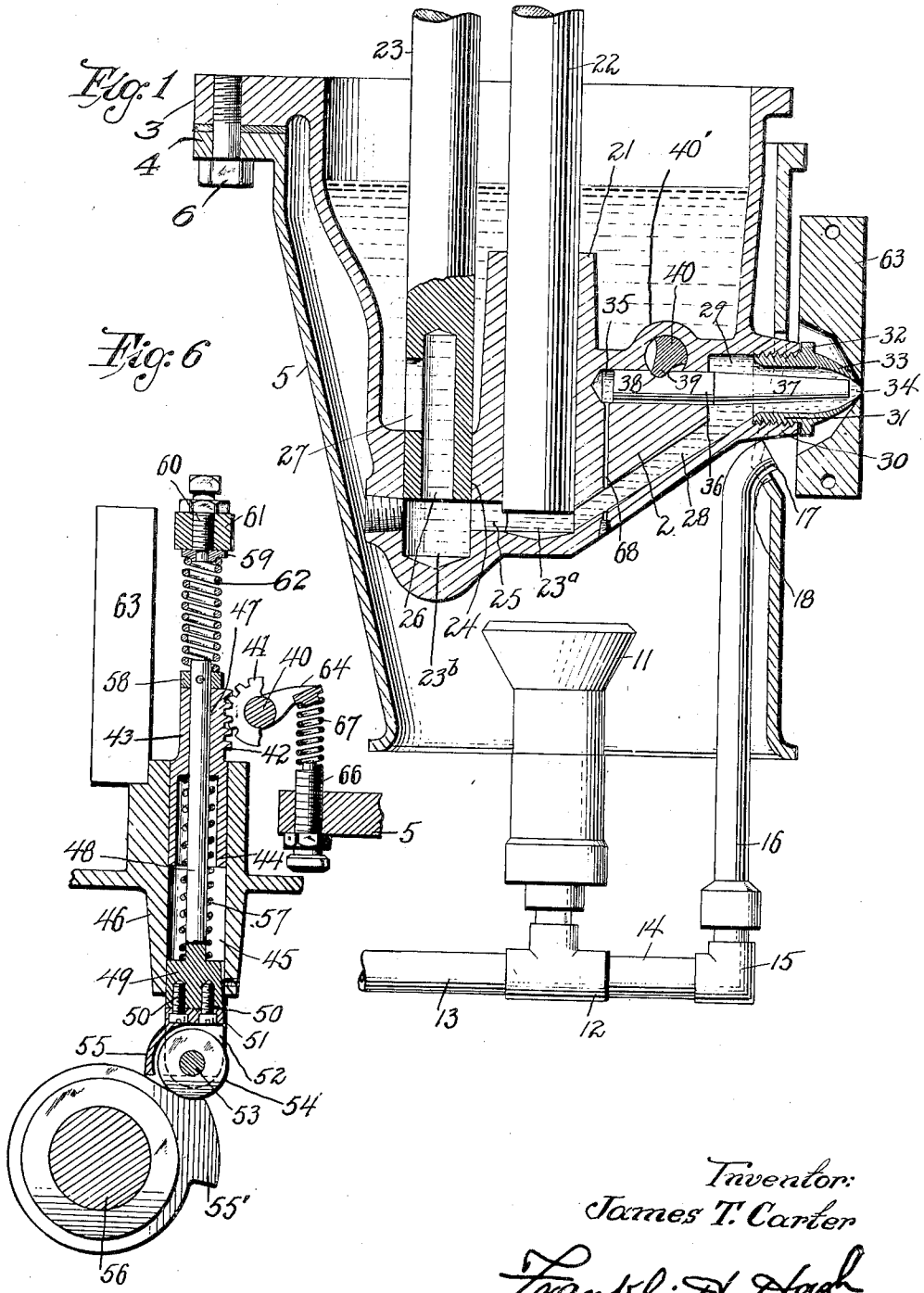


Fig. 6

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5 SHEETS—SHEET 2.

