E. B. VAN WAGNER.

CASTING APPARATUS.

APPLICATION FILED APR. 29, 1908.

900,803.

Patented Oct. 13, 1908.

2 SHEETS—SHEET 1.

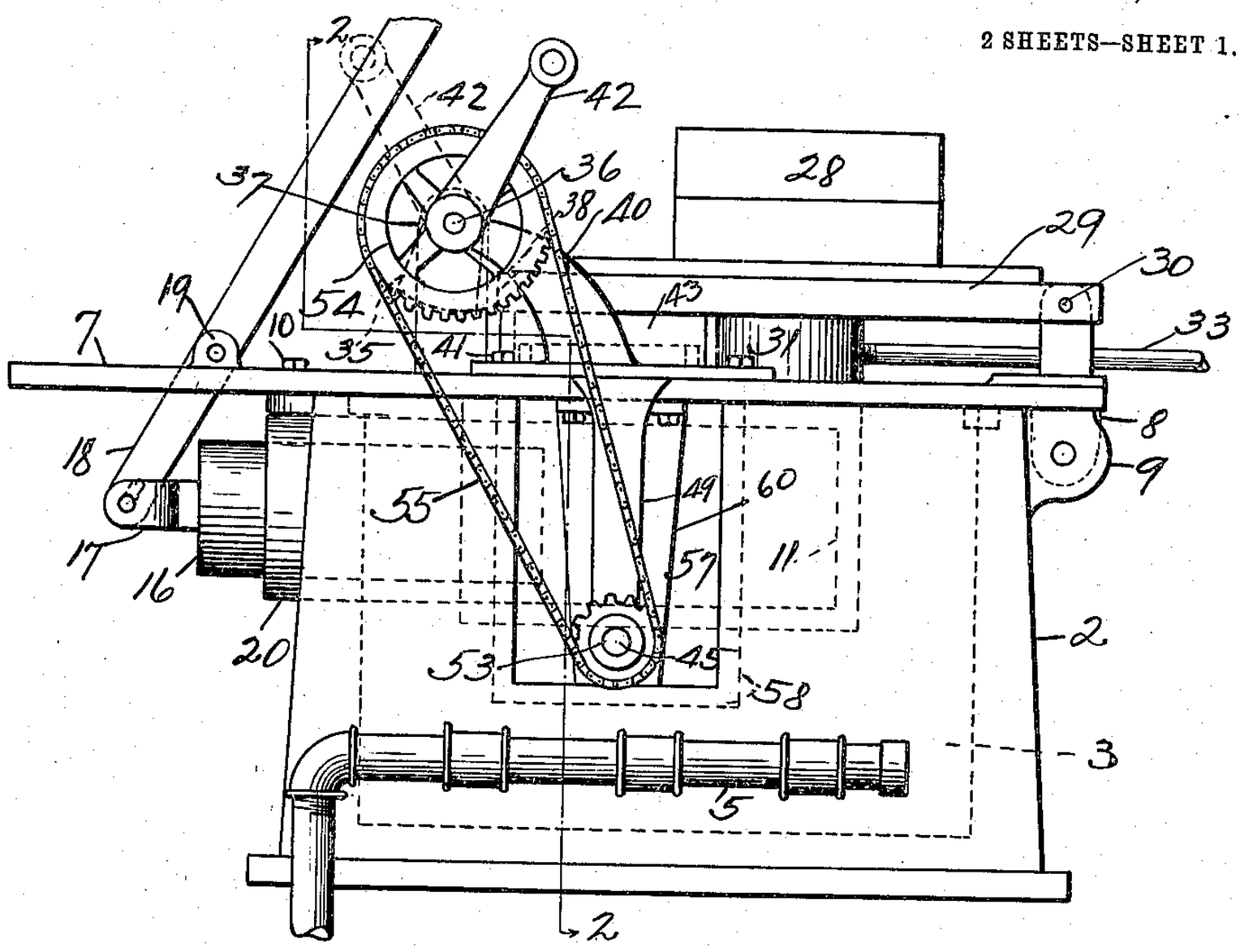

Fig. 1.

