

900,802.

E. B. VAN WAGNER.
CASTING APPARATUS.
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2 SHEETS—SHEET 1.

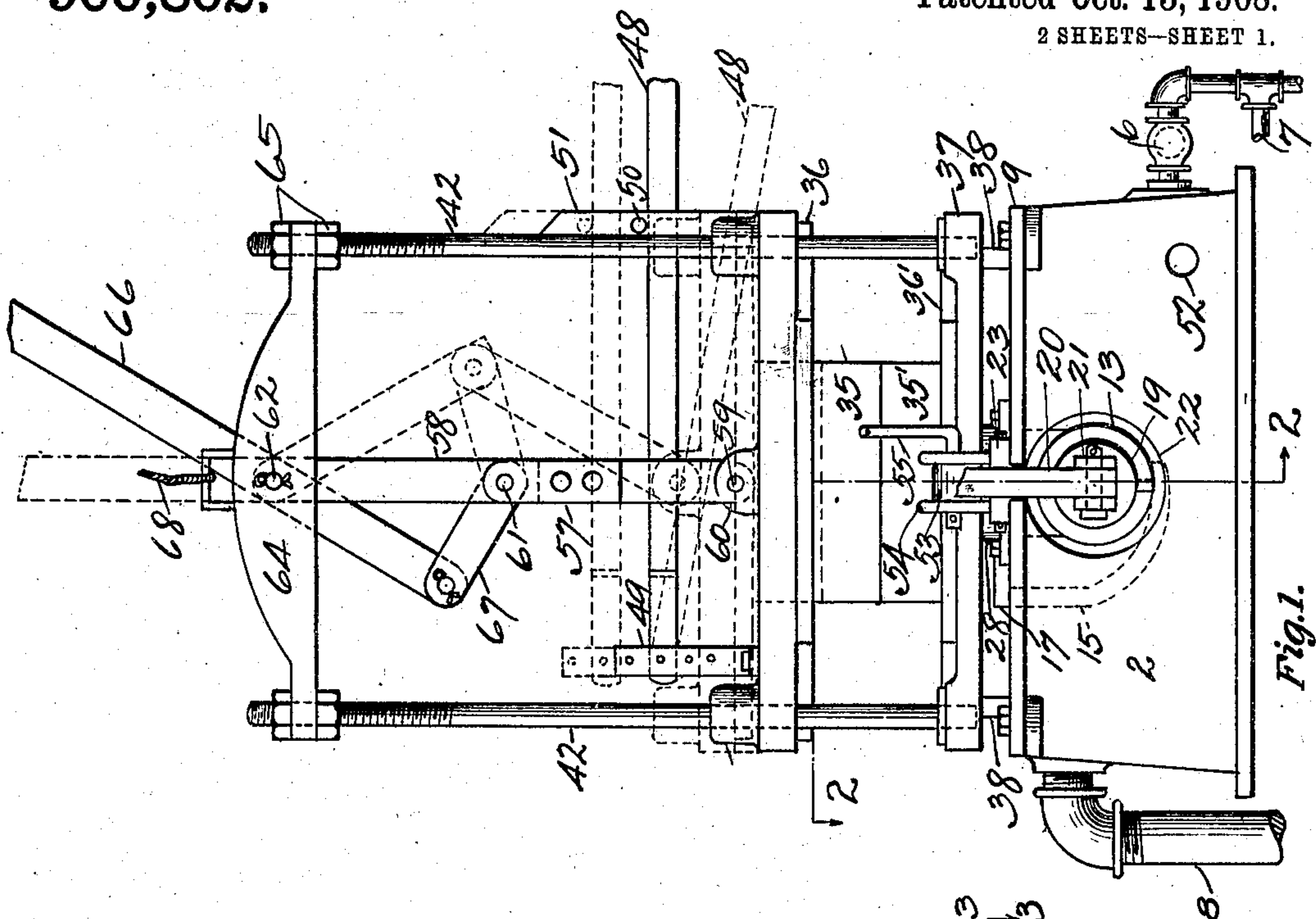


Fig. 1.

