May 8, 1934. F. A. FOSTER ET AL 1,957,453

CASTING MACHINE FOR STEREOTYPE PLATES

Filed Aug. 22, 1932 5 Sheets-Sheet 1

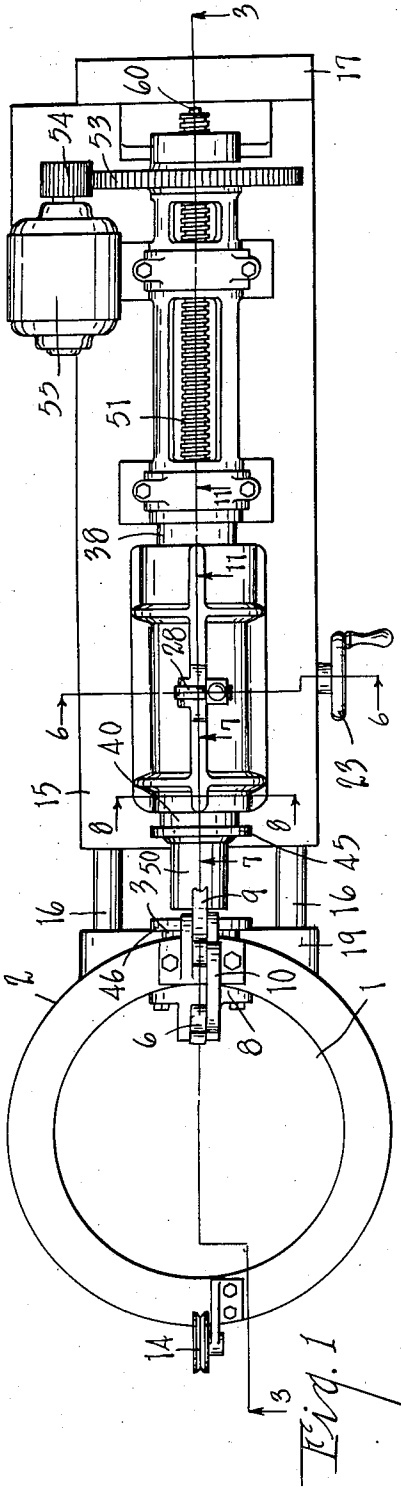


Fig. 1

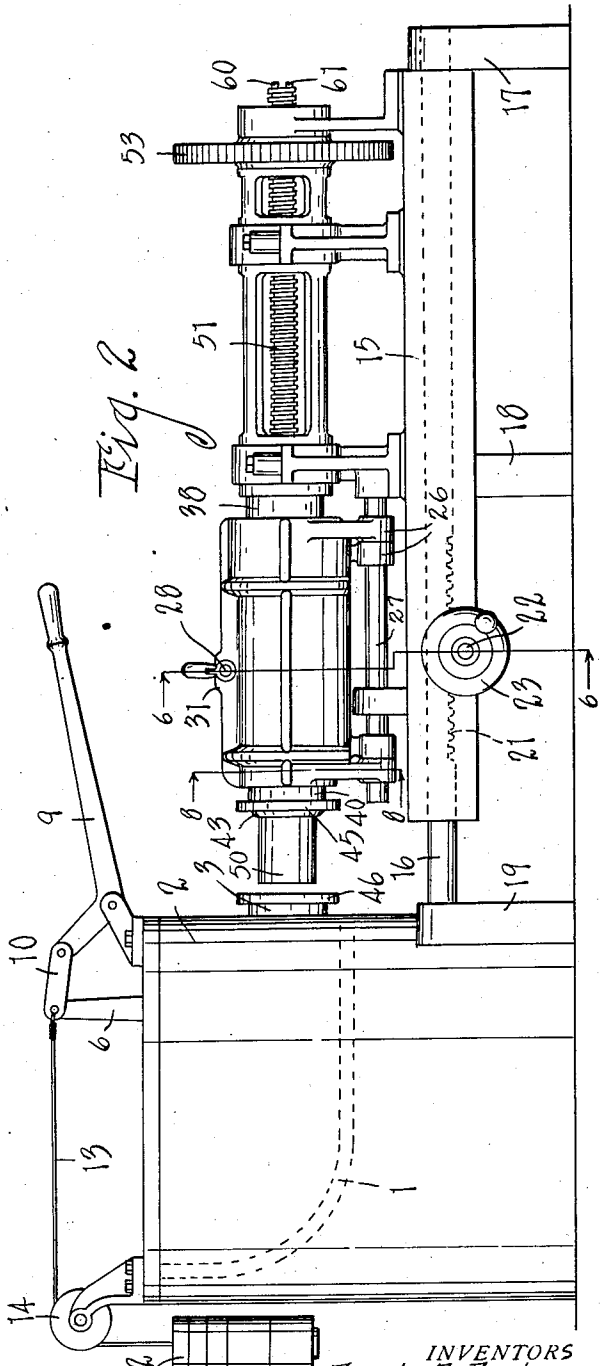


Fig. 2

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Filed Aug. 22, 1932 5 Sheets-Sheet 2