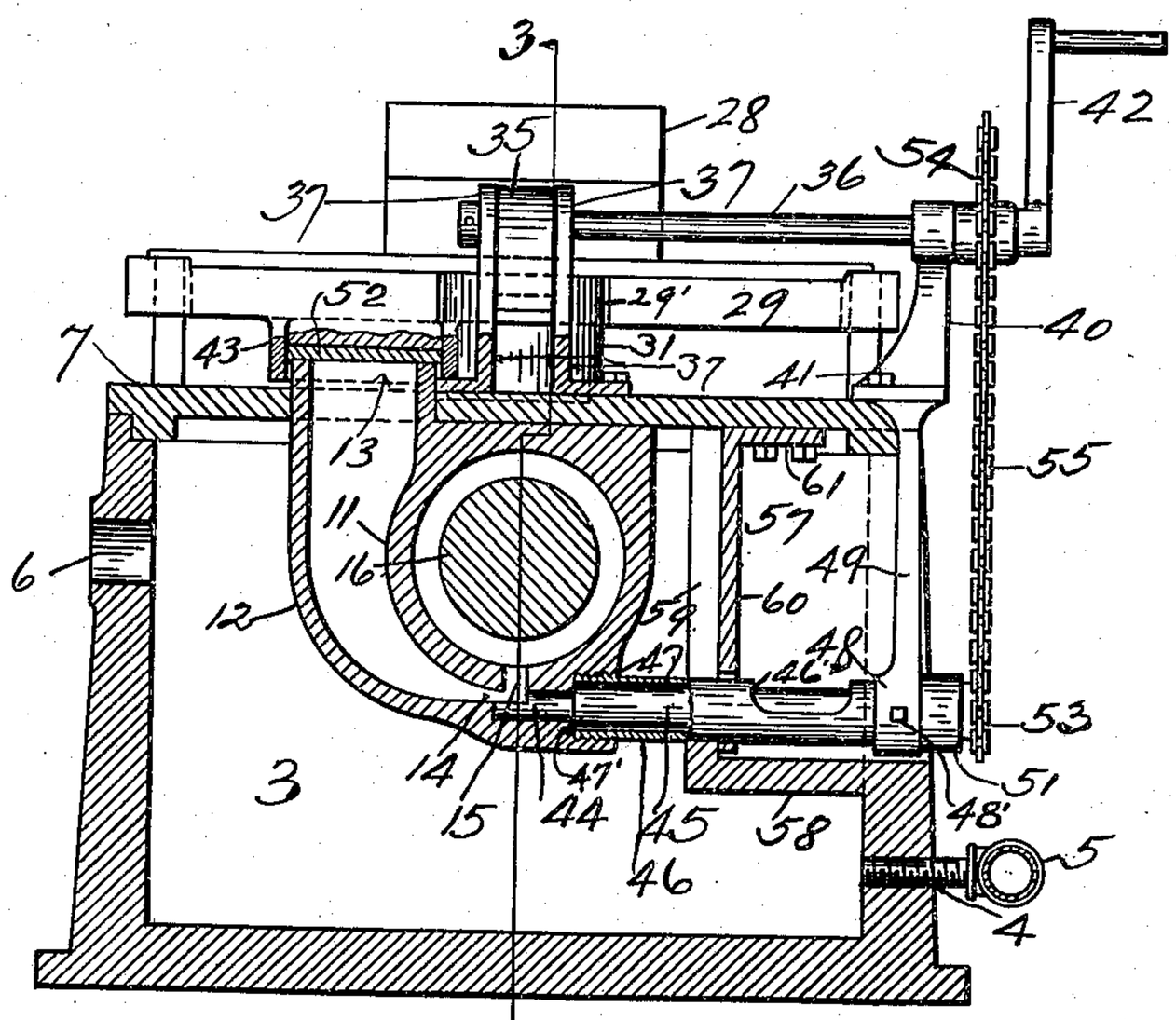

Fig. 2.

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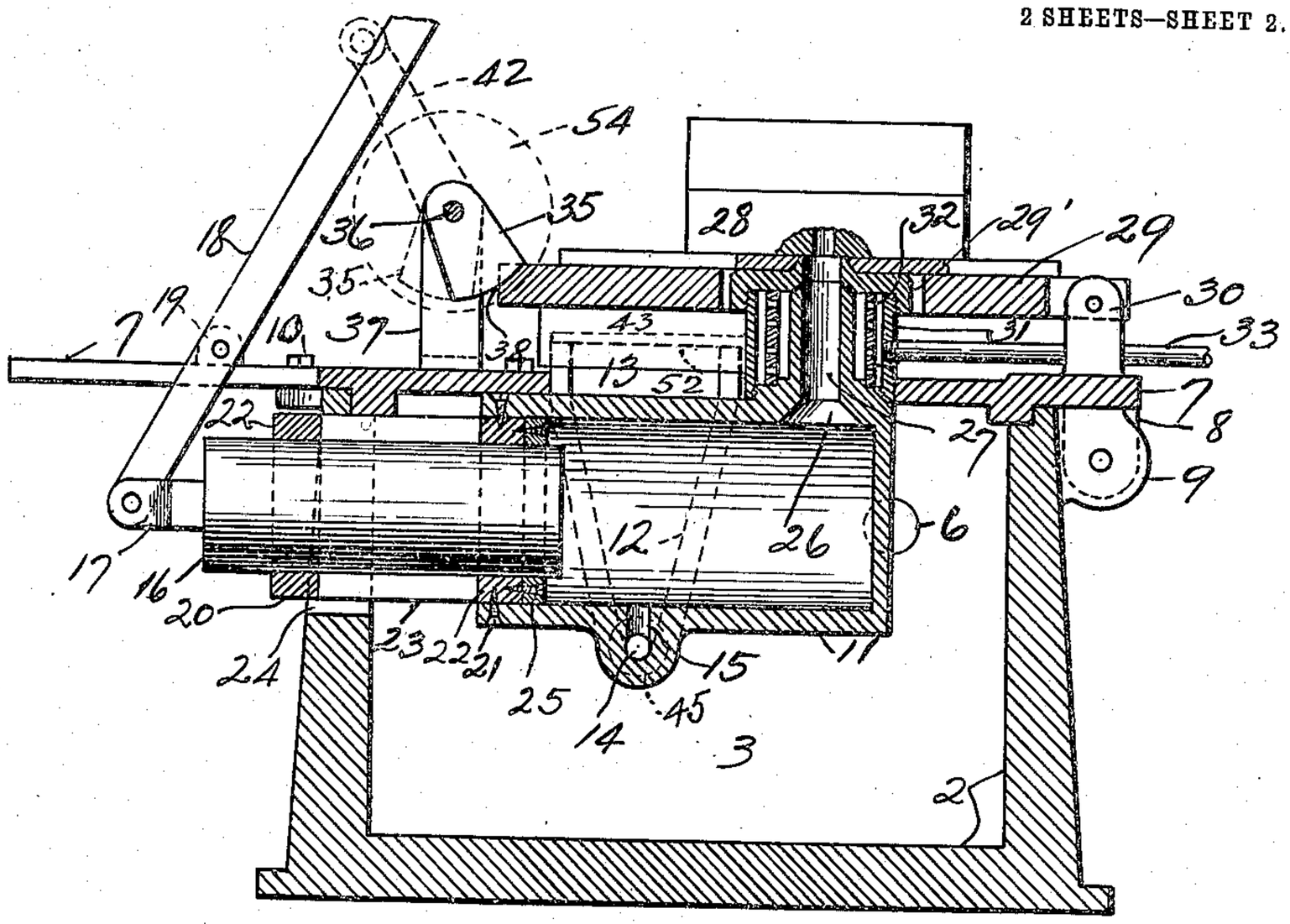