Fig. 2

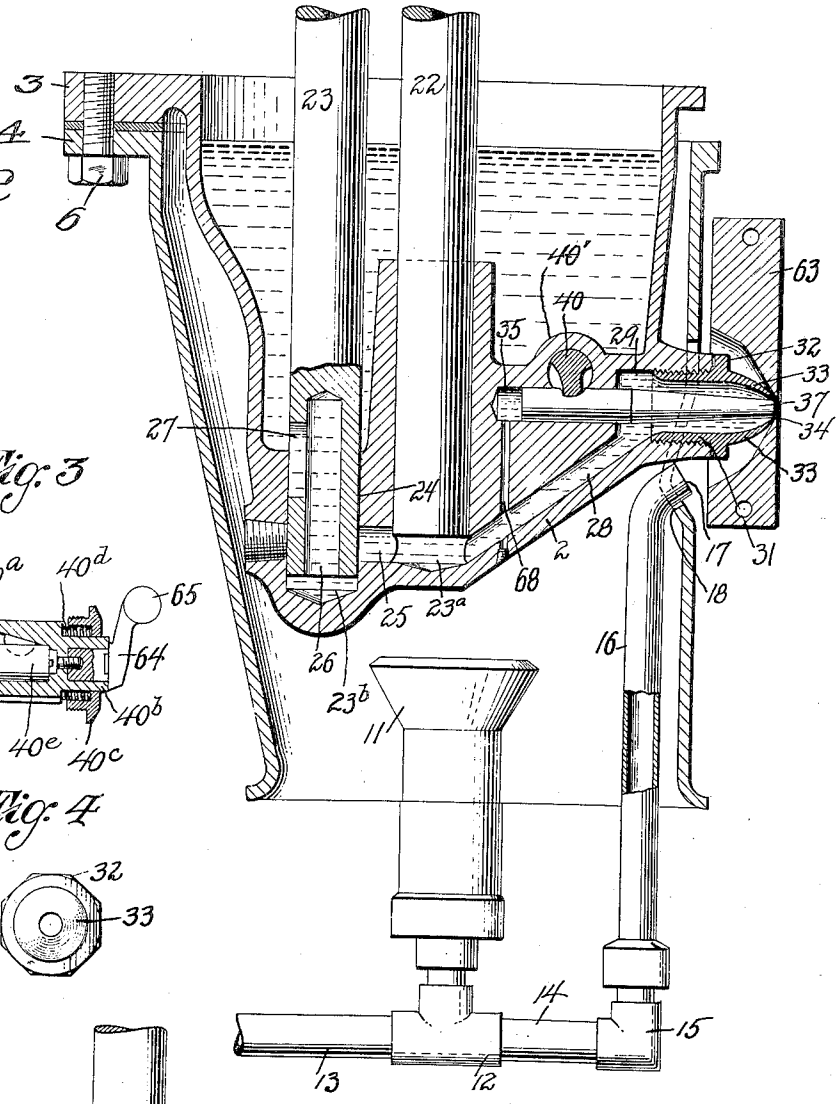
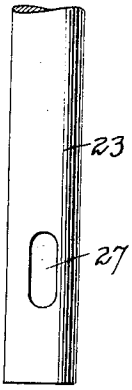


Fig. 3

Fig. 4

Fig. 5



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5 SHEETS—SHEET 3.

Fig. 7

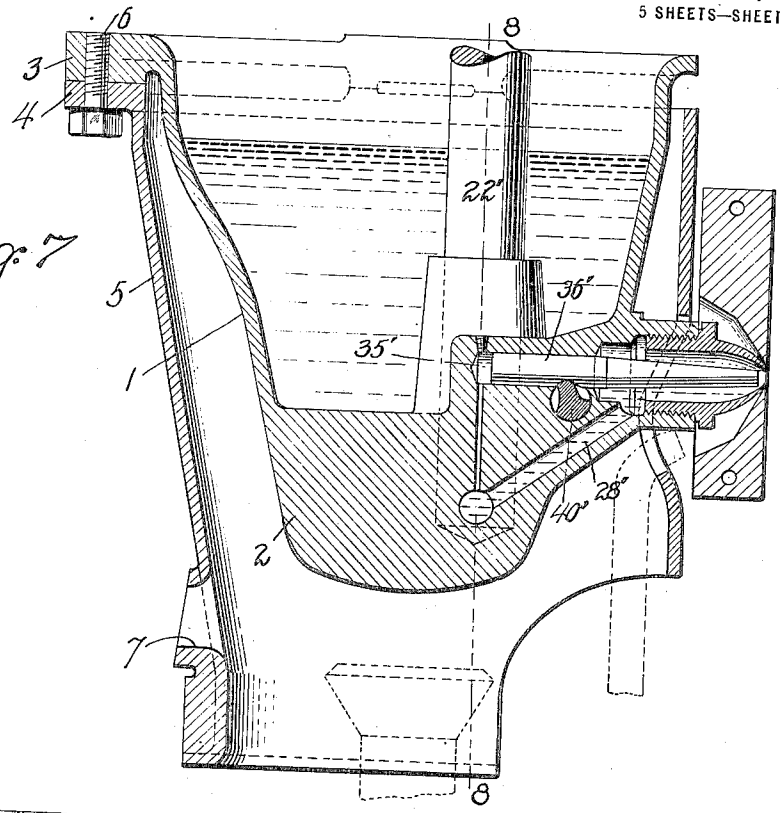
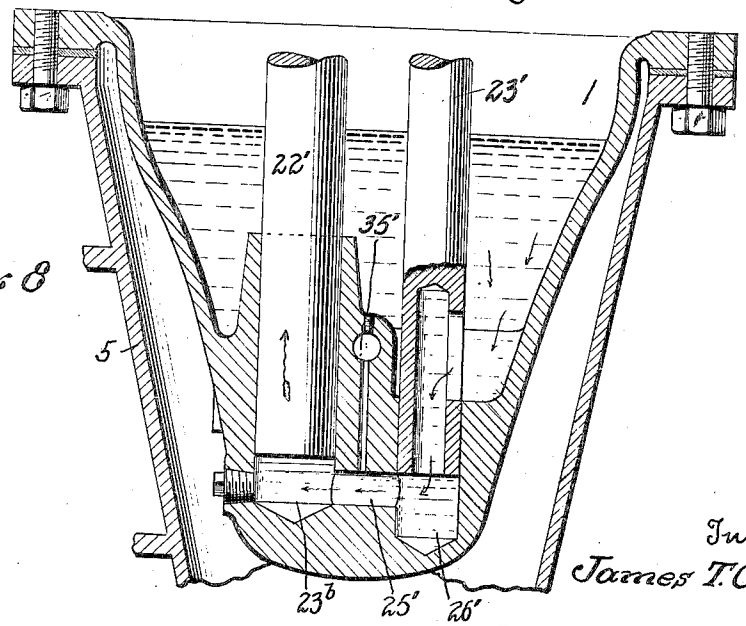


