No. 623,053. Patented Apr. 11, 1899.

A. L. WALKER.

APPARATUS FOR CASTING METAL.

(Application filed Sept. 2, 1898.)

(No Model.) 5 Sheets—Sheet 1.

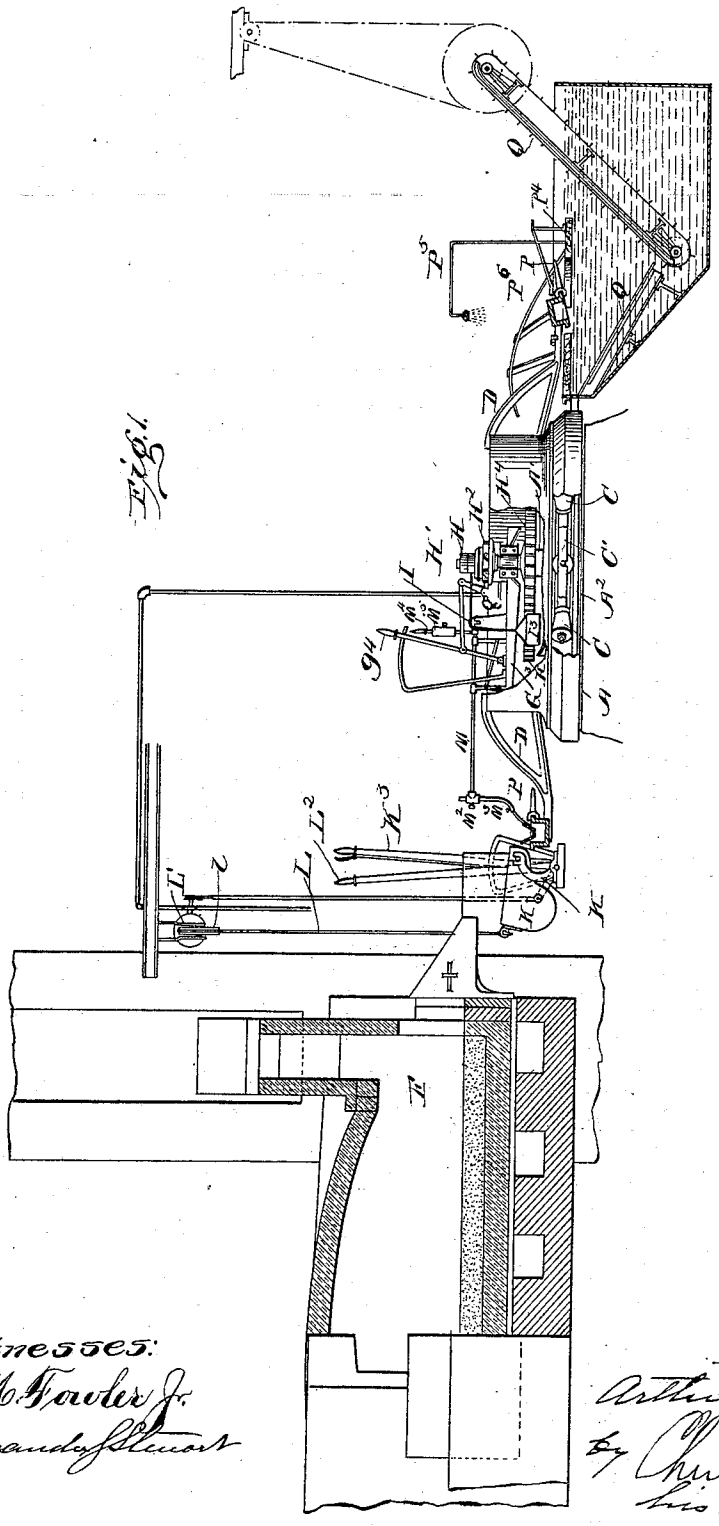


Fig. 1.

Witnesses:
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(No Model.)