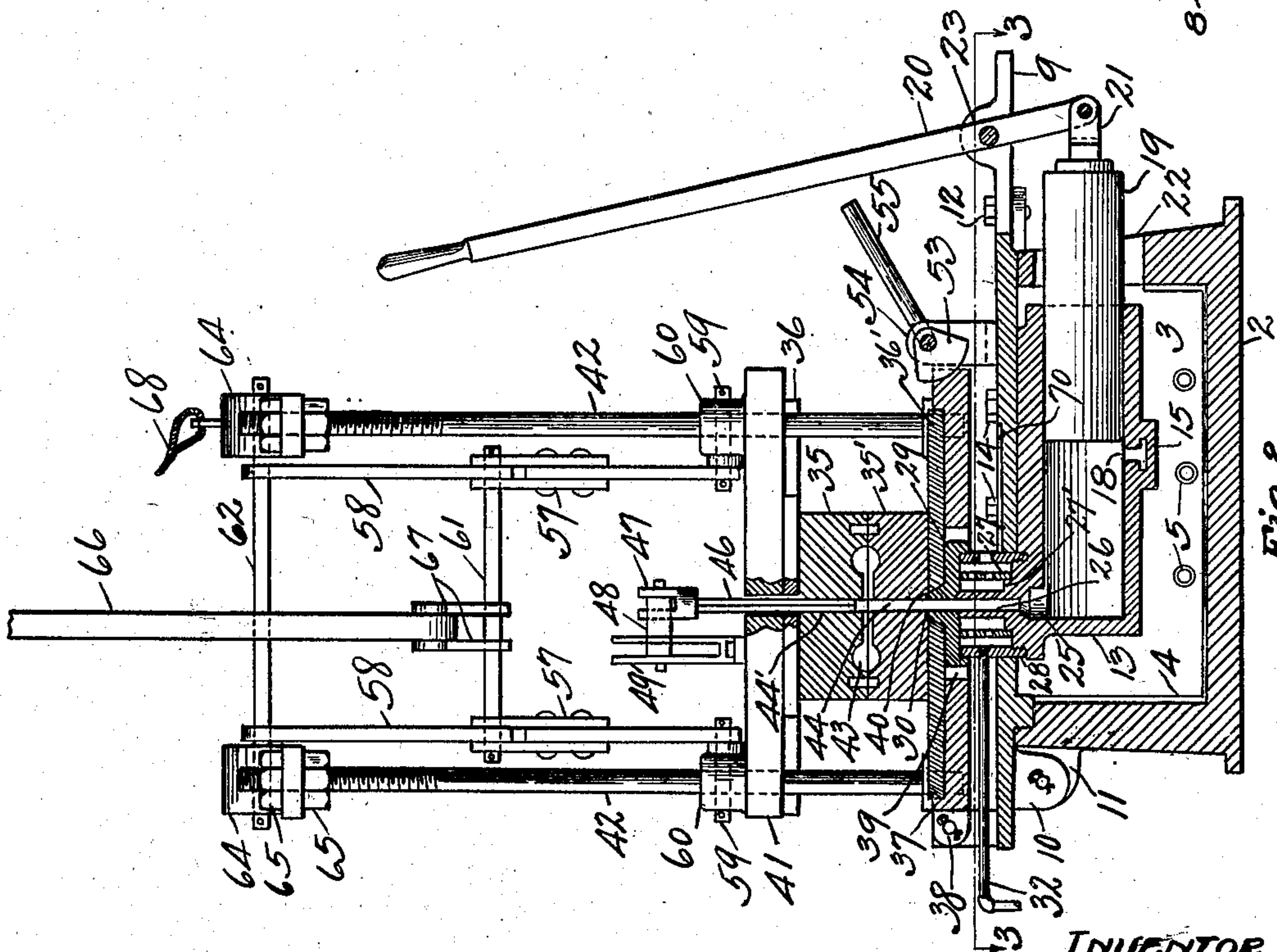


Fig. 2.