Fig. 8



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5 SHEETS—SHEET 4.

Fig. 9

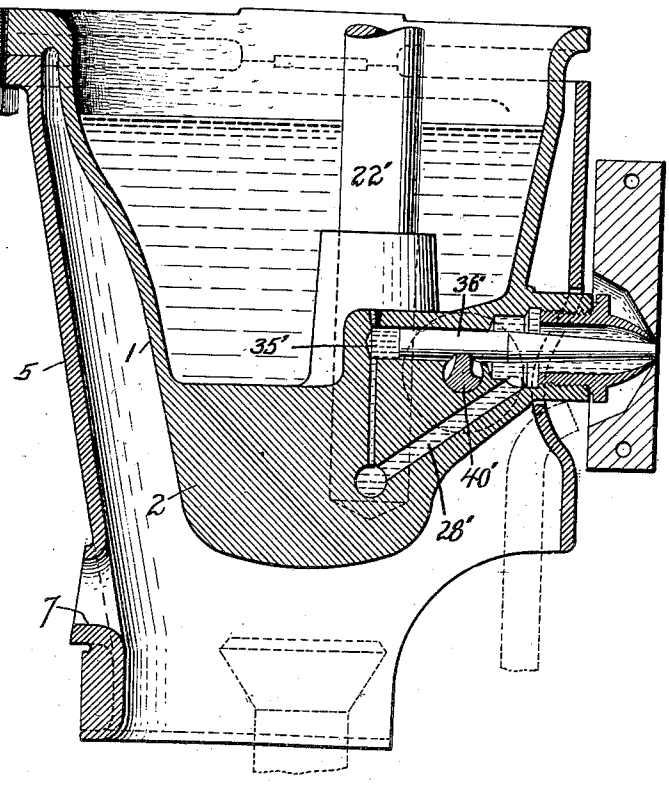
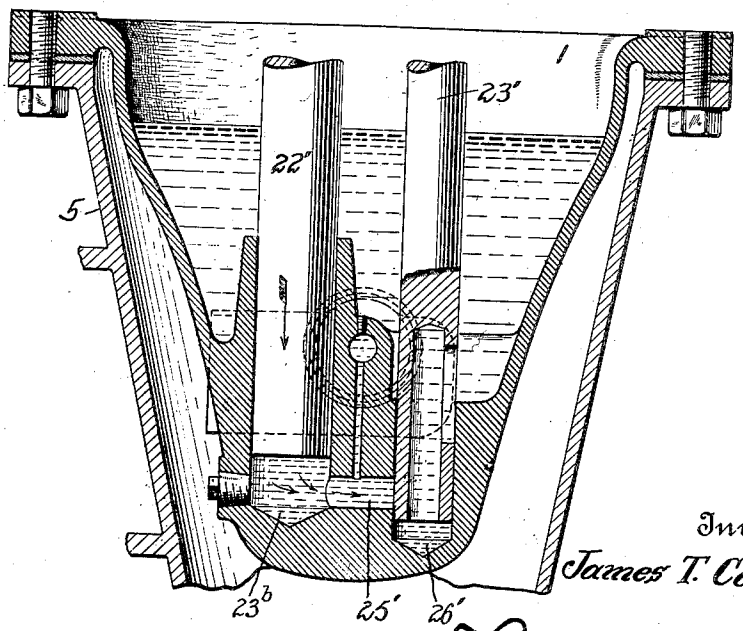


Fig. 10



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5 SHEETS—SHEET 5.