5 Sheets—Sheet 2.

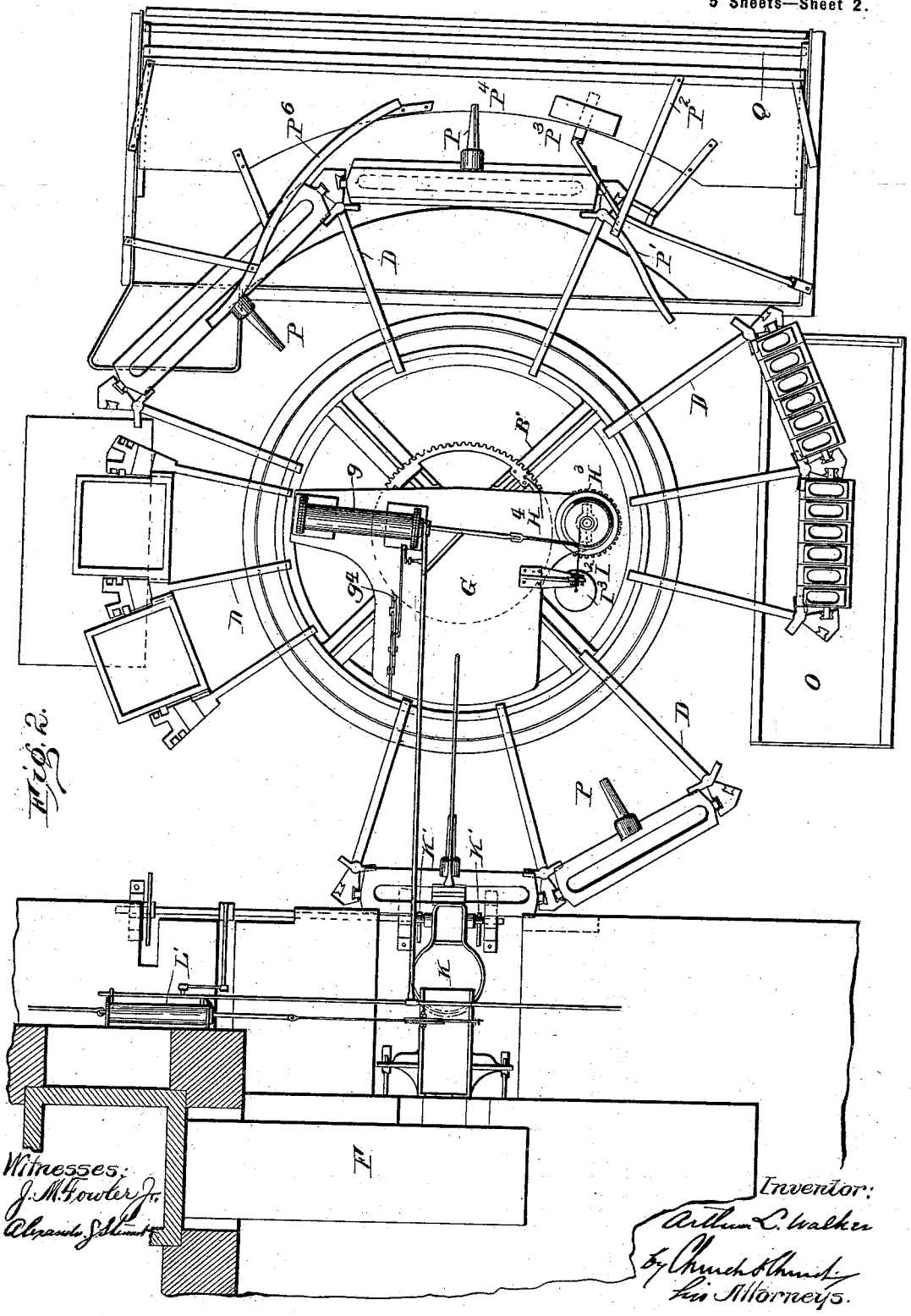


Fig. 2.