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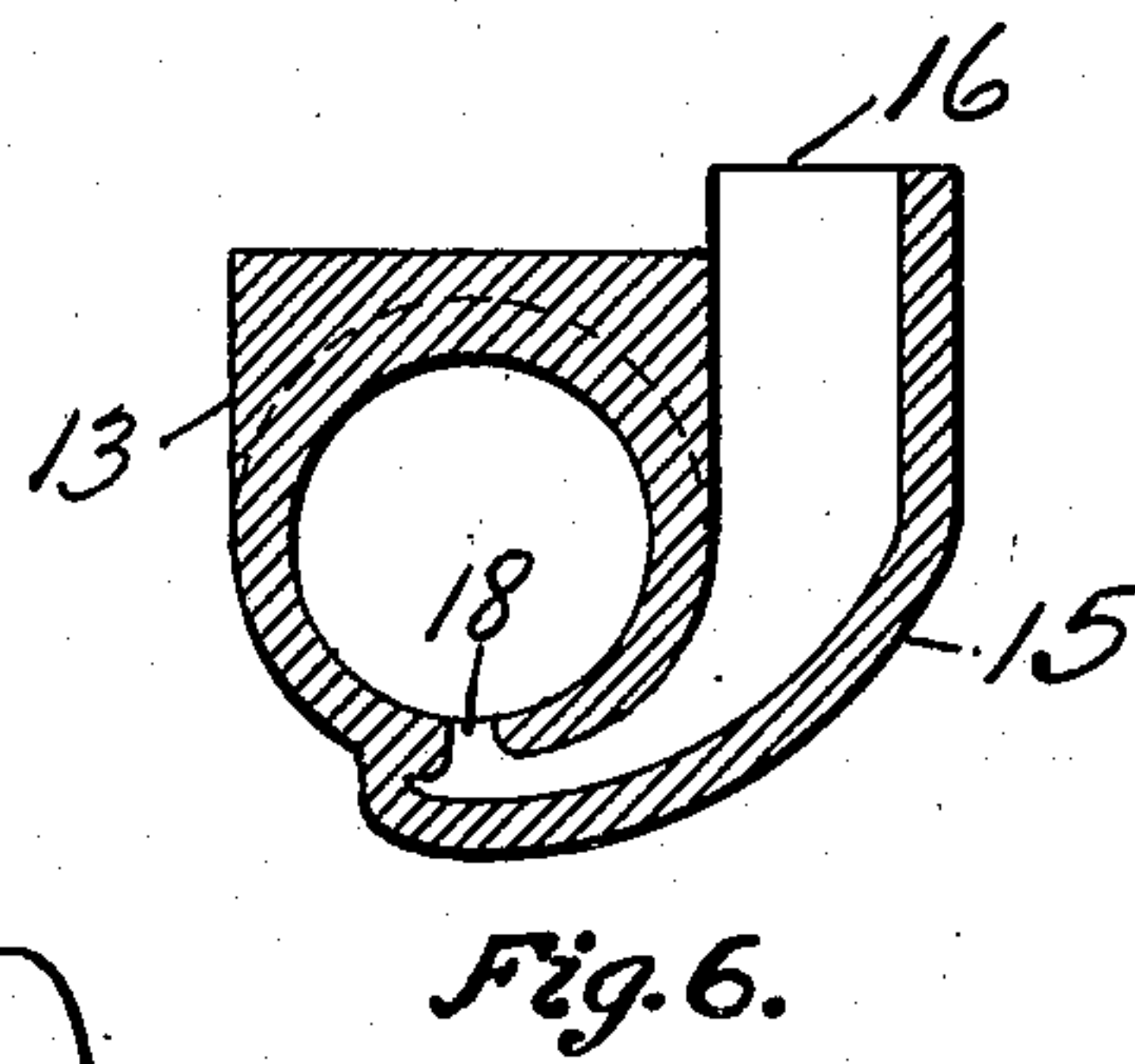
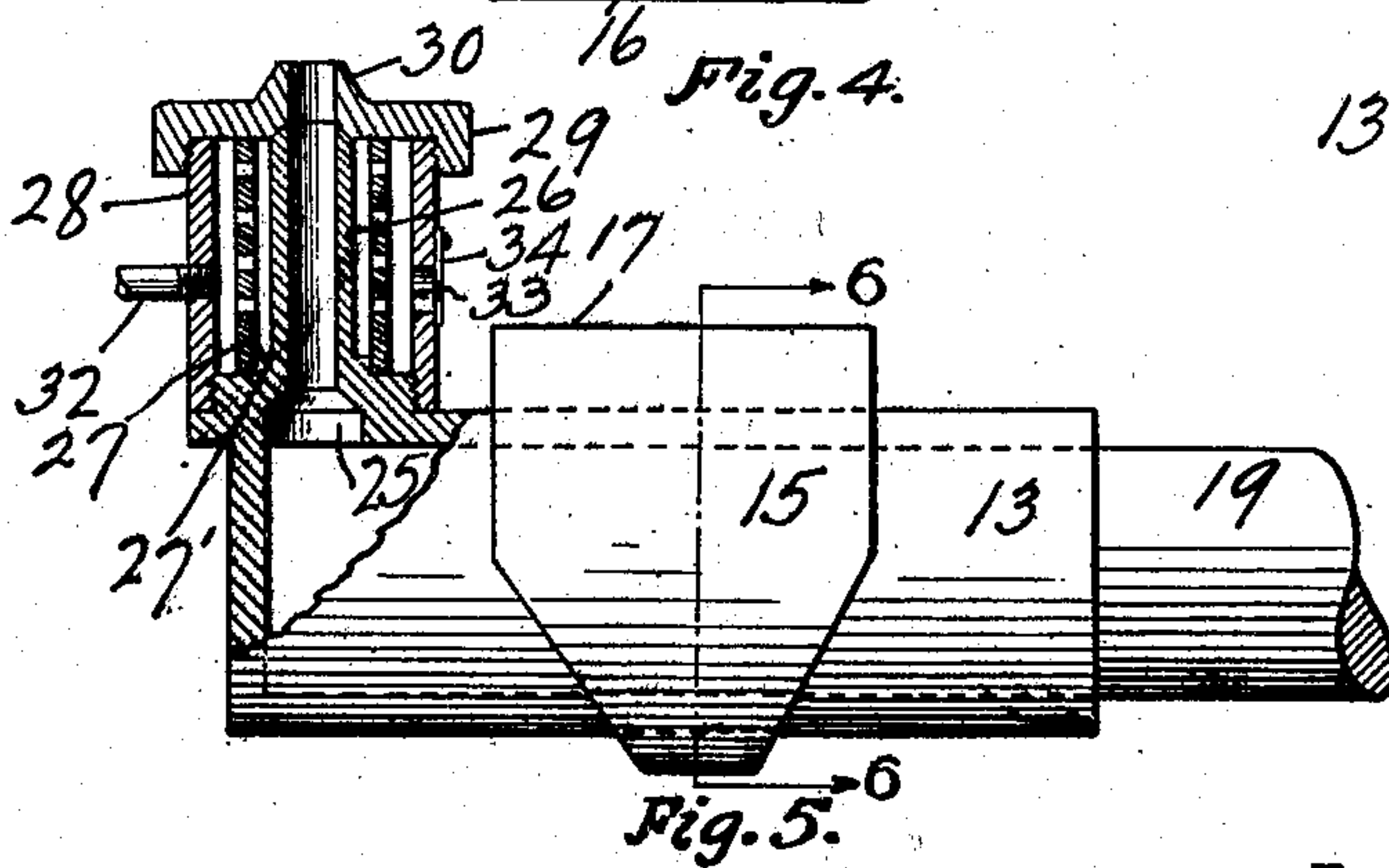