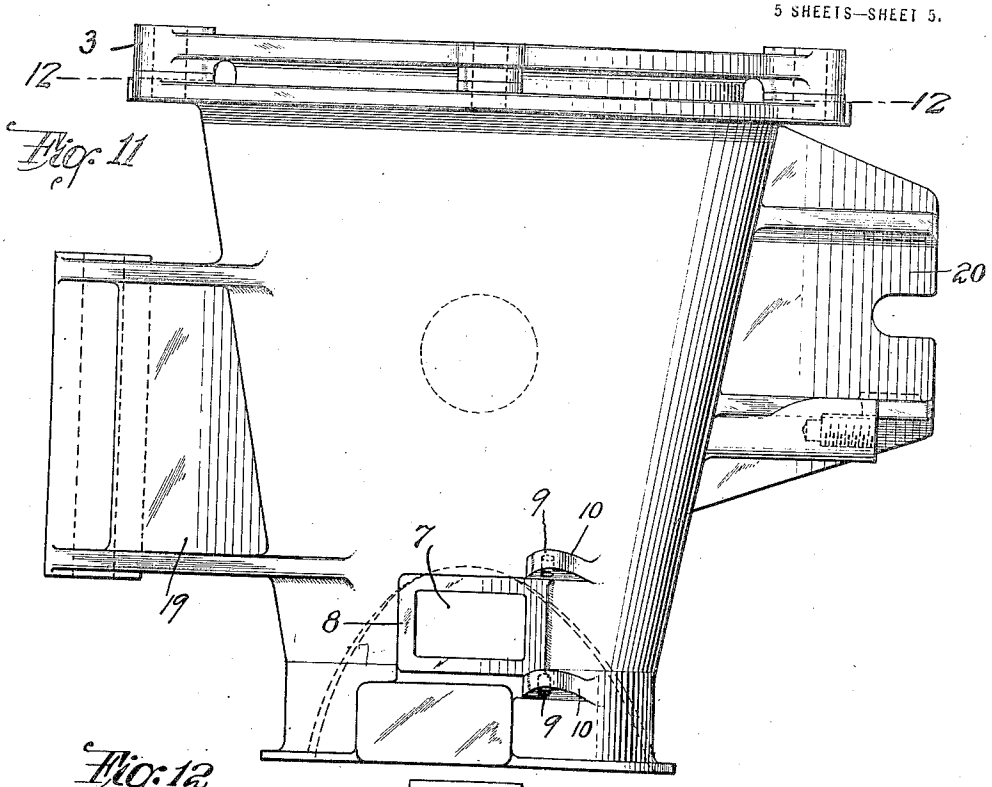
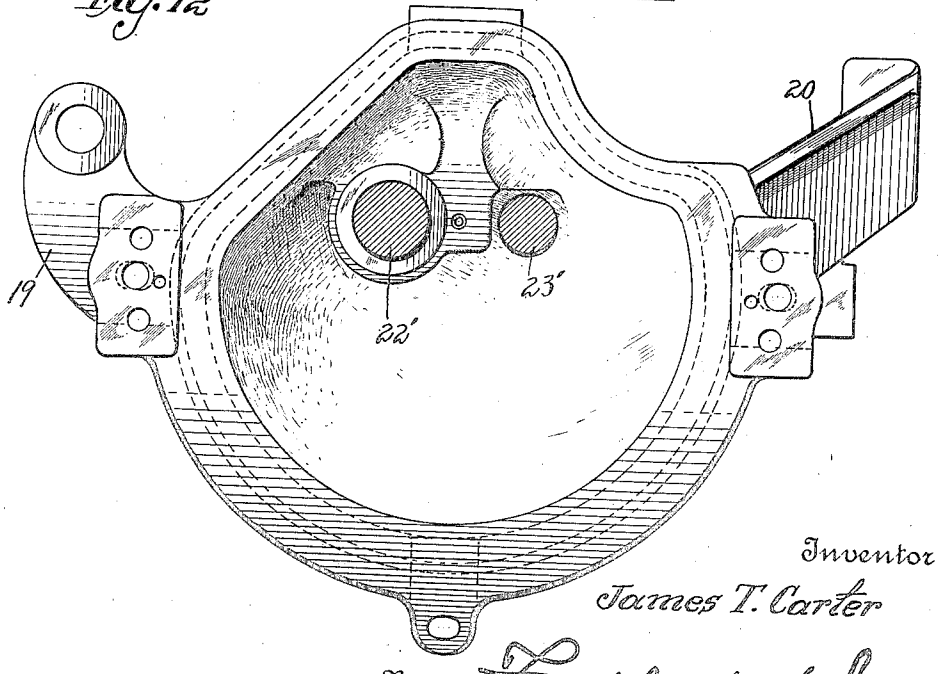


Fig. 11

Fig. 12



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UNITED STATES PATENT OFFICE.

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MELTING-POT AND METAL-INJECTING MECHANISM FOR TYPE-CASTING MACHINES.

1,346,077. Specification of Letters Patent. Patented July 6, 1920.

Application filed April 13, 1920. Serial No. 373,680.