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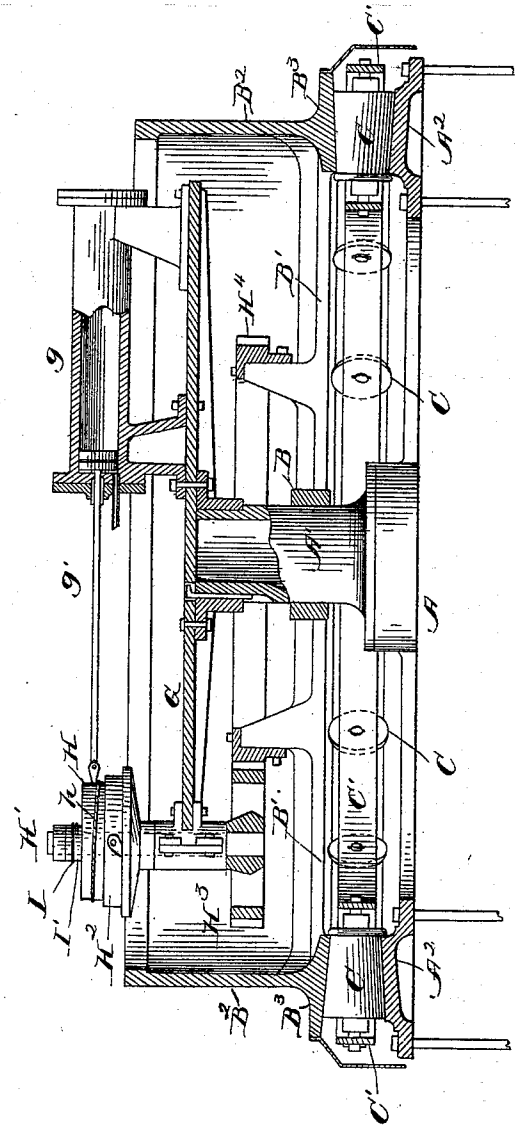
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(No Model.) 5 Sheets—Sheet 3.

Fig. 3.



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(Application filed Sept. 2, 1898.)

(No Model.) 5 Sheets—Sheet 4.

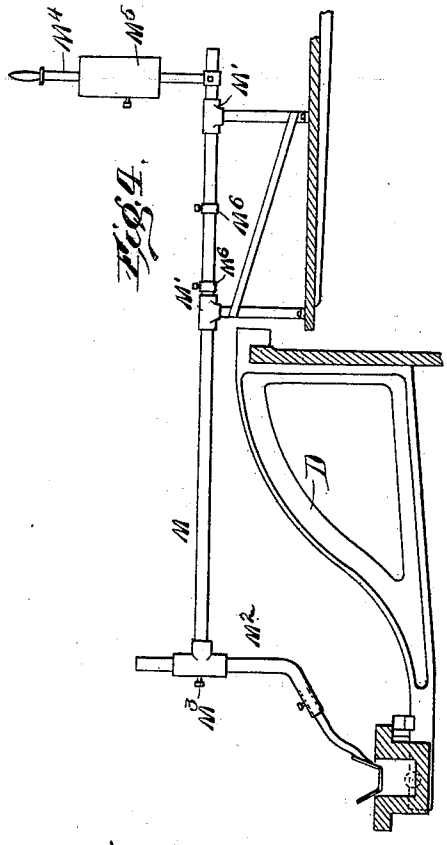


Fig. 4.

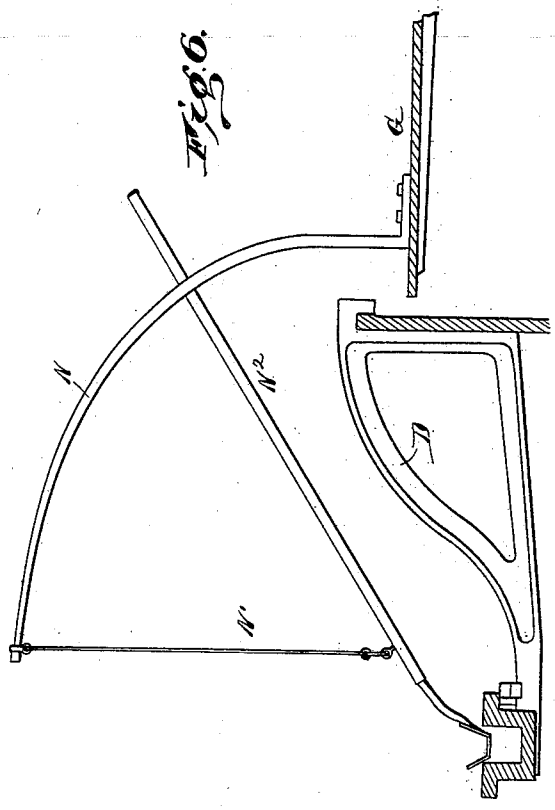


Fig. 6.