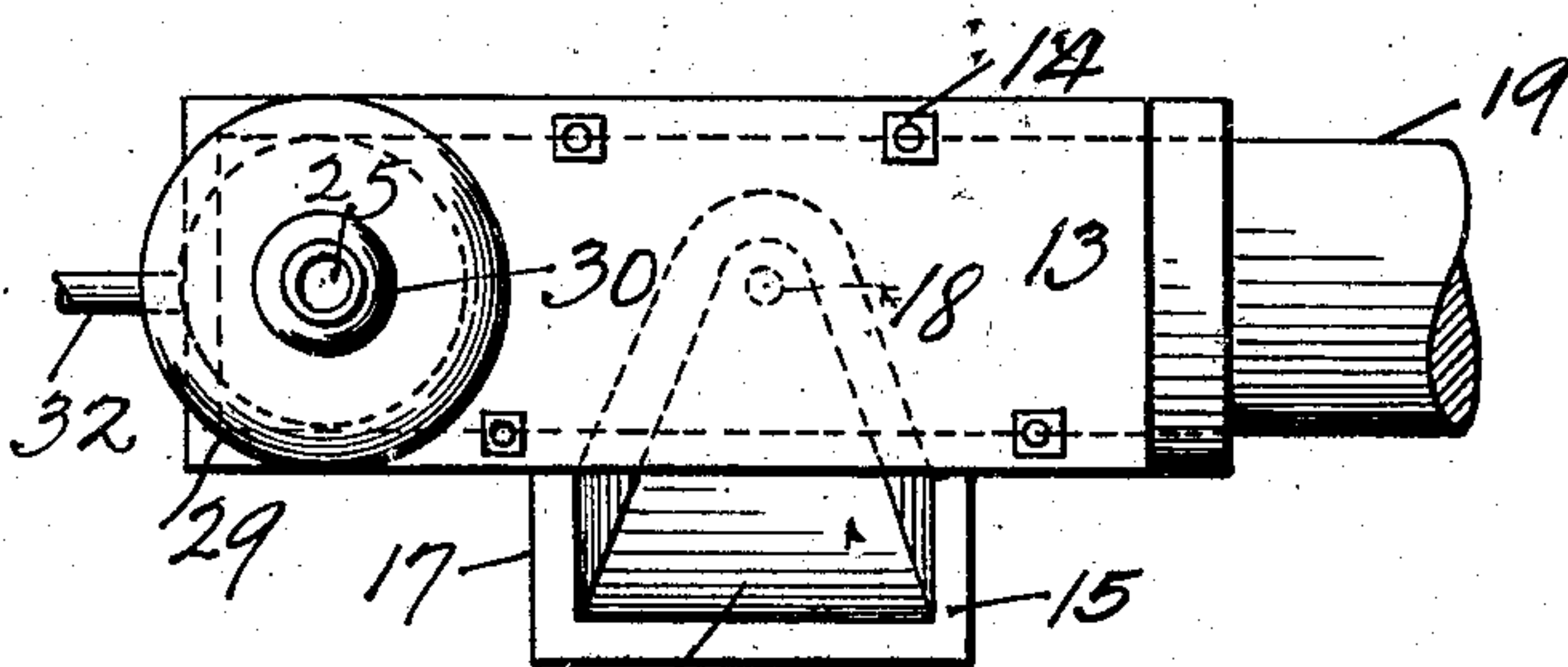
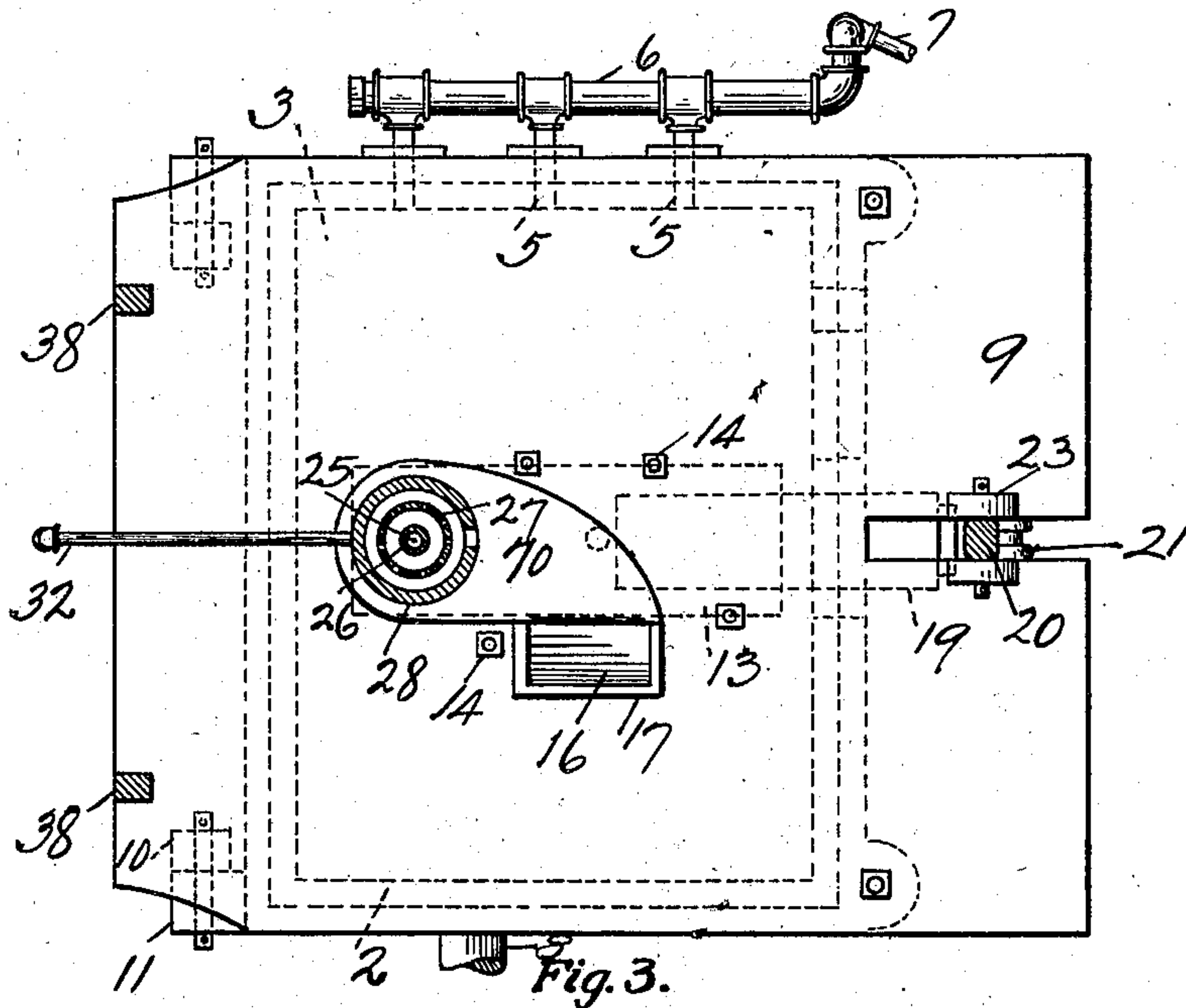
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CASTING APPARATUS.