To all whom it may concern:

Be it known that I, JAMES THOMAS CARTER, a citizen of the United States, residing in the city of Baltimore and State of Maryland, have invented certain new and useful Improvements in Melting-Pots and Metal-Injecting Mechanisms for Type-Casting Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

One of the objects of this invention is to provide a novel form of melting pot and metal injecting mechanism for type casting machines, which will be simple in construction, thoroughly practical from a manufacturing standpoint, and entirely efficient and positive in action.

A further object is to provide a device, of the character described, provided with a pump plunger for causing a forced feed of the molten metal, in combination with a novel and peculiar form of hollow valve rod for governing the supply and shut off of the molten metal to said pump.

A further object is to provide, in a device of the character described, a choker valve to control the discharge of molten metal to the type mold, and a novel means for governing the movement thereof, said mechanism including safety means, as will be more particularly hereinafter described.

The invention also has in view certain other objects, going to make up the ultimate perfection of the device as an entirety, as will be apparent as the specification proceeds.

The invention is shown in an exemplary form in the accompanying drawings, in which like reference characters designate corresponding parts throughout the several views. The different figures or views may be briefly described as follows:

Figure 1 is a central vertical sectional view of the melting pot and metal injecting mechanism constructed in accordance with my invention, certain parts being shown in elevation, and showing the position of the pump plunger, the hollow valve rod, and the choker valve, at one period of the operation of the device.

Fig. 2 is a similar view showing the position of said parts at a different stage in the operation of the device.

Fig. 3 is a detached detail view, partly in section, of the choker valve spindle and certain related parts.

Fig. 4 is a detached detail view, in front end elevation of the jet nozzle.

Fig. 5 is a fragmentary detached detail view, in side elevation, of the hollow valve rod.

Fig. 6 is a detached detail view, in section, of the mechanism for operating the choker valve spindle, and also showing the safety means.

Fig. 7 is a central vertical sectional view of a slightly modified form of melting pot.

Fig. 8 is a sectional view along the line 8—8 of Fig. 7.

Figs. 9 and 10 are views similar to Figs. 7 and 8, respectively, but showing the position of the moving parts at a different stage in the operation.

Fig. 11 is a view in side elevation of the melting pot, and

Fig. 12 is a sectional view on the line 12—12 of Fig. 11.

Referring now in detail to the drawings, and first to Figs. 1 to 6 inclusive thereof:

1 designates a melting pot, functioning as a storage reservoir for the molten type metal. As shown in the drawings, the melting pot is provided with two vertical cylindrical chambers 23^a and 23^b. The walls of one,—the pump plunger well chamber 23^a,—rise above the inside bottom surface of the pot, and form a guide boss 21 for the pump plunger 22, which has a working fit and is arranged to slide up and down in same.

The other cylindrical chamber 23^b has its upper limit flush with the inside bottom surface of the melting pot and descends a small amount below the extreme bottom of the pump plunger well chamber. The hollow valve rod 23 is arranged to reciprocate in this chamber 23^b.

These two chambers are connected at their lower ends by a single passage 25, which serves as a feed and cutoff port from the main supply of type metal in the pot.

There is also provided a stepped cylindrical chamber 29, located somewhat above the lowermost part of pump plunger well 23^a, the proportions of which are arranged to take a choker valve 37 with a single valve seat on its outer end. The rear portion 36

of the choker valve 37 slidably fits the smaller and innermost diametrical part 35 of the stepped chamber 29, which smaller part acts as a guide for same. The outer part of this stepped chamber extends beyond the outside of the melting pot in the form of a hollow boss 30, and this is threaded for a sufficient amount to take a hollow cylindrical extension piece 31 with a conical nose 33 which acts as a jet nozzle.

This nozzle has thin walls which taper down upon approaching extreme nose, and is further provided at this point with an inner and outer valve seat of beveled construction, the outer seat forming a joint with the mold nipple plate 63, and the internal valve seat is arranged to suit the choker valve, which controls the flow of type metal to the mold, through the opening 34 in the center of the nozzle 33.

The stepped cylindrical chamber is connected at the enlarged space 29, between the choker valve guide portion 35 and the nozzle 33, with an inclined passage 28, whose lower end communicates directly with the pump plunger well 23^a, and connecting passage 25, and which inclined passage serves as a discharge duct for the type metal from the pump plunger well, upon the opening of the choker valve 37, by receding from its seat on the jet nozzle nose 33. 68 designates a balance passage between the choker valve guide portion 35 of the cylindrical chamber and the inclined passage 28. This serves to allow the choker valve body 37 to reciprocate to and from its seat with perfect freedom against accidentally trapped metal at the rear of said choker valve body.

The melting pot is further provided with a hollow boss 40′, extending outside the walls of said melting pot, the central portion of which consists of several successive diameters, and a beveled edge to act as a valve seat. The outside diameter of the innermost portion of this chamber cuts into the nipple valve guide chamber 35, a determined amount controlled by the driving means 40. The boss described is also threaded at the extreme outer part of itself to take a retaining nut.