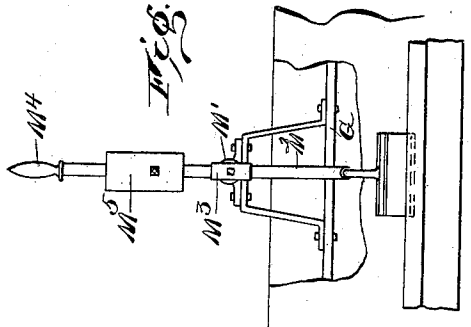


Fig. 5.

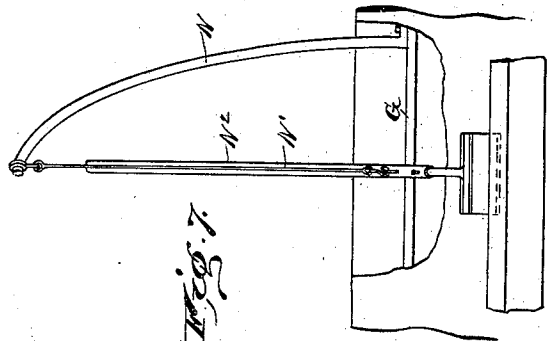


Fig. 7.

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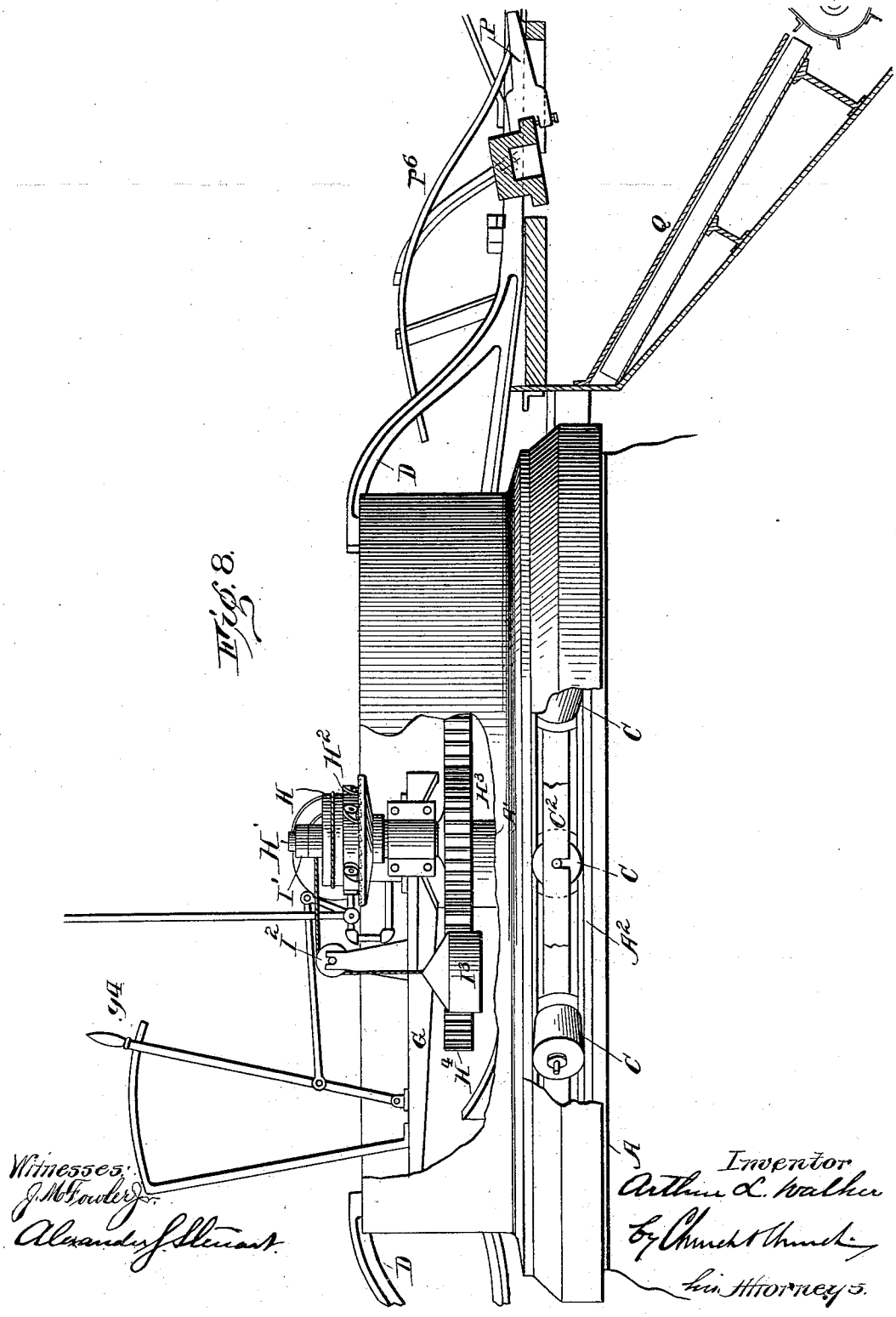