No. 900,802.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ELBERT VAN WAGNER, a citizen of the United States, residing at Syracuse, in the county of Onondaga and State of New York, have invented certain new and useful Improvements in Casting Apparatus, of which the following is a specification.

This invention relates to improvements in casting apparatus, designed for use in making what is known as "finished" metal castings, and the invention relates particularly to a casting machine in which the molten metal enters the molds or dies under pressure.

The object of the invention is to provide a casting machine which is simple, durable and powerful, and wherein the construction and arrangement of certain of its parts are such that a greater number of perfect castings may be produced in a given time, with less labor, expense and waste, than are capable of being produced by any other machines of the class known to me.

The invention consists principally of a fire-box or furnace, in which is disposed a melting-pot and a casting cylinder combined in one part, the cylinder having a plunger for forcing the molten metal into the mold.

The invention further consists of novel and simple means for clamping and holding the sections of the die in operative position, and for releasing and separating the same for the removal of the castings.

The invention further consists of means for heating the nozzle and passage through which the molten metal is forced from the casting cylinder into the molds, to prevent the chilling of the unused metal and the clogging of said passage during the interval between the casting operations.

The invention further consists in novel features and combinations of parts set forth in the detail description which follows and then particularly pointed out in the claims, reference being had to the accompanying drawings forming a part of this specification, and in which—

Figure 1 is a front end elevation of the casting apparatus, showing the location and arrangement of the principal parts of the same. Fig. 2 is a side view, the upper portion in elevation, showing the arrangement of the die or mold clamping and releasing parts, the lower portion in section, substantially on the line 2—2 of Fig. 1, showing arrangement of the casting cylinder and re-

lated parts; also showing independent means for heating the nozzle. Fig. 3 is a horizontal section, substantially on the line 3—3 of Fig. 2, showing location of the gas supply and exhaust pipe; also showing location of melting-pot and port through which metal flows to the mold. Fig. 4 is an enlarged plan view of the combined melting-pot, cylinder and nozzle. Fig. 5 is an enlarged view partly in elevation and partly in section, showing the cylinder and melting-pot; also showing the constructions and arrangement of the gas-heater for the discharge passage and nozzle. Fig. 6 is a central cross-section, substantially on the line 6—6 of Fig. 5, showing cylinder and melting-pot made in one part.

Similar numbers of reference are assigned to corresponding parts throughout the several figures.

In the drawings, 2 represents the casing of the fire-box or furnace, 3 the hollow interior, and 4 asbestos or like lining of the furnace proper. The furnace is preferably cast in one part having its upper side open.

5, 5 represent a series of ports in one side of casing 2 near the bottom, through which gas is admitted by means of a common supply pipe 6.

7 represents a pipe connected to gas pipe 6 for supplying compressed air to create a forced draft, or blow the gas into the furnace 3.

8 is a pipe connected to the opposite side of the casing through which the burned gas is exhausted during the firing of the furnace.

9 represents a movable plate or cover for inclosing the upper open side of the furnace, the rear end of which is provided with lugs 10 which are pivotally connected to corresponding lugs 11 formed on the rear end of the casing 2. The front end of the plate 9 is fastened during the operation of the machine by bolts 12 which pass through the plate and into lugs formed on casing 2.

13 represents a casting cylinder disposed in the fire-box, and preferably secured to the underside of plate 9 by bolts 14.

15 represents a metal melting-pot or part which is formed integrally on one side of the cylinder 13, and having a large opening 16 at its upper end, which terminates in a three-sided wall 17, adapted to pass through and extend an inch or more above the upper face of plate 9. The opening 16, is employed for inserting the metal to be melted by the gas flame which heats the lower portion of the

pot 15 and the cylinder, the metal after being melted passing from the melting-pot into the cylinder through a port 18, formed centrally in the bottom of the cylinder.

19 represents a plunger which fits and operates in the cylinder and by means of which the molten metal is forced out of the cylinder during the casting operations. The plunger is reciprocally operated by means of a hand-lever 20, which connects to the plunger by a forked extension 21 carried by the plunger.

22 represents an opening in the front end of casing 2, through which the plunger is inserted and operates.

Lever 20 is pivotally mounted on plate 9 at 23.

25 represents a port disposed at or near the inner end of the cylinder for the discharge of the molten metal.