Fig. 3.

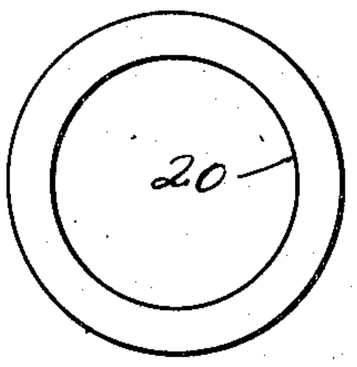

Fig. 5

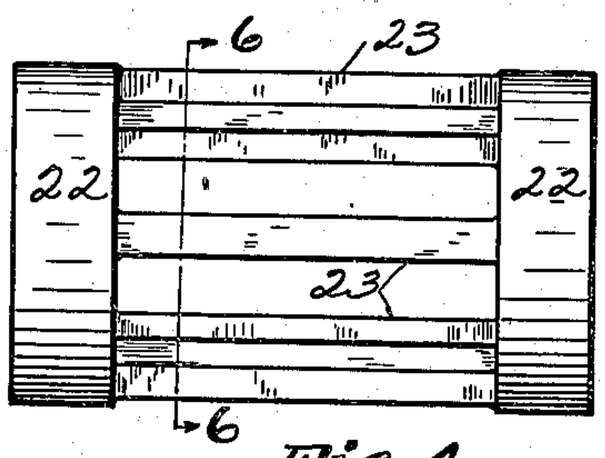

Fig. 4.

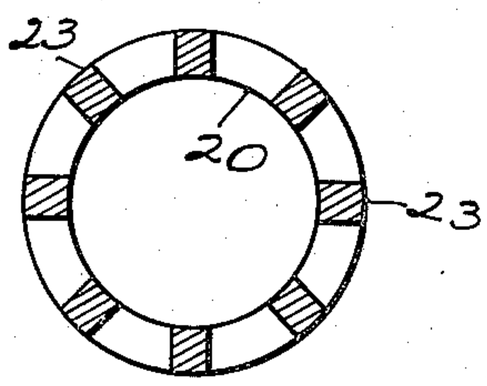

Fig. 6.

Fig. 9. Fig. 8.

Fig. 7.

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ELBERT B. VAN WAGNER, OF SYRACUSE, NEW YORK.

CASTING APPARATUS.

No. 900,803. Specification of Letters Patent. Patented Oct. 13, 1908.

Application filed April 29, 1908. Serial No. 429,880.

To all whom it may concern:

Be it known that I, ELBERT B. 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, having for its object the making of what is commonly called "finished" castings, and wherein the molten metal is forced into the molds or dies under pressure other than by the force of gravity.

In my application, Serial No. 423,819, filed March 28, 1908, I show and claim a casting apparatus for making "finished" metal castings under pressure, chiefly from metals having low fusing points, wherein provision is made for independently heating the molten metal discharge passages, and generally simplifying the construction of the device, by which castings may be made more rapidly and more effectively. The present invention is an improvement in the device therein shown, and has for its particular object the providing of a casting machine in which the construction, arrangement and operation of its parts are such that perfect, finished and compact castings may be made from copper and its several alloys, as well as from other high fusing metals, with less labor, expense and waste than any of the processes and apparatus heretofore employed for the purpose are capable of producing.

A further object is to provide a casting apparatus, which is simple, durable and effective, and wherein the product of the machine requires no wasteful trimming, or laborious finishing in order to prepare the same for commercial or other uses.

The invention consists principally of a furnace having a hinged cover, to the underside of which is connected a melting-pot and casting-cylinder suspended in the furnace, the cylinder and melting-pot connected by a port.

The invention further consists of a valve operatively fitted to the underside of the cylinder, to control the flow of molten metal from the melting-pot into the cylinder.

The invention further consists of a mold or die which is supported above, and adapted to receive molten metal forced from the casting-cylinder.