The driving means 40 or choker valve operating spindle is arranged with a small circular portion, to be supported as a working fit in the extreme innermost diameter of the hollow boss 40′.

The pot is further provided at its upper portion with an outward extending marginal flange 3 through which and through a corresponding flange 4 at the top of the hood 5 passes securing means, such as screws 6, whereby the melting pot is removably attached to said hood and whereby, also, lateral adjustment is permitted.

The hood 5 is an open-ended shell depending below the bottom 2 of pot 1, and is provided in its side walls with an opening 7, normally closed by an observation door 8, hinged as shown at 9, 9, on ears 10, 10, carried by the exterior of the hood. Projecting into the bottom of said hood 5 is a burner 11 carried by a T-union 12, coupled with which are pipes 13 and 14, the pipe 13 constituting a fuel supply pipe and leading from a suitable source of fuel supply, and the pipe 14 being coupled at its end with union 15 in which is screwed a pilot pipe 16 extending upward and provided with a curved upper end projecting through an aperture 18 in the wall of the hood 5.

The hood is preferably formed so as to be swung in the arc of a circle and for this purpose may be provided with a flange 19 (Fig. 11), through which a pivot pin or hinge member may pass for pivoting or hinging said hood 5 to a type casting machine. The hood 5 may also be provided with a flange 20 adapted to engage with a latching device on the type casting machine, so as to secure same against displacement.

The pump plunger 22 is solid, and serves, upon its downward stroke, to eject the type metal, under spring pressure, taken from a driving member when the pot is swung into working position in the machine.

The hollow feed valve rod 23 has a cavity 26 in its lower portion, or even substantially throughout its entire length, and at a suitable distance from the bottom is provided with an elongated port 27, cutting through the circumferential side wall. This rod 23 is arranged to reciprocate, and in so doing, alternately covers and uncovers the port 25, thereby controlling the flow of molten type metal to the pump plunger well 23^a. The path of the metal being from the body of the metal in the pot, through the elongated port 27 in the side wall of the hollow valve rod 23, downward through central cavity 26, along the hollow feed valve well chamber 23^b, through passage 25 and directly into pump plunger well chamber 23^a; and metal continues to flow into this well cavity, as pump plunger rises to make room for same, due to the double influence of gravity and suction, until the hollow feed valve rod 23 descends and shuts off the port 25.

It will be noted that due to its construction, the hollow feed valve rod, is free to rise and fall, and cannot possibly trap any metal, as the central cavity 26 with its elongated port 27, at all times forms a means of escape for any metal in the well cavity 23^b. Also the location of the elongated port 27 is such that at the highest position of the rod 23, it is always possible to drain the pot.

The choker valve 37 is of cylindrical construction and differs from the usual type, inasmuch as it is possessed of only one valve seat, and this controls the discharge and shutoff through the nipple nose, and

does not have anything to do with the feeding of the metal, as in the usual type of choker valve in existing machines, provided with two valve seats one front and one back for this purpose. The choker valve 37 is provided with a transverse notch 38, located in about the center of the body part. This notch 38 is arranged to fit a tooth-shaped portion 39 on the choker valve operating spindle 40. It should be noted that the tooth-shaped part of the choker valve driving spindle is flattened off at the base part entirely across spindle diameter on one side only, the function of this being to aid in disassembling the parts, as upon swinging the pot and removing the jet nozzle, by simply turning the operating valve spindle, so that the flattened portion lies parallel with the axis of choker valve, the choker valve may be withdrawn without taking out or further displacing anything connected with the choker valve operating spindle.

The axis of the choker valve and choker valve operating spindle are, as shown, at right angles to each other, with a small amount of space between the centers. It is evident that the choker valve operator could be placed either above or below, and with the axis displaced from the normal position, and still function correctly. However, the preferred arrangement is with the operating spindle underneath, as shown in Fig. 7.

The driving end of the operating spindle projects through a boss 40′ provided for same, and outside of the melting pot, and is further provided with a valve seat at 40^a to prevent metal leakage, the valve being kept on its seat by means of a spring 40^d and retainer 40^c, and this also tends, through its lapping action, to keep the valve seat in good condition. The diameter at 40^e, beyond the valve seat, is reduced to take a driving pinion 41, which is suitably attached. Extending farther, and properly mounted upon extension bore of the driving pinion 41, is a short arm 64, being locked to same, so that the whole of the three members oscillate as one piece. The function of the short arm is to furnish means for operating choker valve by hand, and also to always tend to close same when melting pot is swung out of mechanical engagement with the type casting machine, the closing force in this case being a helical spring 67 reacting between an adjusting screw 66 on the melting pot hood 5, and the end of the short arm 64.