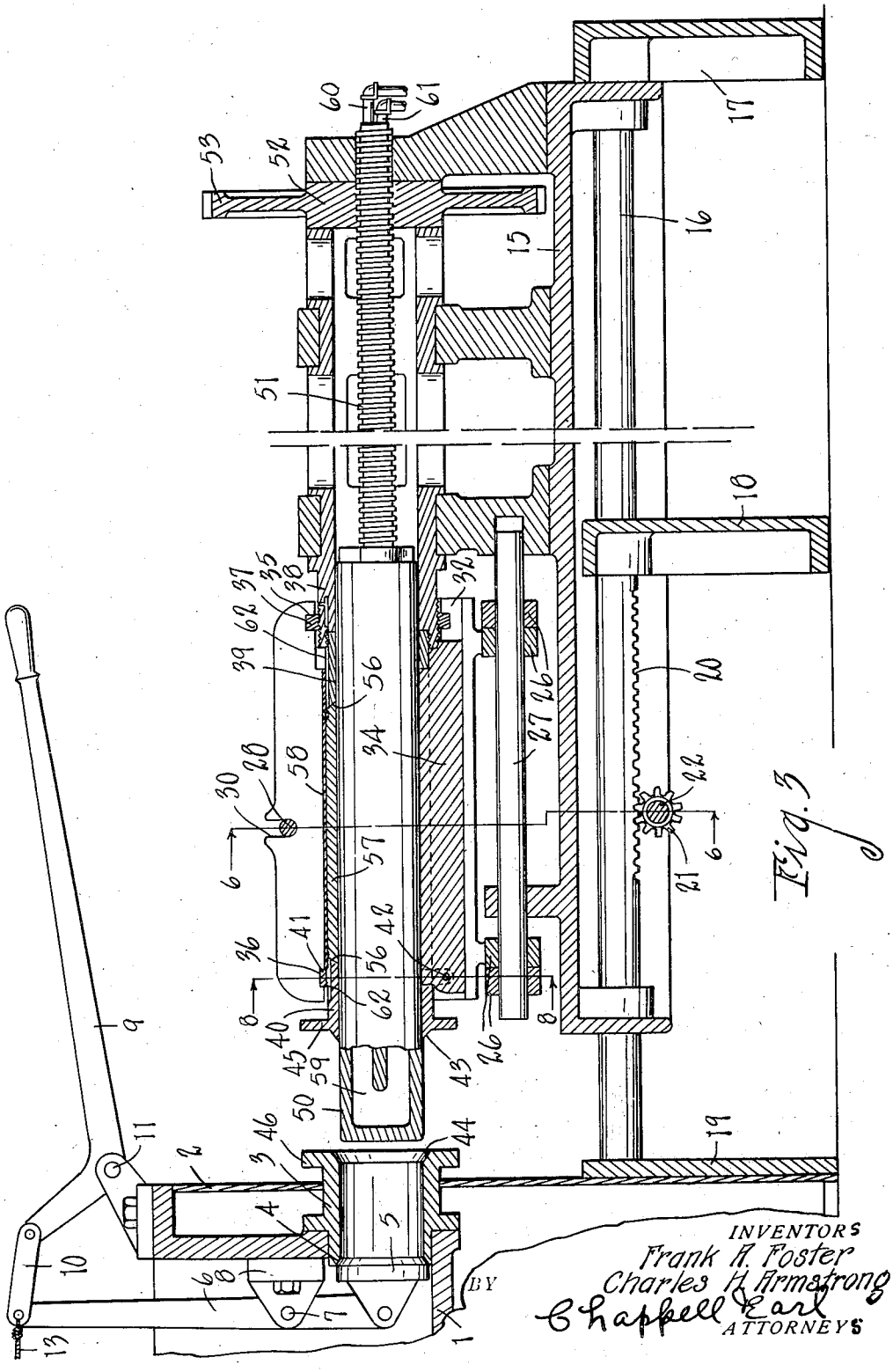


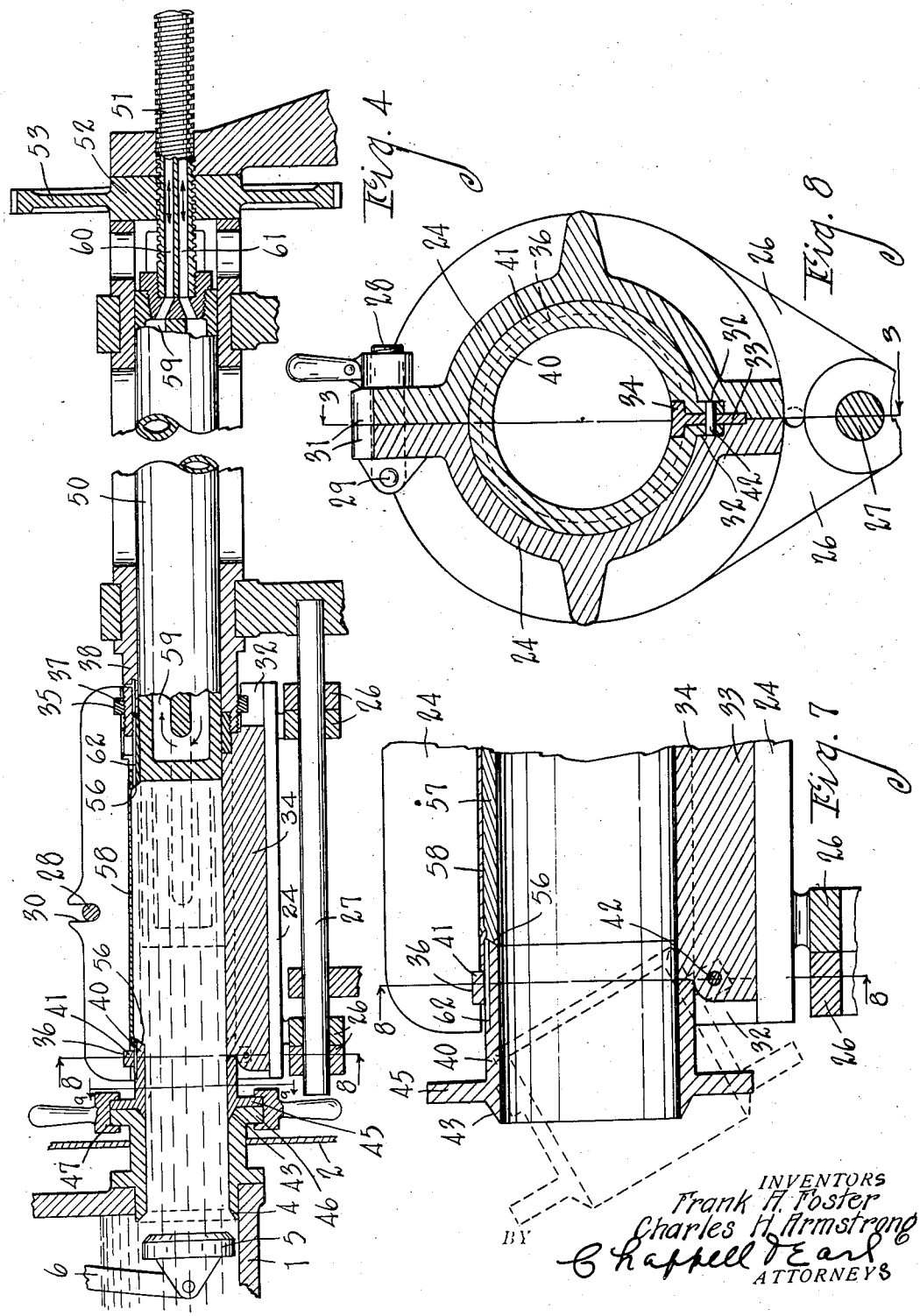
Fig. 3

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Filed Aug. 22, 1932 5 Sheets-Sheet 3