The invention further comprises means for locking and holding the mold and related parts in casting position.

The invention further comprises means for simultaneously operating the mold-locking-parts and also the valve.

The invention further consists of a hand-operated plunger for said casting-cylinder, the said plunger made of metal capable of withstanding a higher temperature than that required to melt the casting-metal, and having a smaller diameter than the bore of the cylinder in which it is employed for displacing and forcing the molten metal into the mold. And the invention further comprises means for supporting and guiding the plunger.

To this end the invention consists in the combination, construction and arrangement of parts of the apparatus as hereinafter fully described, illustrated by the accompanying drawings, and then pointed out in the claims.

Referring to the drawings, Figure 1 is a side elevation of the casting apparatus, showing the fire-box and a mold mounted upon it; also showing means for simultaneously operating the die-lock and the valve. Fig. 2 is a cross-section through the machine, substantially on the line 2—2 of Fig. 1, showing the location and arrangement of the casting-cylinder and melting-pot; also showing location and construction of the valve and its operating mechanism. Fig. 3 is a central longitudinal section through the machine, as on the line 3—3 of Fig. 2, showing the construction and manner of applying the plunger and its supporting and operating parts; also showing the location of the valve, the construction and disposition of the lock for holding the die in operative position, and other important parts of the device. Figs. 4, 5 and 6 are respectively, a side elevation, an end view, and a cross-section of the lantern guides which supports the plunger. Fig. 7 is an enlarged detail sectional view of the valve and related parts. Fig. 8 is an enlarged detail section, showing the valve in relation to the port in cylinder, the valve being open, as in Fig. 2. Fig. 9 is an enlarged detail section, showing the valve in relation to the port in cylinder, the valve being closed.

Similar characters of reference designate corresponding parts throughout the several views.

In the drawings, 2 represents the main casing of the furnace or fire-box, and 3 the hollow interior.

4 represents inlet pipes and ports disposed in one side of the casing, through which gas for heating the furnace is supplied by a common pipe 5.

6 represents a large port formed through the opposite wall of the casing, for exhausting the burned gases during the firing of the furnace. A pipe or other suitable form of conductor may be applied to the port 6.

7 represents a movable plate or cover for inclosing the upper open side of the furnace, the rear end of which is provided with lugs 8, which are pivotally connected to corresponding lugs 9 formed near the rear corners of casing 2. A bolt 10 is employed for securing the front end of plate 7 to the top of the fire-box during the operation of the machine.

11 represents a casting-cylinder disposed in the furnace and preferably secured in suitable manner to the underside of plate 7 and movable therewith.

12 represents a melting-pot formed integrally with and disposed on one side of cylinder 11. The upper end of the melting-pot is formed into a large mouth or opening 13 through which the metal to be melted is inserted. The walls or sides of the open end 13 extend upwardly through and tightly fit a corresponding opening in the plate 7.

14 represents a contracted circular passage at the lower end of the melting-pot which connects with a port 15 formed in the bottom of the casting-cylinder, by means of which the molten metal flows from the melting-pot into the interior of the cylinder.

A plunger 16, operable reciprocally in the cylinder, and having a diameter considerably less than the bore of said cylinder, is employed for displacing and forcing the molten metal from the cylinder into the mold. The outer end of the plunger is provided with a forked extension 17 to which is connected the lower end of a hand-lever 18, which is pivotally mounted upon the front end of plate 7, at 19.

The machine of the present application is intended particularly for making castings from metals having a comparatively high fusing point, such as copper, brass, aluminum and the like, and it is preferred to construct the casting-cylinder and melting-pot out of wrought or cast iron of such quality as will stand the great heat required to melt the other metals for casting.

As the plunger 16 becomes immersed in a large body of the molten metal at each inward stroke, it is liable to fuse or otherwise deteriorate by reason of the intense heat of the molten metal, unless it also is constructed from a material which will resist a temperature considerably in excess of that employed for fusing the casting metal. In order to safe-guard against this danger, and at the same time provide a plunger which will retain its true shape, the plunger 16 is preferably made from a high carbon steel, which has a melting point several hundred degrees above that of copper.

For a casting machine such as shown and described herein, it has been found necessary, in order to prolong the life of the plunger, to dispose the same in such manner that when not employed for displacing the metal, the body of the plunger is almost wholly withdrawn from the cylinder cavity, as shown. Under this arrangement only the face of its inner end is constantly in touch with the molten metal, and the body of the plunger may thus be kept at a comparatively low temperature to prevent deterioration. The plunger 16 is necessarily rather bulky and heavy, and owing to its disposition, as described, requires means for its support while in the outer or idle position. For this purpose I provide a cylindrical part 20, one end of which is tightly fitted into the open end of the cylinder, like a bushing, and secured thereto by suitable means, as screws 21. The guide 20 is preferably of a lantern construction, having annular portions 22 at its opposite ends, connected by integral rounds or bars 23, as shown in Figs. 3, 4 and 5. Guide 20 is bored out centrally to operatively receive plunger 16. The free end of guide 20 and also the plunger extend outwardly through an opening 24 formed in the front end wall of the casing 2. In this position a considerable portion of the plunger, and also of the guide are exposed to the atmosphere, which will have a cooling effect upon these parts. The inner end of guide 20, being disposed at a point where the heat from the gas flame and molten metal is highest, it has also been found necessary to make this part of metal which will stand constant exposure to the high temperature. To this end I prefer to make the guide out of nickel-steel which requires a very high temperature, comparatively, to melt.