26 is a discharge tube cast with the cylinder and forms a continuation of the port or passage 25.

Heretofore machines for producing "finished" castings have given considerable trouble, because after each casting operation, a portion of the metal which remains in the discharge or "casting" tube and nozzle, which intervene between the melting-pot and the mold, becomes chilled and gathers until it clogs the passage, requiring frequent stoppage of the machine, and considerable delay and labor to clear the passage. In a majority of these machines, the dies when set in working position are necessarily placed at some little distance from the melting-pot and casting-cylinder, and for that reason it has been impossible to maintain the proper temperature to prevent the metal from hardening and adhering to the inside walls of the discharge-tube and nozzle. To remedy this annoying defect and prevent the setting of the metal and the clogging of these parts, I provide an independent heater for the discharge-tube and nozzle, of novel and simple construction and operation, which consists of a perforated tube 27, disposed outside of and concentric to the discharge-tube 26, and which is held in place by means of a raised portion 27' formed concentric to the tube 26. Outside of the perforated tube is disposed a still larger tube or casing 28, which is disposed concentric to tube 27. The lower end of this outer tube is preferably secured to the top of the cylinder by threads, as shown. The three tubes, 26, 27 and 28 extend upwardly substantially an equal distance, and the two outer tubes are closed at their upper ends by a common cap 29, which is secured to the outer tube 28 by threads. The upper end of discharge-tube 26 is beveled, and the under side of cap 29 is countersunk centrally to receive the end of said tube, for the purpose of making a tight joint at that point.

30 represents a nozzle which projects up-

wardly and is formed integrally on the upper face of cap 29. This nozzle is preferably circular in form and beveled, as shown in the drawings, and is apertured centrally to coincide with the passage 25. The heating of the discharge passage is accomplished by the burning of gas in the hollow spaces which occur between the tubes 26, 27 and 28. The gas is supplied to the chamber between tubes 28 and 27 by a feed pipe 32 which may be attached in any suitable manner.

33 represents a small opening in the opposite side of the tube 28 for use in lighting the gas, and 34 represents a part for covering the hole 33. The cover 34 pivoted to tube 28, and is intended to fit loosely over the hole 33, so as to admit enough air to burn the gas. The gas in the space between tubes 27 and 28, after being ignited will send tongues of flames through the perforations in tube 27, into the space between tubes 26 and 27 which effect the heating of the metal discharge passage in tube 26 and also in the nozzle, thus preventing the metal from chilling during and after each filling of the mold, and this heating will cause all of the unused metal to gravitate back into the cylinder each time the plunger is withdrawn.

The mold or die generally consists of two parts or sections, which are disposed in the machine one above the other, as upper section 35, and lower section 35'. Before placing the halves of the die in the machine, they are secured to plates 36 and 36'. Plate 36' to which the lower section is attached rests upon and is secured in suitable manner to a heavy support or plate 37 which is disposed parallel to, and a short distance above plate 9, to the rear end of which support 37 is hinged, as at 38.

39 represents a large circular opening disposed about centrally in support 37 through which cap 29 and nozzle 30 extend. Die-plate 36' is also perforated at 40 concentric to opening 39 in a manner to receive and tightly fit over the nozzle 30. When the die has been set in place, ready for casting, support 37 is disposed horizontally, as in Figs. 1 and 2, and the weight of the die and the other parts mounted upon the support 37 will effect a tight seal between the nozzle and die-plate 36'. The point of the nozzle passes through plate 36' and its upper end becomes flush with the top side of the said plate, where it meets the flat under surface of the lower die section 35'.

41 represents a support similar to part 37, to which the die-plate 36 is secured in suitable manner and this is disposed above the die and parallel to the support 37.

42, 42 represent four guide-rods, the lower ends of which are made rigid in support 37 at or near its four corners. These rods pass through the corners of support 41, upon which said support is adapted to be

moved reciprocally, for the purpose of clamping and spreading the die sections 35 and 35' during the operation of the machine.

43 represents a mold formed in the abutting faces of the die sections, and 44 represents a port or passage coinciding with passage 25, for the molten metal to pass upwardly from the nozzle into the mold cavity. This port preferably connects with the center of the cavity, but may be located at any other suitable point. A like port or opening 44' also extends through the center of the upper section of the die, and when the two sections are placed in operative position, these ports form a continuous opening extending vertically through the said sections. A port or hole corresponding to 44' also extends upwardly through the plates 36 and 41.

46 represents a gate, in the form of a plunger, which is operatively disposed in the upper passage 44', in such manner that its lower end is normally positioned at or near the upper side of the die cavity 43. The upper end of gate 46 is formed into a fork 47, to which is pivotally connected a hand lever 48, one end of which is pivoted to an adjusting standard 49 mounted upon support 41. The outer end of lever 48 is free and may be raised or lowered at the will of the operator for the purpose of operating gate 46. The dotted lines 48' represent lever 48 in its lower position to close the gate.

50 represents a gage adjustably mounted upon a standard 51 carried by the support 41. This gage is employed to regulate the movement of the lever 48, so as to prevent the gate 46 from being accidentally lifted out of the hole 44'.