Fig. 8.

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UNITED STATES PATENT OFFICE.

ARTHUR L. WALKER, OF BALTIMORE, MARYLAND.

APPARATUS FOR CASTING METAL.

SPECIFICATION forming part of Letters Patent No. 623,053, dated April 11, 1899.

Application filed September 2, 1898. Serial No. 690,109. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR L. WALKER, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Apparatus for Casting Metals; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the letters of reference marked thereon.

This invention relates to improvements in apparatus for facilitating the casting of metals—such, for instance, as is set forth in my prior patent, No. 597,367, wherein the molds are supported by a movable or rotary carrier and are successively brought into position to receive the molten metal from the furnace or ladle and are thence carried to the bosh or pit, where the castings are discharged from the molds and the molds again returned to the metal-receiving point; and the invention consists in an improved arrangement of the mechanism and in certain details of construction of the several parts, whereby the mechanical operations are facilitated, the labor of the attendant decreased, and the speed and efficiency of the apparatus greatly increased.

In the accompanying drawings, Figure 1 is a side elevation, partly in section and partly broken away to illustrate more completely internal and hidden parts of the mechanism. Fig. 2 is a top plan view of the apparatus. Fig. 3 is a sectional view taken at right angles to Fig. 1 to illustrate the carrier and its rotating mechanism. Fig. 4 is a detail elevation of the deflector-supporting mechanism on an enlarged scale, and Fig. 5 is a similar view looking at the left-hand end of the mechanism illustrated in Fig. 4. Figs. 6 and 7 are views corresponding to Figs. 4 and 5, illustrating a modified deflector-supporting mechanism. Fig. 8 is a side elevation of the central portion of the structure Fig. 1 on an enlarged scale.

Like letters of reference in the several figures indicate the same parts.

Referring to Figs. 1, 2, and 3, particularly Fig. 3, it will be seen that upon a suitable foundation A there is arranged a central upright or post A′, surrounded by a concentric track or way A^2, the diameter of which should be made sufficient to afford the necessary support to the carrier and which is preferably of a diameter equal to that of the carrier proper. This carrier, as shown, is preferably made in the form of a wheel having its central hub B journaled on the upright A′ and joined by a series of arms B′ with a relatively wide peripheral flange B^3. The flange B^3 extends some distance above the level of the arms B′ in the form of apparatus shown, and its lower edge is widened out to afford a bearing B^3, which, through the medium of antifriction-rollers C, coöperates with the track or way A^2. The rollers C may be suitably supported and spaced by spacing-rings C′, arranged to connect their journals, as will be readily understood.

The peripheral flange B^3 of the carrier is adapted to support a series of adjustable bracket-arms D, in the outer edge of which the molds for the metal are journaled in suitable bearings formed in the arms and upon journals either formed directly upon the molds themselves or connected with the molds in any suitable manner. The brackets being adjustable permit of the use of molds of various sizes and shapes, in this particular the apparatus being similar to that described in my before-mentioned patent.