May 8, 1934. F. A. FOSTER ET AL 1,957,453

CASTING MACHINE FOR STEREOTYPE PLATES

Filed Aug. 22, 1932 5 Sheets-Sheet 4

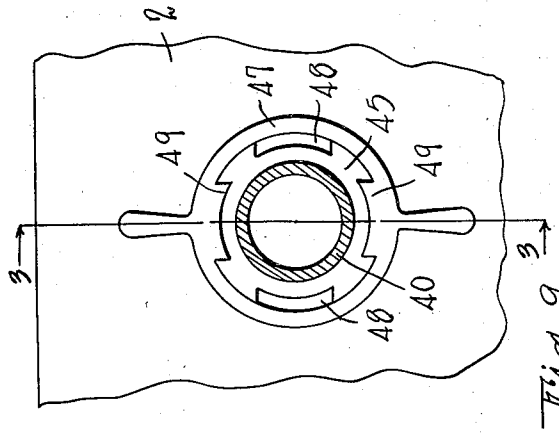


Fig. 9

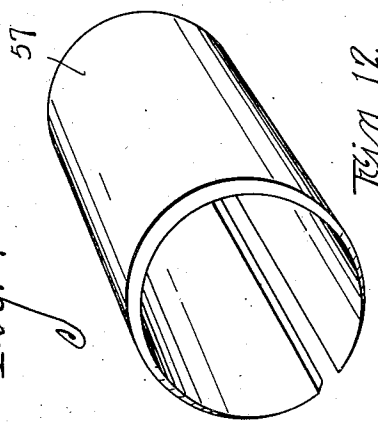


Fig. 12

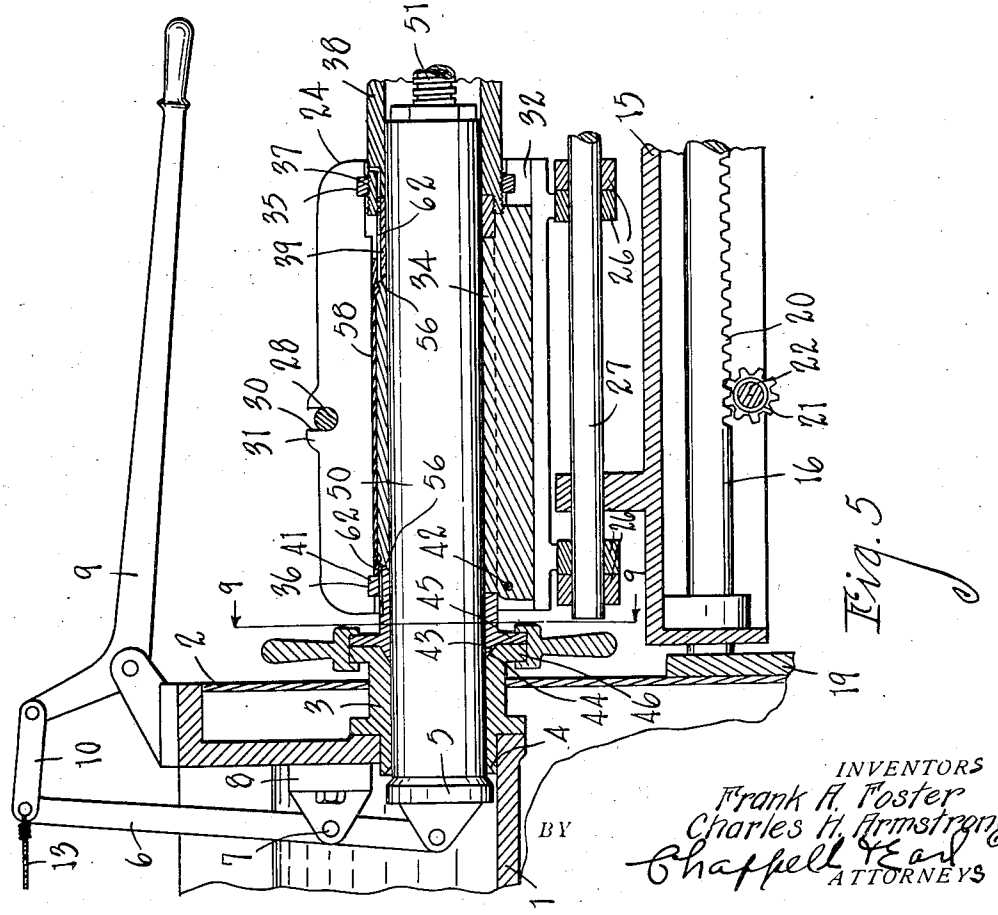


Fig. 5

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Filed Aug. 22, 1932 5 Sheets-Sheet 5