In order to prevent the escape of the molten metal from the open end of the cylinder by passing between the plunger and guide 20, and also for the purpose of shielding the inner end of the guide, as well as, the sides of the plunger from direct contact with the molten metal, I provide a packing, preferably of asbestos, compressed into a heavy ring 25, adapted to surround and tightly fit the inner end of the plunger and also cover the inner end of the guide, the ring being secured to the latter by screws or other suitable means.

26 represents a port in the upper side of the cylinder near its inner end, through

which the molten metal is discharged when displaced by the inward stroke of the plunger.

27 represents a tube forming a passage to connect port 26 with a mold 28, mounted upon a supporting plate 29, which is hinged to the plate 7, at 30. The plate 29 has a large perforation 29′, near its center, through which the discharge tube 27 and related parts pass to connect with the mold. Discharge tube 27 is kept at a high temperature to prevent the chilling of the molten metal therein, by an independent gas-heater, comprising a cylindrical casing 31, and a perforated cylindrical part 32, both of which are disposed outside of, and concentric to, discharge tube 27, and each are spaced a sufficient distance from each other and from tube 27, to facilitate the burning of the gas between them for heating the discharge tube. The gas for this burner is supplied through a pipe 33, which connects with the casing 31.

In order to operate the casting machine effectively and safely, the mold or die must be brought into close contact with the upper end or nozzle of discharge tube 27, and held rigidly in such position while the molten metal is being forced into the mold. To this end I provide a simple locking-part 35, which is secured to a rocking-shaft 36, supported at its inner end by a pair of lugs 37, which are mounted upon the plate 7. The locking-member 35 is disposed between the lugs 37 in such manner that its lower curved end which is slightly eccentric may be swung inwardly to engage a notch 38 formed centrally in the front end of support 29. The full lines in Fig. 3 show lock 35 engaging the notch 38, to hold the mold tightly against the end of discharge tube 27; the dotted lines in the same figure show the lock in its released position, allowing the die-support to be swung upwardly on the pivot 30 to remove the casting. The outer end of rock-shaft 36 is supported by a bracket 40 which is mounted on the outer edge of the plate 7, by bolts 41. A crank 42 is fitted to the outer end of shaft 36 for operating the shaft and lock 35.

The casting machine herein described and shown, being operated at a much higher temperature than machines heretofore employed for making finished castings, it requires a somewhat different construction in several important respects. Instead of providing a normally open port or passage between the melting-pot and casting-cylinder allowing the molten metal to freely gravitate into the latter each time the plunger is withdrawn, it is preferred to retain the metal in the melting-pot except during the brief period required to fill the mold. By this means the high temperature required for melting copper and other high-point-fusing metals may be maintained and the effectiveness of the machine enhanced. To this end, a valve 44 is disposed in a circular hole in line with the passage 14, beneath the port 15, to control the flow of metal into the casting-cylinder 11. The valve is formed on the inner end of a rod or stem 45, disposed horizontally, partly within and partly without the furnace, as shown. The valve is formed by cutting away a portion of the rod at 44′, as shown in Figs. 2, 7, 8 and 9. Figs. 2 and 8 show the valve open, and in this position the notch 44′ coincides with the passage 14, thus providing a free course for the molten metal to flow from the pot 12 to the cylinder 11. The valve is so positioned that when rod 45 is rotated about one-third of a turn in either direction the valve closes the port 15 and stops the flow of metal into the cylinder, as shown in Fig. 9. The valve and part of its operating-rod or stem 45 being disposed inside of the furnace, owing to the intense heat of the fire-box, it is necessary to shield these parts from the heat and at the same time suitably support the same. This is accomplished by placing a tubular casing 46 around the stem 45. The shield 46 is preferably made of wrought-iron pipe, which will readily withstand the heat required to melt the casting metals, and has a greater diameter than the stem 45, so as to provide an air-space around the stem to keep it cool. The shield 46 is attached to the underside of the cylinder by threads at 47, and the valve stem 45 is shouldered at 47′ near its inner end to serve the double purpose of holding the valve from inward movement, and at the same time preventing the molten metal from escaping into the fire-box. The tube 46 has a portion cut away at 46′ so as to allow the hot air to escape. The outer end of shield 46 is supported by a depending integral arm 49 of the bracket 40, the lower end of which is formed into an eye or collar 48 to receive and hold the shield, and a set-screw 48′ is employed to secure the shield rigidly in place. Near its outer end, the rod 45 is provided with an annular flange 50, which is disposed just outside the end of the shield 46. In order to prevent the longitudinal movement of the rod 45 away from the cylinder, a screw-cap 51, perforated centrally to slip over the end of the rod, is attached to the outer threaded end of shield 46. When the cap 51 is placed in position on the end of tube 46, the flange 50 is confined between the cap and the end of the tube and held in rotatable position, but incapable of endwise movement in either direction.