The molds mounted on the carrier are adapted to receive the molten metal from any suitable source—as, for instance, from the furnace F—through mechanism to be presently described, and to be conveyed thence to the dumping-point, as will also be presently described, and in order to give the carrier the movement necessary for carrying out this operation I preferably mount on the central upright or pivot of the carrier a fixed platform G, Fig. 3, upon which an attendant may stand, and upon this platform I also mount the rotating mechanism for the carrier. This mechanism is preferably operated hydraulically, although other power may be employed, and, as shown, it consists of a hydraulic cylinder g, the piston-rod g' of which is connected with a pulley H through the medium of a flexible connection h, and this pulley H is journaled upon a vertical shaft H′, the whole being in turn journaled on the stationary platform G. A ratchet-and-pawl connection H^2 is interposed between the pulley

H and shaft H′, whereby when the piston is forced in one direction the shaft H′ will be rotated; but when said piston is moving in the opposite direction and the pulley H operating in the correspondingly opposite direction no movement will be imparted to the said shaft. To secure this reverse movement of the pulley H, a flexible connection I, passing around a relatively small drum I′ on said pulley, extends over an idler-pulley I^2 and has connected to it a weight I^3, which tends constantly to draw the flexible connection in a direction to move the pulley H reversely. As the piston is moved to advance or rotate the shaft H forwardly the weight I^3 will be raised, and when the power or pressure in the cylinder is released the weight will move the parts reversely. Upon the lower end of the shaft H there is mounted a wheel H^3, which meshes with a relatively large gear-wheel H, mounted on the arms B′ of the carrier. The pressure to the operating-cylinder *g* is controlled by a hand-lever g^4, Fig. 1, arranged in position to be conveniently reached by the attendant standing on the platform and from which point it will be noted that he is in position to survey all of the molds held by the carrier and may therefore control the movement of the carrier with the utmost facility.

Between the molds and the melting-furnace or other source from which the molten metal is supplied to the molds there is arranged a ladle K, the forward end of which is supported upon rocking arms or trunnions K′, so as to advance or move backwardly the pouring end of the ladle without materially changing its level, the said pivotal point between the ladle and trunnions being also at approximately the level and very near the front end of the pouring-spout or discharge-opening of the ladle as a further protection against any change of level during the pouring operation, and consequently insures a uniform dropping of the metal into the mold. The rear end of the ladle is suspended from a connection L, the upper end of which passes over a pulley *l*, firmly attached to the framing, and extends thence to a hydraulic or power cylinder L′, the pressure to which is controlled through a hand-lever L^2, located at any convenient point within reach of the attendant. The rocking trunnions of the ladle are also preferably controlled by a hand-lever K^3, also preferably located within reach of the same attendant who controls the hand-lever L^2. Thus the attendant watching the pouring operation may single-handed watch and control accurately the entire pouring operation; but in order to insure a more complete operation or result there is interposed between the ladle and the molds during the pouring operation a deflector, the particular formation of which is varied to suit the material and form of casting being made, as described in my prior patent. In the present instance, however, this deflector is supported from the central platform of the carrier and is directly under the control of the attendant located on the platform through the medium of a handle, which extends up over the peripheral rim of the carrier.

Various mechanisms may be arranged upon the central stationary platform for supporting the deflector, and in Figs. 4 and 5 I have shown the preferred form of such mechanism, consisting of a substantially horizontal shaft M, supported in bearings M′ on the platform and adapted at one end to be adjustably connected with the deflector-arm M^2, as by a sleeve and set-screw connection M^3, and at the other end to support an operating or controlling handle M^4, with a suitable counterweight M^5, adjustable on said handle. The shaft M is adapted to be moved in the bearings M′ longitudinally or to be rotated to swing the deflector to one side or the other, as occasion requires, the counterweight M^5 balancing the weight of the deflector and materially reducing the labor of the attendant in manipulating the same. For limiting the longitudinal movement of the shaft adjustable collars M^6 may be mounted thereon between the bearings M′. Thus the extreme range of movement of the deflector may be limited or adjusted to conform to the formation or position of the molds being used at any particular time, and the variation in the weight of the deflector used may be compensated for by the adjustment of the counterweight M^5 on the controlling-handle M^4.