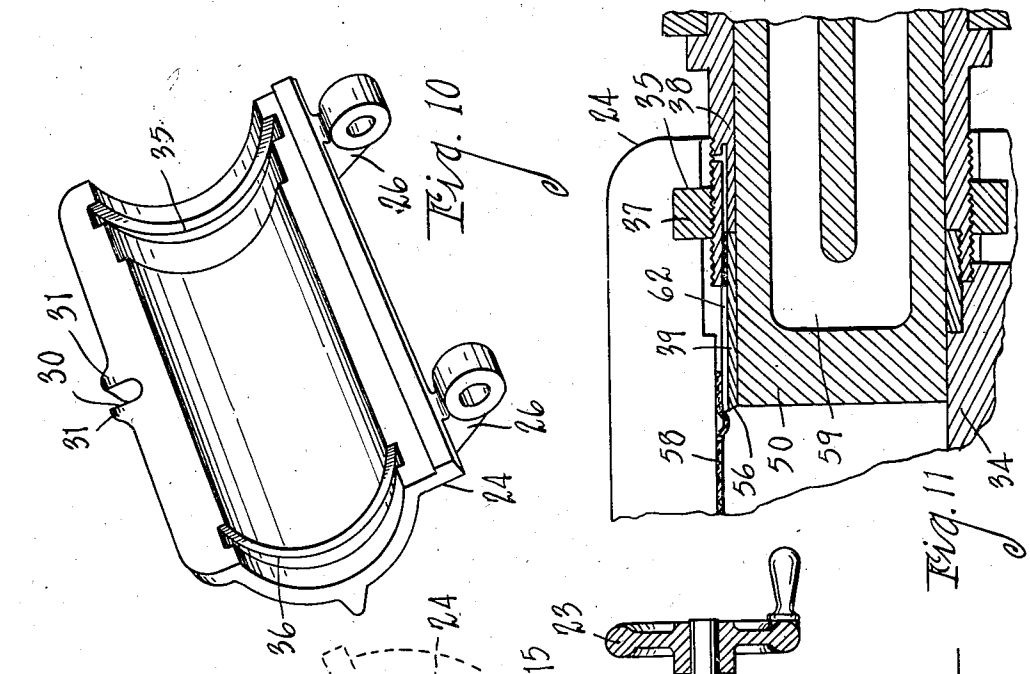


Fig. 10

Fig. 11

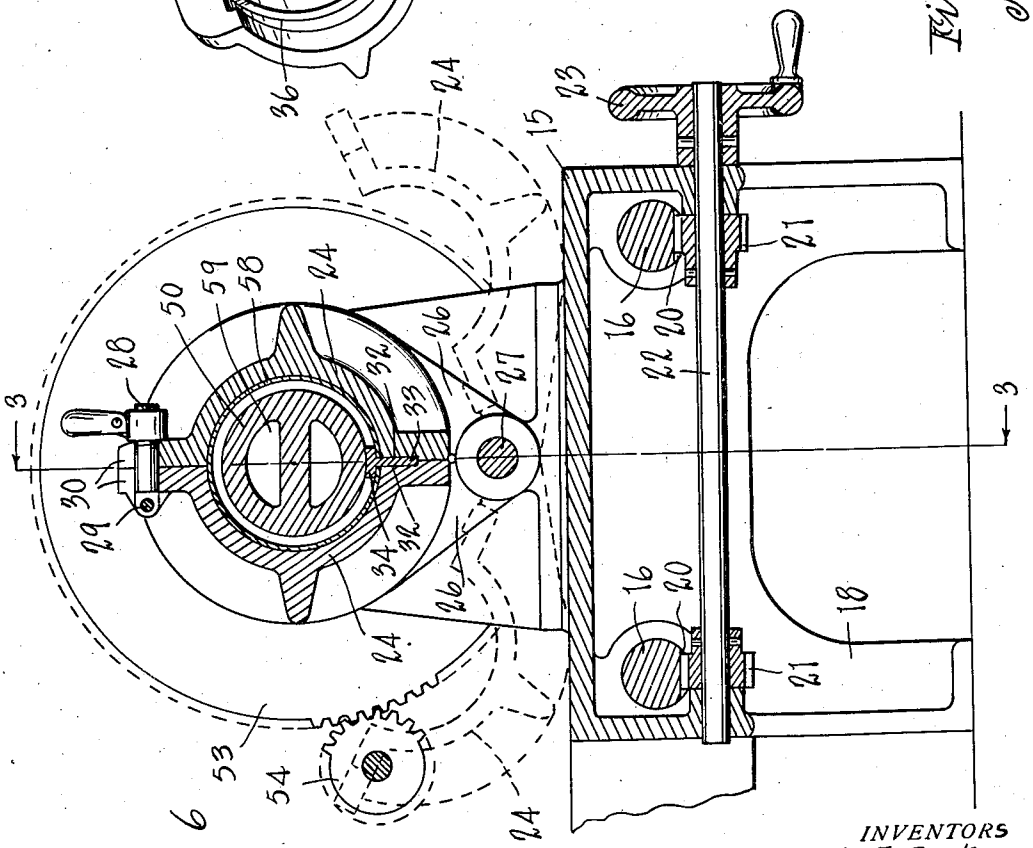


Fig. 6

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UNITED STATES PATENT OFFICE

1,957,453

CASTING MACHINE FOR STEREOTYPE PLATES

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Application August 22, 1932, Serial No. 629,826

33 Claims. (Cl. 22—2)

The main objects of this invention are:

First, to provide a casting machine for stereotype plates and the like in which the plates are cast or formed under pressure.

Second, to provide a casting machine in which a relatively large volume of molten metal is introduced in the mold or casting chamber in which the matrix is positioned, so that the parts are heated to such an extent that there is no premature chilling or congealing of the metal in contact with the face of the matrix before the metal has had opportunity to enter all of the indentures or interstices of the matrix.

Third, to provide a casting machine in which the parts are so arranged that a relatively large volume of metal is placed under pressure during the casting operation, forcing the matrix firmly against the walls of the casting box or chamber and also producing castings of proper interior diameter so that machining is unnecessary.

Fourth, to provide a casting machine in which the casting is firmly supported under pressure while congealing, thereby preventing distortion.

Fifth to provide a casting machine which enables the perfect reproduction of the matrix with the molten metal under controlled pressure thereby preventing "chills" and "shrinks" common in plates cast by the usual methods.

Sixth, to provide an apparatus having these advantages in which the excess metal is returned to the metal pot, the metal forming the casting being trapped off from the metal pot and held under pressure until the pressure is relieved by the cooling of the metal.

Seventh, to provide a machine having these advantages in which the plates of various types may be formed, either segmental plates or otherwise, as desired.