The valve being disposed in the under side of the cylinder, and its operative-rod being disposed partly inside and partly outside of the fire-box, and all of these parts

being movable with the cover 7, it is necessary to construct the casing of the fire-box in a manner to permit of the raising and lowering of the valve-operating-parts with the cover 7. To this end, a deep recess 57 is formed in the side wall of the furnace by depressing the walls 58 as shown in Figs. 1 and 2. Then to provide for the raising and lowering of the casting cylinder and valve-rod out of and into the fire-box, a slot 59 is formed in the inner wall of recess 57. This slot extends from the underside of the cover 7 downwardly to the underside of shield 46, as shown in Fig. 2. It being necessary to keep the fire-box closed as tightly as possible, to prevent the escape or waste of the heat required for the melting of the metal, the slot 59, except the portion occupied by the shield 46 is closed by a guard 60, which consists of a flat piece of metal having a width greater than the slot 59, and having its upper end formed into an angle by which it is secured to the under side of the plate 7 by bolts 61. The lower end of guard 60 is preferably perforated or forked to fit over tube 46, and the body of the guard is adjusted to slidably fit against the vertical wall 58. The valve supporting and operating parts and also the guard 60 are thus freely movable with the plate 7 when the latter is swung upwardly or downwardly on the pivot 8.

For operating the valve 44 I provide a sprocket gear 53 mounted upon the outer end of the rod 45, in line with another sprocket gear 54 mounted on the outer end of the rock-shaft 36 and then connect these wheels by a chain 55. Under this arrangement the rocking of the shaft 36, for locking or unlocking the die-support 29, also effects the opening or closing of the valve 44. Owing to the movement of the lock 35 being slight, as compared with the movement required to open and close valve 44, the sprocket-wheel 54 is preferably about double the size of the gear 53. In making castings of the character described, after the metal is forced into the mold and has become set, the operators are required to release the lock 35 to allow the die support 29 to be tilted back upon its hinge 30 in order to remove the casting. After the casting has been removed, the mold is again restored to its operative position, as shown, the lock 35 is again placed in notch 38 by manipulating crank 42, and everything is ready for another casting operation. The object in connecting the valve-rod 45 with the rock-shaft 36, in a manner to effect the synchronous operation of the lock and valve, is to provide a means for preventing the passage of the molten metal from the melting-pot into the cylinder during the interval in which the lock is in the released position. When the mold is made ready for casting, lock 35 is set in notch 38 by manipulating crank 42 which also opens valve 44 and lets the molten metal pass into the cylinder 11. As soon as the metal enters the cylinder, the plunger may be operated by means of hand-lever 18. The inward stroke of the plunger will then displace a quantity of the molten metal and force it upwardly into and fill the mold. In operating the plunger, the operator must exert enough strength or force in pulling on lever 18, to drive the plunger into the cylinder until it comes to a stop, which will indicate that the mold is completely filled. He should then hold the lever firmly in the last position until the mold or casting is gated. Ordinarily in casting machines of the class a gate (not shown) of some form is employed in connection with the mold for closing the port through which metal passes into the mold. The plunger should be left in the cylinder until after the gating and the setting of the casting. As soon as the metal in the mold is set, the lock 35 should be released by operating crank 42, which will also close the valve 44. Then the plunger should be withdrawn from the cylinder, and the casting removed from the mold. During all the time required for removing the casting and closing and locking the mold ready for the next casting operation, it is intended that valve 44 be held in closed position to prevent the molten metal from entering and filling the cylinder. By holding the metal in pot 12 during the intervals between casting operations the metal may readily be kept at the proper temperature for the work. Owing to the construction and disposition of the melting-pot, a high and uniform temperature may be more readily maintained in that part alone, than could be effected if the metal was allowed to stand in both the pot and cylinder during the intervals the plunger is at rest.

The necessary disposition of the open end 13 of the melting-pot in the narrow space between the plate 7 and the die-support 29, so as to permit fresh metal to be inserted for melting, renders it difficult to provide a convenient covering for the same, which will not interfere with the adjacent working parts. To overcome this difficulty and at the same time to effect a tight seal of the top of the melting-pot, during each operation, an inverted cup-like part 43 is formed on the under side of the support 29, which is adapted to fit over the mouth 13 of the pot, like a cap. Owing to the manner in which the plate 29 is operated on its pivot 30, the cap 43 must be formed to loosely fit over the mouth of the pot. To properly seal the mouth 13 so as to prevent over-flow of the metal when under pressure produced by the inward stroke of the plunger, a lining or packing of asbestos or like material 52, is

fitted to the inner face of the cup, in a manner to effectively seal the melting-pot each time die plate 29 is placed in horizontal position, as shown in the drawings, and particularly to seal the same during the interval that the valve 44 is open. When plate 29 is swung upwardly on the pivot 30, the mouth of the pot is opened to permit fresh unmelted metal to be inserted.

By the employment of the valve 44, connected and operated in the manner described, the employees may perform their work about the machine with greater safety, because there is little or no danger of the molten metal being forced out of either the nozzle 27, or the mouth 13 of the melting-pot, by the accidental operation of the plunger. Heretofore casting machines of the class have not been provided with such safe-guards and many of the attendants have been burned by the molten metal which at times was forced out of the melting-pot and nozzle, when the die was disconnected.

It is obvious that some changes or modifications may be made in the parts of the device without departing from the spirit of my invention and I therefore do not wish to restrict myself to the precise construction and arrangement as herein shown and described.