As before noted, the segmental pinion 41 meshes with a rack 42, carried by a resiliently supported member 43, comprising, as shown, a tubular portion 44, reciprocating in a correspondingly shaped opening 45, extending through a stationary member 46, constituting part of the main body casting of the machine. The member 43 is provided with a longitudinally extending, or axial, opening 47, through which slidably projects a rod 48, carried at its lower end by a head 49. Secured to said plunger, or head 49, as by means of screws 50, is a bracket 51, carrying depending parallel ears 52, in which is supported an axle 53 of a roller 54. The bracket also carries a wing or curved guard 55. The roller 54 is adapted to be engaged by a cam 55′, carried by a cam shaft 56.

Encircling the rod 48 is a coiled spring 57, bearing at one end against the top of the head 49, and at its other end against the top wall of the tubular portion 44 of the member 43.

Keyed to the rod 48, near the top thereof, is a collar 58, between which and a disk 59 on the reduced end of a screw 60, projecting through a portion 61 of the member 46, is a coiled spring 62, which functions to return the rack 42 to normal position after movement thereof through the cam 55′.

In operation, the power of the spring 57 is sufficient to overcome that of the spring 62, the latter being a weaker spring, and, as the roller 54 rides up on the cam 55′, the plunger 49 is raised, and thereby, through the spring 57, the rack 42 is also elevated, rotating the segmental gear 41, thereby turning the spindle 40 and reciprocating the choker valve 36. When the roller 54 becomes disengaged from the cam 55′, the spring 62, which has been compressed by the elevation of the rack 42, functions to move the rod 48 and rack-carrying member 43 and the plunger 49 to normal position. The spring 57 functions as a safety means, in that, should the choker valve operating spindle 40 become jammed, and consequently immovable, preventing movement of the rack-carrying member 43, the rod 48 will slide through the rack-carrying member, the spring 57 compressing. By this arrangement, breaking of the parts is prevented.

Referring now in detail to Figs. 7 to 12 of the drawings:

These figures show a slight modification, in which, instead of the pump and valve being disposed in substantial alinement with the choker valve, as in the preceding figures of the drawings, I dispose the pump 22′ and the valve 23′ on each side of the choker valve 36′, so that the latter occupies a position between the pump and the valve, as shown. Also in this modification, the choker valve operating spindle 40′ is disposed beneath the choker valve 36′, instead of above the same, as in the preceding figures of the drawings. Also, instead of the plunger well 23^b, the port 25′, the valve well 26′ and the inclined passage 28′ being

in the same vertical plane as in the preceding figures of the drawings, said inclined passage 28′ is in this modified form disposed in a vertical plane at right angles to said pump well and valve well. 35′ designates the passage, or recess, in which the choker valve 36′ reciprocates. The operation of this modified form is precisely the same as that described in connection with the forms shown in the preceding figures.

What I claim to be new is:

1. In type casting apparatus, metal injecting mechanism, comprising a melting pot having at its bottom a thickened portion, chambered to provide a pump well and a valve well, a port connecting the said wells, and an exit passage leading from said pump well, a pump, comprising a plunger movable into and out of said pump well, and a valve, comprising a plunger movable into and out of said valve well, so as to close and open passage through said port connecting said valve well and said pump well, said valve plunger being provided with a hollow portion extending from its bottom and communicating in all positions of movements of said valve with the interior of said melting pot.

2. In type casting apparatus, metal injecting mechanism, comprising a melting pot having at its bottom a thickened portion, chambered to provide a pump well and a valve well, a port connecting the said wells, an exit passage leading from said pump well, a pump, comprising a plunger movable into and out of said pump well, and a valve, comprising a plunger movable into and out of said valve well, so as to close and open passage through said port connecting said valve well and said pump well, said valve plunger being provided with a hollow portion extending from its bottom, said valve being provided with a slot in the wall of said hollow portion, communicating in all positions of movement of said valve with the interior of said melting pot.

3. In type casting apparatus, metal injecting mechanism, comprising a melting pot having at its bottom a thickened portion, chambered to provide a pump well and a valve well, a port connecting the said wells, an exit passage leading from said pump well, a pump, comprising a plunger movable into and out of said pump well, and a valve, comprising a plunger movable into and out of said valve well, so as to close and open passage through said port connecting said valve well and said pump well, said valve plunger being provided with a hollow portion extending from its bottom, and communicating in all positions of movements of said valve with the interior of said melting pot, said melting pot carrying a nozzle communicating with said exit passage.

4. In type casting apparatus, metal injecting mechanism, comprising a melting pot having at its bottom a thickened portion, chambered to provide a pump well and a valve well, a port connecting the said wells, an exit passage leading from said pump well, a pump, comprising a plunger movable into and out of said pump well, and a valve, comprising a plunger movable into and out of said valve well, so as to close and open passage through said port connecting said valve well and said pump well, said valve plunger being provided with a hollow portion extending from its bottom, and communicating in all positions of movements of said valve with the interior of said melting pot, said melting pot carrying a nozzle communicating with said exit passage, and a choker valve adapted to control passage through said nozzle.