Eighth, to provide a casting machine which is of large capacity and largely automatic in operation.

Objects pertaining to details and economies of the invention will definitely appear from the description to follow. The invention is defined in the claims.

A structure embodying the features of the invention is clearly illustrated in the accompanying drawings, in which:

Fig. 1 is a plan view of a casting machine embodying the features of this invention, the valve control lever and counterweight being omitted, the valve lever sectioned, the casting box carriage being retracted, and the plunger in its partially advanced position.

Fig. 2 is a side elevation with the parts in position shown in Fig. 1.

Fig. 3 is an enlarged fragmentary view mainly in central longitudinal section on a line corresponding to line 3—3 of Figs. 1, 6, 8 and 9.

Fig. 4 is an enlarged fragmentary longitudinal section with the parts in casting position and the casting chamber or mold filled with molten metal.

Fig. 5 is a fragmentary longitudinal section corresponding to that of Fig. 4 with the plunger in advanced position.

Fig. 6 is an enlarged fragmentary transverse section on line 6—6 of Figs. 1 and 3, the casting box being shown in closed position by full lines and in open position by dotted lines.

Fig. 7 is an enlarged detail section showing the inner mold box end members or rings in closed position by dotted lines and in open position by full lines.

Fig. 8 is a detail section on line 8—8 of Figs. 3, 4 and 7.

Fig. 9 is a detail view partially in section on line 9—9 of Figs. 4 and 5.

Fig. 10 is an inside perspective view of one of the mold box or casting chamber sections.

Fig. 11 is an enlarged detail section on line 11—11 of Fig. 1 showing details of the adjustable end ring of the casting chamber or box.

Fig. 12 is a perspective view of a completed stereotyped plate of the cylinder type.

In the embodiment of the invention illustrated there is a metal pot 1 of substantial capacity, the heating means not being illustrated. This metal pot is supported in a cylindrical housing 2. The pot has a cylindrical outlet 3 having an inwardly facing valve seat 4 at its inner end controlled by the valve 5 mounted on a lever 6 pivoted at 7 to the bracket 8 and operatively connected to the hand lever 9 by means of the link 10. The lever is pivoted at 11 to project into convenient position for manipulation.

A weight 12 is connected to the valve lever 6 by means of the cable 13 passing over the guide pulley 14. The weight is preferably made up of several sections or parts so that it may be increased or diminished as desired by adding or removing the parts.

The carriage 15 on which the casting box and coacting parts are mounted is carried by the rails 16 mounted on the pedestal members 17, 18 and 19. This carriage is slidable or reciprocable toward and from the metal pot, the rails or ways 16 being provided with racks 20 coacting with the pinions 21 on the transversely disposed shaft

22 having a handwheel 23 at its outer end so that by manipulation thereof the carriage is moved to casting position as shown in Fig. 5, for example, or retracted to the position shown in Fig. 1, for example.

The casting box in the embodiment illustrated comprises a pair of complementary sections 24 having pivot arms 26 mounted on the pivot rod 27, which is in turn mounted on or carried by the carriage. The casting box sections 24 are secured in their closed position by means of threaded latch 28 pivoted at 29 on one of the sections 24 and adapted to swing through registering notches 30 on the flanges 31 at the top of the casting box members. The casting box members are recessed at 32 to receive the web 33 of the margin bar 34, this bar being of T shape or cross section, see Fig. 6.

The casting box members have internal grooves 35 and 36, the grooves 35 being adapted to receive or close over the end ring 37 which is threaded for adjustment on the inner end of the plunger guide 38. A relatively fixed casting box end ring or bevel ring 39 is threaded into the end of this plunger guide 38. A pivoted casting box end ring or bevel ring 40 is provided at the opposite end of the casting box, this ring having an annular rib 41 adapted to engage or be received in the grooves 36 in the casting box sections 24. The ring 40 is pivoted at 42 on the end of the margin bar 34.

This ring 40 has a beveled pilot 43 adapted to coact with the beveled seat 44 in the metal pot outlet 3. The ring 40 also has a flange 45 while the metal box outlet 3 has a meeting flange 46 when the parts are in casting position, a lock 47 being provided for clamping the parts in casting position as shown in Fig. 4. This clamping ring is rotatably mounted on the flange 46 and the flange 45 has notches 48 in the periphery thereof adapted to receive the locking lugs 49 of this locking ring. These lugs are cammed so that the parts are clamped together.

The plunger guide 38 is in axial alinement with the metal pot outlet 3, the casting box being in axial alinement with the plunger guide and this discharge 3, so the plunger 50 is, on the casting operation, forced through the casting box into the discharge 3, returning all excess metal from the casting box into the melting pot. The fully projected portion of the plunger is shown in Fig. 5. The plunger is a sliding fit, not only in the guide but in the casting box end members 39 and 40 and the discharge 3.

The plunger actuating screw 51 is provided with a driving nut 52 which constitutes the hub of a gear 53 meshing with a gear 54 on the shaft of the motor 55. The inner ends of the members 39 and 40 are beveled at 56 to provide end bevels on the plate or casting 57. The matrix is indicated at 58. The plunger has cooling fluid circulating passages 59 therein, the inlet and discharge connections 60, 61 being provided for these passages. The passages in this embodiment extend through the driving screw or worm. A vent 62 is provided at the top of the casting box.

The machine may be operated as follows:

With the casting box and plunger retracted, the casting box members 24 are swung to their open position as shown by dotted lines in Fig. 6 and the end member 40 adjusted to closed or operative position. One edge of the matrix 58 is then arranged under the matrix clamp or margin bar 34. The matrix is then wrapped around the end members 39 and 40 and its opposite end or tail engaged under the opposite edge of the margin bar as shown in Fig. 6. The casting box members are then closed and locked in closed position as described and as shown by full lines in Fig. 6. The matrix is thus formed and supported in cylindrical shape.

The casting box carriage is then advanced to casting position as shown in Fig. 4, the pilot of the casting box end member 40 entering and fitting in the recess 44. The parts are locked in this position by means of the lock 47. The valve 5 is then opened allowing the metal from the pot to enter and entirely fill the casting box chamber, the confined air therein escaping through the vent 62.