Should it be desired, a simple crane or overhanging arm N, Figs. 6 and 7, may be mounted on the central platform and the deflector supported therefrom by a hanging connection N′ and the long handle N^2 of the deflector, extending back over the rim of the carrier, be utilized for controlling the position of the deflector, this form of apparatus making an exceedingly simple arrangement—an improvement advantageous from an economical point of view—although the first-described arrangement is preferred.

Small castings or castings of small articles may be dumped out of their molds when they have been carried through an arc of ninety degrees into a water-bosh or dry pit O, while larger castings may be carried through an arc of one hundred and eighty degrees or, if desired, farther and dropped into a bosh or pit containing water, if so desired, and conveyed away automatically. The dumping operation may be performed automatically, and I have shown in the drawings one arrangement for accomplishing this end. Upon those molds which it is desired to dump automatically a dumping handle or projection P is provided in such position that as the molds are advanced by the carrier the handle P will be brought into contact with an incline P′, supported by a frame P^2, and by said incline raised until the mold is inverted, when the handle will slide down a second incline P^3 until it comes in contact with and rests upon the top P^4 of the box, and in this position the casting will drop out, the position of the mold being

as shown in Fig. 1, with its upper end preferably below the level of the top of the bosh, so as to lie in the water contained in said bosh, and kept approximately at the level of the top of the bosh. The effect of the water is to cool the mold to fit it for the subsequent reception of molten metal, and in order to heighten this effect a spray P^5 is preferably arranged to play on the bottom of the inverted mold, as also indicated in Fig. 1.

Before the mold leaves the bosh or reaches a position where its end might strike the side wall of the bosh the inverting-arm P comes in contact with another incline P^6, up which it rides as the carrier continues its movement and by which the mold is turned back to its original position ready for the reception of the molten metal when the mold reaches the receiving position again. Sufficient heat will usually be retained by the mold to insure its being completely dried after leaving the bosh and before it reaches the receiving position in front of the pouring-ladle.

When castings are dumped into the water-bosh, they slide down an inclined floor Q and are elevated from the bottom of the bosh by a slow-moving elevator Q′, which will carry them up into position to be handled by the attendants or into position to be conveyed away to any suitable source for further treatment or sale, as desired.

With an apparatus such as herein described it will be observed that practically the entire handling of the metal from the time it flows from the furnace or is deposited in the pouring-ladle until the completed castings are delivered is performed by mechanical power, but under the direct control of the attendant, whose labor, however, is very light, and as a result not only is the operation of casting facilitated and the speed with which castings may be made greatly enhanced, but the castings, receiving a uniform treatment, will be more homogeneous and uniform throughout the whole batch than it is possible where the metal is conveyed about and deposited in a series of molds which are subsequently dumped by hand.

It will be noted that the molds are pivoted on axes which are eccentric to the center of gravity of the molds. Thus the molds will normally retain their initial position with the stop projections on their inner sides engaging the supporting-brackets, as in my former patented construction; but in the present instance a greater proportion of the molds which are intended to be subjected to the action of the water in the water-bosh lies above their axes. The result of this arrangement is that when inverted the lower portion of the inverted mold (formerly the top of the mold) occupies a plane which is lower than the normal plane of the bottom of the mold, and hence when inverted the top of the mold may be extended down into the water within the water-bosh, as before explained, the walls of the bosh for this purpose being higher than the plane of the lower portion of the inverted mold, but lower than the normal level of the bottom of the mold when in initial position.

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

1. In a casting apparatus, the combination with a mold-carrier having mold-supporting brackets mounted thereon, and means for rotating it in a horizontal plane, of a fixed platform mounted centrally of said carrier and controlling mechanism for govering the movement of the carrier located on said platform; substantially as described.

2. In a casting apparatus, the combination of the horizontally-rotating mold-carrier, a central fixed shaft or support about which said carrier rotates and a fixed platform supported by said shaft and forming a suitable base for the operator; substantially as described.

3. In a casting apparatus the combination of the mold-carrier and means for rotating it in a horizontal plane, a central fixed shaft or support about which said carrier rotates and a fixed platform supported by said shaft with carrier-controlling mechanism mounted on said platform; substantially as described.