In preparing the machine for casting, after the die has been set in position, the gas is first turned on from pipe 6, and enters the furnace through the ports 5. The operator may then light the gas by means of an opening 52 in the end of casing 2. The metal for the castings should be inserted through opening 16 into the melting-pot 15. As soon as the melting-pot and cylinder become sufficiently heated to melt the metal, the operator takes hold of lever 20 and pulls it outwardly away from the machine. This operation drives the plunger into the cylinder and forces the molten metal upwardly through tube 26, nozzle 30 and port 44 into the mold cavity 43. As soon as the cavity of the mold is filled, and while the pressure is still on, the operator should take hold of lever 48 and press it downwardly to position 48'. This latter operation forces gate 46 downwardly across or through the mold cavity 43 and closes the passage 44, thereby confining the metal in the mold. The gate is then left in the last position a few seconds until the metal comprising the casting becomes hardened. After the gate is operated to cut off

the supply of metal, the operator should manipulate lever 20 in the opposite direction to withdraw the plunger and allow the cylinder to become recharged with fresh molten metal from the pot 15 through port 18. When the plunger is withdrawn the molten metal which filled the tube 26 while the pressure was on, will then gravitate back into the cylinder, by reason of the heat produced by the burning gas in tubes 27 and 28. The port 18 which connects the melting-pot with the cylinder, is so positioned that when the plunger is withdrawn the inner end of the plunger just clears said port, and the first slight movement of the plunger into the cylinder closes port 18 and prevents the metal from being forced back into the melting-pot. After the metal in the mold has become hardened, the gate should be withdrawn by the upward movement of the lever 48 and then the casting may be removed.

When the die sections are being set in place between supports 37 and 41 the upper portion of the machine is usually tilted backwards on the hinges 38. When everything is in readiness for making castings these parts are again placed in upright position, as shown in Figs. 1 and 2. They are then held rigidly in the last named position by means of a locking-part 53 pivotally mounted between supporting lugs 54 which are secured to the plate 9. The lock 53 is slightly eccentric and when set (as shown in Fig. 2) by means of handle 55, it engages a notch in the free end of plate 37 and holds the same rigidly in place. The nozzle, discharge-tube and heater extend some distance above the plate 9, and to provide for saving any metal which might overflow from the nozzle and fall upon the said plate, the latter is recessed at 70 so that the metal descending from the nozzle will flow into the opening 16 and be delivered directly to the melting-pot.

It is necessary in order to make perfect castings, and perform the work rapidly and with as little labor as possible, to provide means for raising and lowering the upper die support 41, so as to open and spread apart the mold sections to remove the casting or to perform other needful work. The die sections must also be clamped and held tightly together while the castings are being made. To perform these different functions in a simple and effective manner, I provide a pair of knuckle-levers, each comprising a lower and an upper link 57 and 58. The lower links 57 are pivoted to the top of support 41 by pins 59, which pass through the ends of the links and also through lugs 60 which are cast on the support. The upper ends of links 57 are forked to receive the lower ends of links 58, and a common pivot-rod 61 completes the knuckle joints of the two levers. The upper ends of the links 58

are pivotally connected to a rod 62, the opposite ends of which are supported by tie-bars 64 which are adjustably mounted near the upper ends of the guide-rods 42.

5 65 represents a series of nuts employed for adjusting and holding the tie-bars 64 in place. If dies of different thickness are used, the nuts 65 may be screwed upward or downward on the threaded portion of
10 rods 42 to effect the proper adjustment of the knuckle-levers; so that when the links of the said levers are brought into true alinement, as shown by the full lines in Fig. 1, these levers will exert a strong pressure
15 downwardly against plates 41 and 36 and the upper die section 35, which will bring the two sections tightly-together, and hold them in such position until the knuckle-links are shifted to the position shown by
20 dotted line in Fig. 1, which raises the support 41, upper die-section 35, and lever 48 as indicated by the other dotted lines in the same figure.

To operate the knuckle-links 57 and 58, I
25 provide a hand-lever 66 pivoted to the tie-rod 62, a sufficient distance from its lower end to give the operator an advantage of the leverage. The lower end of lever 66 is pivoted between a pair of links 67 by means
30 of which said lever connects with the rod 61, to which the knuckle-links 57 and 58 are pivotally connected. The lever 66 is so positioned and connected that when the operator, who should stand at the right of the
35 machine (Fig. 1) pulls said lever to the right, the links 57 and 58 are brought into vertical alinement, to close the sections of the die and hold them tightly together, and when he pushes the lever 66 toward the left,
40 the pressure is relieved and the die-sections may be spread apart a sufficient distance to allow the casting to be removed or the die to be replaced or repaired.

By the use of a casting apparatus, constructed and operated as shown and described herein, perfect castings may be made with great rapidity at slight expense and with practically no loss of time.

While my apparatus is intended principally for use in making finished metal castings, which are commonly made from metal which fuses at a comparatively low temperature, I wish to include in the scope of the invention the production of castings of all
55 grades and finish, and I also wish to reserve the right to modify or change the parts of the device in any manner not at variance with the spirit of my invention, as the same is shown and described herein.

60 Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is—

1. A casting apparatus, comprising a fire-box having an open top inclosed by a hinged
65 cover, a casting cylinder secured to the

under side of said cover and disposed in the fire-box, a melting-pot formed integrally with said cylinder, having an open top to receive metal to be melted, and connected with the interior of said cylinder by a port
70 disposed in the bottom of said cylinder, a discharge-tube formed integrally with said cylinder and connected with the interior thereof by a port, an independent heater for said discharge-tube comprising a gas burner
75 consisting of a perforated inner tube and a plain outer tube disposed concentric with said discharge-tube, a gas supply pipe connected to said plain tube, a nozzle formed upon a cap mounted upon and inclosing the
80 upper ends of said heater tubes concentric with said discharge-tube, a die support mounted upon said cover and hinged thereto, a die comprising two sections, the lowermost section secured to said hinged support, the
85 uppermost section secured to a second support slidably mounted upon guide-rods carried by said first support, a mold formed in said die sections and connecting with the casting cylinder by means of a port coinciding with the passage in said discharge-tube, and means comprising a pair of knuckle-levers and a hand-lever supported by said
90 guide-rods for effecting the clamping and spreading apart of said die-sections, substantially as described.