It will be noted that there is a large volume of metal within the casting chamber under pressure from the head of metal in the melting pot and this effectively heats the casting chamber walls, preventing chills and permitting the molten metal to fill all the interstices of the matrix, and forces the matrix firmly against its supporting walls so that the resulting casting is a perfect reproduction of the detail of the matrix and of perfect cylindrical shape.

After a suitable interval the valve 5 is allowed to close and is urged to closed position by yielding means such as the weight 12, and the plunger is actuated so that controlled pressure is brought to bear on the molten metal, forcing it into the slightest indentations of the matrix and returning all excess metal into the pot.

The diameter of the plunger corresponds to that of the plate cylinder on which the plate is to be used so that the plate fits the cylinder perfectly and machining is unnecessary. It will be observed that while the molten metal is under this pressure the portion not returned to the melting pot remains under pressure until such pressure is relieved by the shrinkage of the metal in cooling.

At a suitable interval after the plunger is in its completely actuated position the cooling is extended by allowing the cooling fluid, such as water, to flow through the plunger. The result is that the machine is capable of a very large production.

After the plate has cooled the plunger and carriage are retracted, the casting box members 24 opened and the end member 40 swung to open position which permits the ready removal of the casting.

The castings, as stated, require no machining or trimming other than possibly a slight flash. The inside diameter and curve of the plate is correct to fit the press cylinder and the ends have the proper bevel to receive the clip plates of the cylinder.

The machine illustrated is designed for the casting of complete or cylindrical plates but it will be understood that by proper modification of the casting box any desired segment or shape may be cast. The castings are of very high quality in that perfect reproductions of the matrix are had; they are of uniform density and cannot warp or distort in cooling as the metal is, as stated, held under pressure until that pressure is relieved by shrinkage of the metal, and this occurs while supported by the plunger and the casting box walls.

We have illustrated and described our improvements in a highly practical embodiment. We have not attempted to illustrate or describe certain modifications or adaptations which we contemplate, or the modifications in structural details which might be required for different plates,

as it is believed that such modifications will be readily understood from the disclosure made.

Having thus described out invention what we claim as new and desire to secure by Letters Patent is:

1. In a casting machine, the combination of a metal pot having a discharge provided with an inwardly facing valve seat at its inner end and with a flange and an outwardly facing conical pilot recess at its outer end, an inwardly opening valve coacting with said seat, a casting box carriage mounted to reciprocate in a plane parallel to the axis of said discharge, a pair of complementary segmental casting box side members pivotally mounted on said carriage, a margin bar of T cross section, said side members being recessed at their pivot edges to receive the web of said margin bar, an annular casting box end member pivoted on said margin bar and provided with a tapered pilot coacting with the pilot recess of said metal pot discharge and having a flange at its outer end abutting the flange on said conduit when the parts are adjusted to casting position, means for detachably securing said flanges together, a plunger guide mounted on said carriage and axially alined with the said discharge, a casting box end ring mounted on said guide, a ring threaded for adjustment on said guide, said pivoted end member having an annular rib and said casting box side members having grooves to receive said ring and rib when the casting box is closed, means for reciprocating said carriage, and a casting plunger adapted to reciprocate through said casting box and into said metal pot discharge to return excess metal to the metal pot.

2. In a casting machine, the combination of a metal pot having a discharge provided with an inwardly facing valve seat at its inner end and with a flange and an outwardly facing conical pilot recess at its outer end, an inwardly opening valve coacting with said seat, a casting box carriage mounted to reciprocate in a plane parallel to the axis of said discharge, a pair of complementary segmental casting box side members pivotally mounted on said carriage, a margin bar of T cross section, said side members being recessed at their pivot edges to receive the web of said margin bar, an annular casting box end member pivoted on said margin bar and provided with a tapered pilot coacting with the pilot recess of said metal pot discharge and having a flange at its outer end abutting the flange on said conduit when the parts are adjusted to casting position, means for detachably securing said flanges together, a plunger guide mounted on said carriage and axially alined with the said discharge, a casting box end ring mounted on said guide, means for reciprocating said carriage, and a casting plunger adapted to reciprocate through said casting box and into said metal pot discharge to return excess metal to the metal pot.

3. In a casting machine, the combination of a metal pot having a discharge provided with an inwardly facing valve seat at its inner end and with an outwardly facing conical pilot recess at its outer end, an inwardly opening valve coacting with said seat, a casting box carriage mounted to reciprocate in a plane parallel to the axis of said discharge, a pair of complementary segmental casting box side members pivotally mounted on said carriage, a margin bar of T cross section, said side members being recessed at their pivot edges to receive the web of said margin bar, an annular casting box end member pivoted on said margin bar and provided with a tapered pilot coacting with the pilot recess of said metal pot discharge, a plunger guide mounted on said carriage and axially alined with the said discharge, a casting box end ring mounted on said guide, a ring threaded for adjustment on said guide, said pivoted end member having an annular rib and said casting box side members having grooves to receive said ring and rib when the casting box is closed, means for reciprocating said carriage, and a casting plunger adapted to reciprocate through said casting box and into said metal pot discharge to return excess metal to the metal pot.

4. In a casting machine, the combination of a metal pot having a discharge provided with an inwardly facing valve seat at its inner end and with an outwardly facing conical pilot recess at its outer end, an inwardly opening valve coacting with said seat, a casting box carriage mounted to reciprocate in a plane parallel to the axis of said discharge, a pair of complementary segmental casting box side members pivotally mounted on said carriage, a margin bar of T cross section, said side members being recessed at their pivot edges to receive the web of said margin bar and provided with a tapered pilot coacting with the pilot recess of said metal pot discharge, a plunger guide mounted on said carriage and axially alined with the said discharge, a casting box end ring mounted on said guide, means for reciprocating said carriage, and a casting plunger adapted to reciprocate through said casting box and into said metal pot discharge to return excess metal to the metal pot.