5. In metal injecting mechanism for type casting machines the combination with a melting pot, of a choker valve controlling the exit of metal from said pot, and mechanism for governing the movement of said choker valve, including an operating spindle rotatably mounted in said melting pot and engaging said choker valve, a segmental gear carried by said spindle and a cam controlled rack meshing with said gear.

6. In metal injecting mechanism for type casting machines, the combination with a melting pot, of a choker valve, controlling the exit of metal from said pot, and means for actuating said choker valve, comprising an operating spindle, rotatably mounted in said pot and engaging said choker valve, a segmental gear carried by said spindle, a rack meshing with said gear, a cam actuated plunger, and a yielding connection between said plunger and said rack.

7. In metal injecting mechanism for type casting machines, the combination with a melting pot, of a choker valve controlling the exit of molten metal from said pot, and mechanism for actuating said choker valve, comprising an operating spindle, rotatably mounted in said pot and engaging said choker valve, a segmental gear carried by said spindle, a rack meshing with said gear, a cam controlled plunger carrying a rod, slidably projecting through said rack, and a yielding connection between said plunger and said rack.

8. In metal injecting mechanism for type casting machines, the combination with a melting pot, pivoted so as to be swung, of a choker valve controlling the exit of molten metal from said pot, mechanism for actuating said choker valve, comprising an operating spindle rotatably mounted in said

pot, and engaging said choker valve, a segmental gear carried by said spindle, a rack meshing with said gear, cam operated mechanism for reciprocating said rack, and safety means operating to close said choker valve when the melting pot is swung to disengage said gear from said rack.

9. In metal injecting mechanism for type casting machines, the combination with a melting pot, pivoted so as to be swung, of a choker valve controlling the exit of molten metal from said pot, mechanism for actuating said choker valve, comprising an operating spindle rotatably mounted in said pot, and engaging said choker valve, a segmental gear carried by said spindle, a rack meshing with said gear, cam operated mechanism for reciprocating said rack, and safety means operating to close said choker valve when the melting pot is swung to disengage said gear from said rack, said safety means comprising an arm carried by said spindle and spring means for moving said arm to rotate said spindle to close said choker valve when the gear is disengaged from said rack.

10. A type-casting metal-injecting mechanism, comprising a melting pot, a cylindrical chamber in the lower portion of the same, a pump-rod reciprocating in said chamber, a parallel cylindrical chamber having its bottom on a lower level than said first-mentioned cylindrical chamber, a hollow valve-rod movable in said parallel chamber and having a transverse port through the wall of said hollow portion thereof, a passage connecting the bottom ends of said parallel chambers, a third chamber of different diameters positioned above the bottom of the pump rod chamber, a cylindrical valve reciprocating in said third chamber and guided in its movements by the smaller diameter of said third chamber, and an inclined passage connecting the enlarged diameter of said third chamber with the pump-rod chamber.

11. In type-casting apparatus, metal injecting mechanism, comprising a metal pot, two vertical, parallel, cylindrical chambers in the lower portion of the pot, a solid rod reciprocating in one of said chambers, a hollow rod reciprocating in the other of said chambers, a cylindrical passage of varying diameters disposed at right angles to said parallel chambers and disposed in a plane above the bottom of said parallel cylinders, a cylindrical one-seated valve, functioning as a choker-valve, reciprocating in said right-angled passage and guided in its movements by the smaller diameter thereof, and having a transverse groove for engagement by valve-operating means, and having a reduced, tapering portion projecting into the larger diameter of said right-angled passage, a hollow nozzle secured to the end of the larger diameter of said right-angled passage, the outer portion of said hollow nozzle being provided with inner and outer valve-seats, the inner valve-seat fitting the end of the tapering portion of said choker-valve and forming a seat for the same, said nozzle being provided with an axial hole in the end thereof, constituting an exit passage when the choker-valve recedes from its seat.

12. In type-metal injecting mechanism for type-casting machines, the combination of a melting pot, a single-ended choker-valve controlling exit of metal from said pot and provided with a transverse notch for engagement with a tooth forming part of an operating-spindle arranged to oscillate, a valve-seat on the operating valve-spindle to function against leakage of type metal, a segmental pinion for externally operating the said spindle, a spring to hold valve-seat portion of operating spindle in contact with its seat, an extension arm tending to return operating spindle to its original position before displacement, and a spring in conjunction with same to assist in this function.

13. In a melting pot injecting mechanism for type casting machines, the combination of a melting pot, of a single-ended choker-valve controlling discharge of molten metal from said pot, said choker-valve being provided with a transverse notch for engagement by a tooth-shaped member, said tooth being formed by cutting away metal from one side of the tooth-form, thereby allowing the removal of the choker-valve by oscillating operating spindle through an arc greater than the working arc in one direction, so that the flattened off part lies parallel with the axis of choker-valve, thereby allowing the choker-valve to be withdrawn without displacing anything connected with the choker-valve operating spindle.

In testimony whereof I hereunto affix my signature.

JAMES THOMAS CARTER.