2. A casting apparatus, comprising a furnace having an open top and a hinged cover therefor, a casting cylinder disposed in said furnace secured to said cover and movable
100 therewith, a plunger operatively disposed in said cylinder, means for operating said plunger by hand, a melting-pot formed integrally with said cylinder and connected with the interior thereof by means of a port, a
105 discharge-tube formed integrally on one end of the cylinder, a nozzle formed on a cap mounted on the upper end of said discharge-tube, a gas burner for heating said discharge-tube and said nozzle, comprising a
110 perforated tube disposed around said discharge-tube and a plain tube disposed around the said perforated tube, a pipe connected to said plain tube for supplying gas to said heater, a die comprising two sections, the
115 lowermost section mounted upon a support hinged to said cover and movable therewith, and also movable independently, the uppermost section secured to the under side of a second support mounted upon guide-
120 rods carried by said first support, a port connecting said discharge-tube with a mold formed in said die-sections through which molten metal may be forced from the cylinder into said mold by the operation of said
125 plunger, a gate supported by said second support adapted to close the port leading to said mold after the latter has been filled with molten metal, a lever mounted on said second support for operating said gate, a gate to
130

limit the movement of said lever, a pair of knuckle-levers carried by said guide-rods and connected to said upper support for raising and lowering the upper die-section, and a hand-lever for operating said knuckle-levers, substantially as described.

3. A casting apparatus, comprising a furnace and means for heating the same, the furnace having an open top, and a hinged cover adapted to close said opening, a melting-pot and casting cylinder combined in one part supported by said cover and movable therewith, a plunger for said cylinder, means for operating said plunger, a discharge-tube cast integrally with and forming an outlet for molten metal forced from said cylinder by the plunger, a nozzle formed upon a cap mounted upon the upper end of said discharge-tube, a heater for said discharge-tube and nozzle, comprising a gas-burner disposed around said tube beneath said nozzle, a pipe for supplying gas to said burner, a support disposed above and hinged to said cover, a series of vertical guide-rods secured to said support, a second support movable reciprocally on said guide-rods, a die comprising two separate sections, one section secured to the lower support, the other section secured to and movable with the upper support, a mold cavity formed in the abutting faces of said sections, a port passing through said sections and connecting with the casting cylinder by means of the passage in said discharge-tube and nozzle, a gate operable in the port in said die-sections adapted to permit or prevent the flow of molten metal into said cavity, a pivoted lever to operate said gate, a pair of tie-bars adjustably mounted on said guide-rods, a pair of knuckle-levers to effect the reciprocal movement of the second support and upper die-section, the said knuckle-levers connected at their lower ends to said second support, their upper ends pivotally connected to said tie-bars, and a hand-lever supported by said tie-bars adapted to operate said knuckle-levers, substantially as described.

4. In a casting apparatus, the combination with a fire-box having an open top, a gas supply-pipe and an exhaust-pipe, of a casting-cylinder disposed in the fire-box, a plunger for said cylinder, a melting-pot formed on one side of said cylinder, a port to connect said pot with the interior of said cylinder, a molten metal discharge-tube formed upon the inner end of said cylinder, an independent gas-heater disposed around and concentric

with said discharge-tube, a common cap mounted upon the top of said discharge-tube and inclosing the upper end of said heater, a nozzle formed on the upper face of said cap having a port registering with the opening in said discharge-tube, a sectional mold mounted upon a hinged-support disposed above said nozzle, a port in said mold sections registering with the port in said nozzle, a gate disposed in the port in the upper section of said mold adapted to permit or prevent the passage of molten metal to and from said mold, means for clamping and holding said mold sections tightly together while the metal is passing into the mold, and also for separating the said sections for the purpose of removing the castings, and a locking member for holding the lower mold section and the nozzle tightly together, substantially as described.

5. A casting apparatus, comprising a fire-pot having an open top and a hinged cover therefor, a sectional mold mounted upon a support hinged to said cover, a casting-cylinder in said fire-pot, a melting-pot formed on the side of said cylinder, a port connecting said melting-pot and cylinder, a tubular-extension formed on the top of said cylinder for conducting molten metal from said cylinder to said mold, a gas-burner for heating said tubular-extension, comprising a perforated-tube and a plain-tube disposed outside of and concentric with said tubular-extension, and means for supplying gas to said burner, substantially as described.

6. In a casting apparatus, the combination with a fire-box and a mold mounted above said box, of a casting cylinder disposed in said fire-box and having a plunger operatively fitted thereto, a melting-pot formed integrally with said cylinder having an open top, its lower end connected with said cylinder by means of a port, a tubular discharge-part formed upon the upper side of said cylinder for conducting molten metal from said cylinder to said mold, and a gas-burner comprising a perforated tube placed within a plain tube disposed concentric with said discharge part, adapted to prevent the hardening of the metal and the clogging of said discharge-tube, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ELBERT B. VAN WAGNER.

Witnesses:

WM. F. CANOUGH,
HARRY DE WALLACE.