5. In a casting machine, the combination of a metal pot having a discharge provided with an inwardly opening valve and with a pilot recess at its outer end, a casting box carriage mounted to reciprocate in a plane parallel to the axis of said discharge, a pair of complementary segmental casting box side members pivotally mounted on said carriage, an annular pivotally mounted casting box end member provided with a pilot coacting with the said metal pot discharge when the parts are adjusted to casting position, a plunger guide mounted on said carriage and axially alined with the discharge and casting box, a casting box end member mounted on said guide, a ring threaded for adjustment on said guide, said pivoted end member having an annular rib and said casting box side members having grooves to receive said ring and rib when the casting box is closed, and a casting plunger adapted to reciprocate through said casting box and into said metal pot discharge to return excess metal to the metal pot.

6. In a casting machine, the combination of a metal pot having a discharge provided with an inwardly opening valve and with a pilot recess at its outer end, a casting box carriage mounted to reciprocate in a plane parallel to the axis of said discharge, a pair of complementary segmental casting box side members pivotally mounted on said carriage, an annular pivotally mounted casting box end member provided with a pilot coacting with the said metal pot discharge when the parts are adjusted to casting position, a plunger guide mounted on said carriage and axially alined with the discharge and casting box, a casting box end member mounted on said guide, and a casting plunger adapted to reciprocate through said casting box and into said metal pot discharge to return excess metal to the metal pot.

7. In a casting machine, the combination of a metal pot having a discharge provided with an inwardly opening valve and with a pilot recess at its

outer end, variable means urging said valve toward its seat, a casting box carriage mounted to reciprocate in a plane parallel to the axis of said discharge, a pair of complementary segmental casting box side members pivotally mounted on said carriage, an annular pivotally mounted casting box end member provided with a pilot coacting with the said metal pot discharge when the parts are adjusted to casting position, a plunger guide mounted on said carriage and axially alined with the discharge and casting box, a casting box end member mounted on said guide, and a casting plunger adapted to reciprocate through said casting box and into said metal pot discharge to return excess metal to the metal pot.

8. In a casting machine, the combination of a metal pot having a valved discharge, means urging valve to its seat, a casting box carriage, a casting box comprising side members adjustably mounted on said carriage, an adjustably mounted casting box end member, a plunger guide mounted on said carriage, a casting box end member mounted on said guide, a ring threaded for adjustment on said guide, said adjustably mounted end member having an annular rib and said casting box side members having grooves to receive said ring and rib when the casting box is closed, and a casting plunger adapted to reciprocate through said casting box and into said metal pot discharge to return excess metal to the metal pot.

9. In a casting machine, the combination of a metal pot having a valved discharge, means urging said valve to its seat, a casting box carriage, a casting box comprising side members adjustably mounted on said carriage, an adjustably mounted casting box end member, a plunger guide mounted on said carriage, a casting box end member mounted on said guide, and a casting plunger adapted to reciprocate through said casting box and into said metal pot discharge to return excess metal to the metal pot.

10. In a casting machine, the combination of a metal pot having a laterally disposed discharge provided with an inwardly opening valve at its inner end, variable pressure means for urging said valve to its seat, a casting box carriage mounted to reciprocate in a plane parallel to the axis of said discharge, a casting box mounted on said carriage and communicating with said discharge when the carriage is adjusted to casting position, a plunger and coacting guide carried by said carriage and operatively associated with said casting box so that the plunger can be retracted to permit the molten metal to flow from said metal pot into the casting box, and means for actuating said plunger through said casting box and into said discharge whereby excess metal is returned to said metal pot against the pressure of the metal in said pot and on said valve.

11. In a casting machine, the combination of a metal pot having a laterally disposed discharge provided with an inwardly opening valve at its inner end, a casting box carriage mounted to reciprocate in a plane parallel to the axis of said discharge, a casting box mounted on said carriage and communicating with said discharge when the carriage is adjusted to casting position, a plunger and coacting guide carried by said carriage and operatively associated with said casting box so that the plunger can be retracted to permit the molten metal to flow from said metal pot into the casting box, and means for actuating said plunger through said casting box and into said discharge whereby excess metal is returned to said metal pot.

12. In a casting machine, the combination of a metal pot having a laterally disposed discharge provided with an inwardly opening valve at its inner end, variable pressure means for urging said valve to its seat, a casting box communication with said discharge, a plunger and coacting guide operatively associated with said casting box so that the plunger can be retracted to permit the molten metal to flow from said metal pot into the casting box, and means for actuating said plunger through said casting box and into said discharge whereby excess metal is returned to said metal pot against the pressure of the metal in said pot and on said valve.

13. In a casting machine, the combination of a metal pot having a laterally disposed discharge provided with an inwardly opening valve at its inner end, a casting box communicating with said discharge, a plunger and coacting guide operatively associated with said casting box so that the plunger can be retracted to permit the molten metal to flow from said metal pot into the casting box, and means for actuating said plunger through said casting box and into said discharge whereby excess metal is returned to said metal pot.

14. In a casting machine, the combination of a metal pot having a gravity discharge provided with an inwardly opening valve, means for urging said valve to its seat, a casting box operatively associated with said discharge, a plunger operatively associated with said casting box so that the plunger can be retracted to permit the molten metal to flow from said metal pot into the casting box, and means for actuating said plunger whereby excess metal is returned to said metal pot against the pressure of the metal in said pot and on said valve.

15. In a casting machine, the combination of a metal pot having a gravity discharge provided with a valve, means urging said valve to closed position, a casting box operatively associated with said discharge, a plunger operatively associated with said casting box for reciprocatory movement therein so that the plunger can be retracted to permit the molten metal to flow from said metal pot into the casting box, and means for actuating said plunger whereby excess metal is returned to said metal pot against the pressure of the metal in said pot and on said valve.

16. In a casting machine, the combination of a metal pot, a casting box operatively connected therewith so that the molten metal will flow by gravity into said casting box, a valve in the connection between the pot and box and biased to close in the direction of the gravity flow, and a water-cooled plunger operatively associated with said casting box for reciprocatory movement therein and adapted when actuated to return excess metal from the casting box to the metal pot against the action of gravity and of said valve.