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

1. A casting apparatus, comprising a furnace, a casting-cylinder disposed in said furnace, a plunger for said cylinder, a lantern support for said plunger, the inner end of said support inserted in the outer end of said cylinder, a mold disposed above said casting-cylinder, a tubular passage connecting said cylinder with said mold, means for locking said mold in casting position, a melting-pot mounted on the side of said casting-cylinder, a port connecting the melting-pot with said cylinder, a valve to control the flow of molten metal from said melting-pot into said cylinder, a train of sprocket-gears to connect said valve with said mold-locking-means, and a crank adapted for synchronously operating said valve and said mold-locking-means.

2. A casting apparatus, comprising a furnace and means for heating the same, a casting-cylinder disposed in said furnace, a plunger loosely fitting said cylinder, a cylindrical guide for said plunger, the inner end of said guide tightly fitted to the outer end of said cylinder, a hand-lever for operating said plunger, a mold disposed above said casting-cylinder, a discharge tube connecting said cylinder with said mold, a locking-member mounted upon a rock-shaft adapted to hold said mold in casting position, a melting-pot disposed in said furnace and connecting with said cylinder by means of a port, a valve interposed between said melting-pot and said cylinder adapted to permit or prevent the flow of molten metal from said melting-pot into said cylinder, the said valve having an operating-rod extending outwardly through a slot in the wall of said furnace, a guard to close said slot, a sprocket-wheel mounted on the outer end of said valve-rod, a sprocket-wheel mounted on said rock-shaft, a chain to connect said sprocket-wheels, and a crank mounted on said rock-shaft adapted to operate said lock and said valve synchronously.

3. The combination with a fire-box and a mold operatively mounted upon said box, of a casting-cylinder having one open end disposed in said fire-box, a plunger loosely fitting said cylinder adapted to be operated for displacing and forcing molten metal into the mold, a lantern-guide to support said plunger when in its outer position and adapted to guide said plunger concentric to the bore of said cylinder when operated reciprocally therein, the inner end of said guide tightly fitting the outer end of said cylinder, a packing-ring disposed around the inner end of said cylinder and against the inner end of said guide, a melting-pot disposed in said fire-box, a port to connect said melting-pot with said cylinder, a valve disposed in the bottom of said cylinder adapted to open and close said port, the said valve formed on the inner end of an operating-stem, a tubular casing surrounding said valve stem, the inner end of said casing connected by threads to the bottom of said cylinder, a sprocket-gear mounted on the outer end of said valve stem, a rock-shaft mounted upon said fire-box, a sprocket-wheel mounted on the outer end of said rock-shaft, a chain to operatively connect said sprocket-wheels, a locking-member mounted on the inner end of said rock-shaft, adapted to lock and hold the mold in casting position, a crank mounted upon the outer end of said rock-shaft for operating said locking-member and said valve in the same time, and a lever for operating said plunger.

4. A casting apparatus, comprising a casting-cylinder having a discharge tube disposed near one end, a mold disposed above said cylinder and connecting with said discharge tube, a melting-pot having an open top and having a contracted passage in its bottom, a port in said cylinder connecting with said passage, a valve disposed in said passage adapted to permit or prevent the flow of molten metal from said melting-pot into said cylinder, means for locking and holding said mold against the free end of said discharge tube, means for connecting said valve with said locking-means, and means for operating said valve and said locking-means synchronously.

5. A casting apparatus, comprising a casting-cylinder having a discharge tube disposed near one end, a mold disposed above said cylinder and connecting with said dis-

charge tube, a melting-pot having an open top and having a contracted passage in its bottom, a port in said cylinder connecting with said passage, a valve disposed in said passage adapted to permit or prevent the flow of molten metal from said melting-pot into said cylinder, means for locking and holding said mold against the upper end of said discharge tube, means for connecting said valve with said locking-means, means for operating said valve and said locking-means synchronously, a cylindrical plunger operable reciprocally in said cylinder, the said plunger having a smaller diameter than the bore of said cylinder, the said plunger adapted to be operated for displacing molten metal and forcing the same from said cylinder into said mold, and a hand-lever for operating said plunger.

6. A casting apparatus, comprising a furnace, a casting-cylinder disposed in said furnace having one open end, and having a discharge tube disposed near the opposite end, a plunger adapted to operate reciprocally in said cylinder, the said plunger having a diameter smaller than the bore of said cylinder, a cylindrical-support for said plunger, the inner end of said support telescoping the open end of said cylinder and rigidly secured thereto, the said support adapted to guide and hold said plunger truly concentric to the bore of said cylinder, a hand-lever pivoted to said furnace for operating said plunger, a mold mounted upon said furnace adapted when set in casting position to connect with said discharge tube, and capable of being moved away from said discharge tube for the purpose of removing a casting, a rock-shaft disposed upon said furnace having a mold-lock mounted on one end and a sprocket-wheel fitted to the opposite end, a melting-pot supported by said casting-cylinder, a port connecting said melting-pot with said casting-cylinder, a valve to permit or prevent the flow of molten metal from said melting-pot into said casting-cylinder, the said valve having an operating-rod disposed in a slot formed in the wall of said furnace, a bracket mounted on the top of said furnace having an upwardly projecting arm to support said rock-shaft, and having a downwardly extending arm to support the outer end of said valve-rod, a sprocket-gear mounted on the outer end of said valve-rod in line with the first-mentioned sprocket-wheel, a chain to operatively connect said sprocket-wheels, and a crank mounted on said rock-shaft for operating said mold-lock and said valve in equal time, substantially as described.