4. In a casting apparatus, the combination with the horizontally-rotatable carrier having the mold-brackets mounted thereon, of a central shaft about which said carrier rotates, projecting up through the carrier, a horizontal platform mounted on the upper end of said shaft and fixed with relation to the carrier, a driving mechanism mounted on said platform, gearing interposed between said driving mechanism and carrier and a controlling-handle for said driving mechanism; substantially as described.

5. In a casting apparatus, the combination with the horizontally-rotatable carrier, having mold-supporting brackets projecting therefrom and a central shaft about which said carrier rotates projecting up through the carrier, of a platform supported on said shaft above the carrier, a hydraulic cylinder mounted on the platform, a piston working in said cylinder, a shaft rotated by the movement of the piston and gearing interposed between said shaft and carrier as set forth.

6. In a casting apparatus, the combination with a horizontally-rotatable carrier, of a driving mechanism for rotating said carrier embodying a hydraulic-cylinder and piston, a shaft, connections between said piston and shaft whereby the latter is rotated with a ratchet interposed in said connections for preventing reverse movement of the shaft and gearing interposed between the shaft and carrier; substantially as described.

7. In a casting-machine, the combination with a horizontally-rotatable carrier, having mold-supporting brackets projecting therefrom, of a driving mechanism for rotating said carrier embodying a hydraulic reciprocating motor, a drum, connections between the

motor and drum, whereby the latter is rotated in one direction by the motor, a weight connected with the drum for rotating it in the opposite direction, a shaft gearing with the carrier and a pawl-and-ratchet connection interposed between the drum and shaft; substantially as described.

8. In a casting-machine, the combination with a horizontally-rotatable carrier and a series of pivoted dumping-molds mounted on and entirely supported thereby with controlling-arms for said molds, of inclines with which said arms coöperate as the carrier rotates to invert said molds and discharge the castings; substantially as described.

9. In a casting apparatus, the combination with a horizontally-rotatable carrier, having a series of mold-supporting brackets projecting therefrom, dumping-molds pivoted on horizontal axes tangential to the carrier in said supporting-brackets and entirely supported thereby and controlling-arms for said molds, of an incline located in the path of travel of said controlling-arms, whereby the molds are inverted to discharge the castings, and reverse inclines also located in the path of travel of said controlling-arms for returning the molds to their initial position; substantially as described.

10. In a casting apparatus, the combination with the horizontally-rotatable carrier, the mold-supporting brackets carried thereby, the molds journaled in said arms on horizontal axes and controlling-arms for said mold, of an incline lying in the path of travel of said controlling-arm for inverting the mold, a second incline with which said arms coöperate, and down which they travel as the molds become inverted and a reverse incline lying in the path of travel of said arms when the molds are in their inverted position for returning the molds to their initial position; substantially as described.

11. In a casting apparatus, the combination with a horizontally-rotatable carrier and a series of molds supported thereby, of a central stationary platform arranged within said carrier, a pouring-ladle for supplying molten metal and a universally movable deflector interposed between said ladle and molds, with a support for said deflector carried by the central fixed platform; substantially as described.

12. In a casting apparatus, the combination with the horizontally-rotatable carrier, a series of molds supported thereby, a pouring-ladle for supplying molten metal to said mold and a fixed support or platform, of a substantially horizontal shaft mounted in bearings on said platform to rotate and move longitudinally, a deflector carried by said shaft and adapted to be interposed between the ladle and mold, and a controlling-handle and counterweight also carried by said shaft for manipulating the deflector; substantially as described.

13. In a casting apparatus, the combination with the horizontally-rotatable carrier, the series of molds supported thereby, a pouring-ladle for supplying molten metal to the mold and a fixed platform, of a substantially horizontal deflector-supporting shaft mounted in bearings on said platform so as to be capable of a rotary and a longitudinal movement, a vertically-adjustable deflector-arm carried by one end of said shaft with a deflector connected with said arm and adapted to be interposed between the ladle and molds, and a controlling-handle and counterweight carried by the opposite end of said horizontal shaft; substantially as described.

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