17. In a casting machine, the combination of a metal pot, a casting box operatively connected therewith so that the molten metal will flow by gravity into said casting box, a valve at the inlet of said box, a plunger operatively associated with said casting box for reciprocatory movement therein and adapted when actuated to return excess metal from the casting box to the metal pot, and means urging said valve to closed position, the end of said plunger coacting with the face of said valve, whereby when the plunger begins to retract at the end of its stroke, the

valve follows and closes to prevent the molten metal from entering the box after the plunger.

18. In a casting machine, the combination of a casting box, means operatively associated therewith for supplying fluid thereto and adapted to receive the excess fluid therefrom, a plunger operatively associated with said casting box for reciprocatory movement therein and acting when actuated to return the excess fluid to the source of supply, and pressure means resisting the return of such fluid whereby pressure is maintained during the actuation of the plunger.

19. In a casting machine, the combination of a casting box, means operatively associated therewith for supplying molten metal thereto and adapted to receive the excess molten metal therefrom, a plunger operatively associated with said casting box for reciprocatory movement therein and acting when actuated to return the excess metal to the source of supply, and a valve at the inlet end of said box, the valve and plunger having coacting faces of equal area whereby the valve follows the retreating plunger and closes before any molten metal enters the box.

20. In a casting machine, the combination of a metal pot having a horizontally disposed discharge conduit provided with an inwardly opening valve, variable means for urging said valve to its seat, a casting box carriage reciprocating in a plane parallel to the axis of said discharge, a casting box, means for adjusting said carriage to bring said casting box into communicating relation with said discharge when the casting box is in erected position, means for securing said casting box in casting position, and a plunger operatively associated with said casting box and constituting a closure for the outer end thereof when the plunger is retracted so that molten metal may be permitted to flow from the metal pot into the casting box, said plunger when actuated returning the excess metal to said pot against the head of metal therein and the pressure on said valve.

21. In a casting machine, the combination of a metal pot having a discharge conduit, a casting box carriage reciprocating in a plane parallel to the axis of said discharge, a casting box, means for adjusting said carriage to bring said casting box into communicating relation with said discharge when the casting box is in erected position, means for securing said casting box in casting position, and a plunger operatively associated with said casting box and constituting a closure for the outer end thereof when the plunger is retracted so that molten metal may be permitted to flow from the metal pot into the casting box, said plunger when actuated returning the excess metal to said metal pot.

22. In a casting machine, the combination of a casting box carriage, a casting box comprising coacting members mounted on said carriage for adjustment when the carriage is in retracted position, means for adjusting said carriage to bring the casting box into communicating relation with said metal pot, and a plunger operatively associated with said casting box and constituting a closure for the outer end thereof when the plunger is retracted so that molten metal may be permitted to flow from the metal pot into the casting box, said plunger when actuated returning the excess metal to said metal pot.

23. In a casting box, the combination of a pair of complementary segmental pivotally mounted side members, a margin bar of T cross section, said side members being recessed at their pivot edges to receive the web of said margin bar, an annular casting box end member pivoted on said margin bar, and an opposed casting box end member, said pivoted end member having an annular rib and said side members having grooves to receive said rib when the casting box is closed.

24. In a casting box, the combination of a pair of complementary segmental pivotally mounted side members, a margin bar, said side members being recessed at their pivot edges to receive said margin bar, an annular casting box end member pivoted on said margin bar, and an opposed casting box end member.

25. In a casting box, the combination of a pair of complementary segmental side members, a coacting margin bar, an annular casting box end member pivoted on said margin bar, and an opposed casting box end member, said pivoted end member having an annular rib and said side members having grooves to receive said rib when the casting box is closed.

26. In a casting box, the combination of a pair of complementary segmental side members, a coacting margin bar, an annular casting box end member pivoted on said margin bar, and an opposed casting box end member.

27. In a casting machine, the combination of a casting box, a plunger in said casting box for discharging excess metal therefrom and constituting a core for the metal remaining in the casting box, and a valve adapted to close the inlet to said box immediately at the beginning of the retract stroke of the plunger to prevent such excess metal from following the plunger back into the chamber.

28. In a casting machine, the combination of a casting chamber adapted to be filled by gravity with hot molten metal, a plunger for said casting chamber adapted when actuated to place the metal under pressure and act as a core for the metal not expelled thereby, a valve at the inlet end of said casting chamber, and means urging said valve to follow said plunger at the beginning of its retract stroke and close so as to exclude the metal from the box.

29. A casting machine comprising a casting chamber, a combined core and plunger mounted for reciprocation into and out of said chamber, and a valve coacting with said plunger for closing said chamber at the beginning of the retract stroke thereof.

30. A casting machine having in combination a casting box having alined end bores, a plunger-core fitting and operatively associated with said end bores for reciprocatory movement in said casting box, and a fluid reservoir connected to one of said end bores.

31. In a casting machine, the combination of a casting box, means for feeding a comparatively large amount of molten metal to said casting box comprising a valve opening outwardly with respect to the casting box, and a plunger movable into and completely through the casting box for driving a large portion of the molten metal out of the casting box through said valve and serving in its advanced position as a core against which a portion of the surface of the casting is formed.

32. In a casting machine, the combination of a casting box comprising an end ring member, means for feeding a comparatively large amount of molten metal to said casting box through said end ring member, and a plunger movable into and completely through the casting box into engagement with said end ring member for driving a large portion of the molten metal out of the casting box and serving in its advanced position

as a core against which a portion of the surface of the casting is formed, said end ring member being adapted when engaged by the plunger to hold the plunger in centered position with respect to the casting box.

33. In a casting machine, the combination of a casting box comprising an end ring member, means for feeding a comparatively large amount of molten metal to said casting box through said end ring member, and a plunger movable into and completely through the casting box into engagement with said end ring member for driving a large portion of the molten metal out of the casting box and serving in its advanced position as a core against which a portion of the surface of the casting is formed, said end ring member having a beveled inner edge by which the plunger is directed to centered position with respect to the casting box when the plunger enters said end ring member.

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