7. A casting machine, comprising a fire-box, a melting-pot disposed in said fire-box, a casting-cylinder disposed in said fire-box, the said cylinder having a port for the passage of molten metal from the said melting-pot, a plunger loosely fitting said cylinder, a cylindrical guide for supporting said plunger, one end of said guide fitting in the end of said cylinder, means for operating said plunger reciprocally for the purpose of displacing molten-metal from said cylinder, a valve disposed in the underside of said cylinder adapted to permit or prevent a passage of molten metal from said melting-pot into said cylinder, and means for operating said valve.

8. A casting apparatus, comprising a casting-cylinder having a discharge tube near one end, the opposite end being open, a mold disposed above said cylinder and connecting with said discharge-tube, a melting-pot having an open top and a contracted passage in its bottom, a port in the bottom of said cylinder connecting with said passage, a valve disposed in said passage adapted to permit or prevent the flow of molten metal from said melting-pot into said cylinder, a lock for holding said mold in operative engagement with said discharge-tube, a pair of sprocket-gears and a chain to connect said valve with said lock, and means for operating said valve and said lock synchronously.

9. A casting apparatus, comprising a fire-box having a movable cover, a casting-cylinder supported by said fire-box cover suspended in the fire-box, the said cylinder having a discharge-tube formed near one end, the opposite end thereof being open, connecting with said discharge-tube, the said mold mounted upon a support hinged to the cover of the fire-box, a melting-pot supported by said cover having an open top for inserting unmelted metal and having a contracted passage in its bottom for the discharge of molten metal, a port in said cylinder connecting with the passage in said melting-pot, a cylindrical-guide having its inner end tightly fitted in the open end of said cylinder, its outer end projecting through the wall of the fire-box, a plunger supported by and operatively fitting said guide adapted for reciprocal movement in said cylinder, the said plunger having a less diameter than the bore of said cylinder, adapted for displacing and forcing molten metal from said cylinder through said discharge-tube into said mold, and a valve disposed in the bottom of said cylinder adapted to permit or prevent the passage of molten metal from said melting-pot into said cylinder.

10. A casting apparatus, comprising a fire-box having a movable cover, a casting-cylinder and melting-pot supported by said cover within the fire-box, the melting-pot and casting-cylinder connected by a port, a mold disposed above said cylinder, the said mold mounted upon a support hinged to the cover of the fire-box, a discharge-tube for connecting said cylinder with said mold, a

lantern-guide having its inner end tightly fitted in the outer end of the cylinder, its outer end extending through the wall of the fire-box, a plunger supported by and operatively fitting said guide for reciprocal movement in said cylinder for displacing and forcing molten metal from said cylinder into said mold, and a valve disposed in the bottom of said cylinder adapted to permit molten metal to flow from said melting-pot into said cylinder when said mold is in engagement with said discharge-tube and to prevent the molten metal from flowing into said cylinder when said mold is out of engagement with said discharge-tube.

11. A casting apparatus, comprising a fire-box having a movable cover, a casting-cylinder and melting-pot supported by said cover within the fire-box, the melting-pot and casting-cylinder connected by a port, a mold disposed above said cylinder, the said mold mounted upon a support hinged to the cover of the fire-box, a discharge-tube for connecting said cylinder with said mold, a lantern-guide having its inner end tightly fitted in the outer end of said cylinder, its outer end extending through the wall of the fire-box, a plunger supported by and operatively fitting said guide adapted for reciprocal movement in said cylinder for displacing and forcing molten metal from said cylinder into said mold, a valve disposed in the bottom of said cylinder adapted to permit molten metal to flow from said melting-pot into said cylinder when said mold is in engagement with said discharge-tube and to prevent the molten metal from flowing into said cylinder when said mold is out of engagement with said discharge-tube, and means for operating said valve.

12. A casting apparatus, comprising a fire-box having a movable cover, a casting-cylinder and melting-pot supported by said cover within the fire-box, the melting-pot and casting-cylinder connected by a port, a mold disposed above said cylinder, the said mold mounted upon a support hinged to the cover of the fire-box and movable independently of said cover, a discharge-tube for connecting said cylinder with said mold, a lantern-guide having its inner end tightly fitted in the outer end of said cylinder, its outer end extending through the wall of the fire-box, a plunger supported by and operatively fitting said guide adapted for reciprocal movement in said cylinder for displacing and forcing molten metal from said cylinder into said mold, a valve disposed in the bottom of said cylinder adapted to permit molten metal to flow from said melting-pot into said cylinder when said mold is in engagement with said discharge-tube, and to prevent the molten metal from flowing into the cylinder when said mold is out of engagement with said discharge-tube, a lock for holding said mold in engagement with said discharge-tube, and a pair of sprocket-gears and a chain for operating said lock and said valve synchronously.

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

ELBERT B. VAN WAGNER.

Witnesses:
ELEONORA DOMSER,
ROBERT L. WALLACE.