No. 706,841. Patented Aug. 12, 1902.

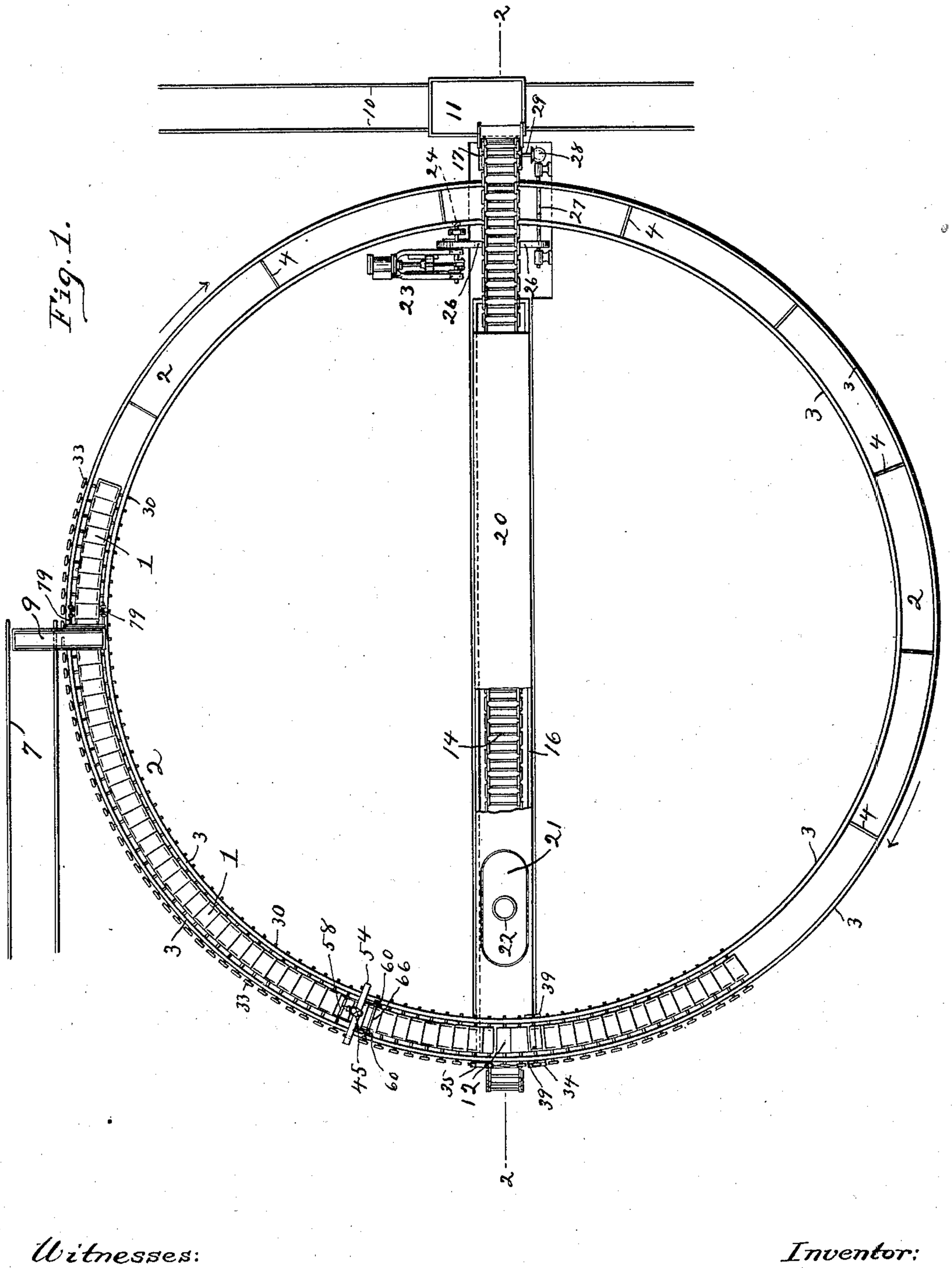
P. MEEHAN.

CASTING APPARATUS.

(Application filed Apr. 21, 1900.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.



Witnesses:

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(No Model.) 3 Sheets—Sheet 2.

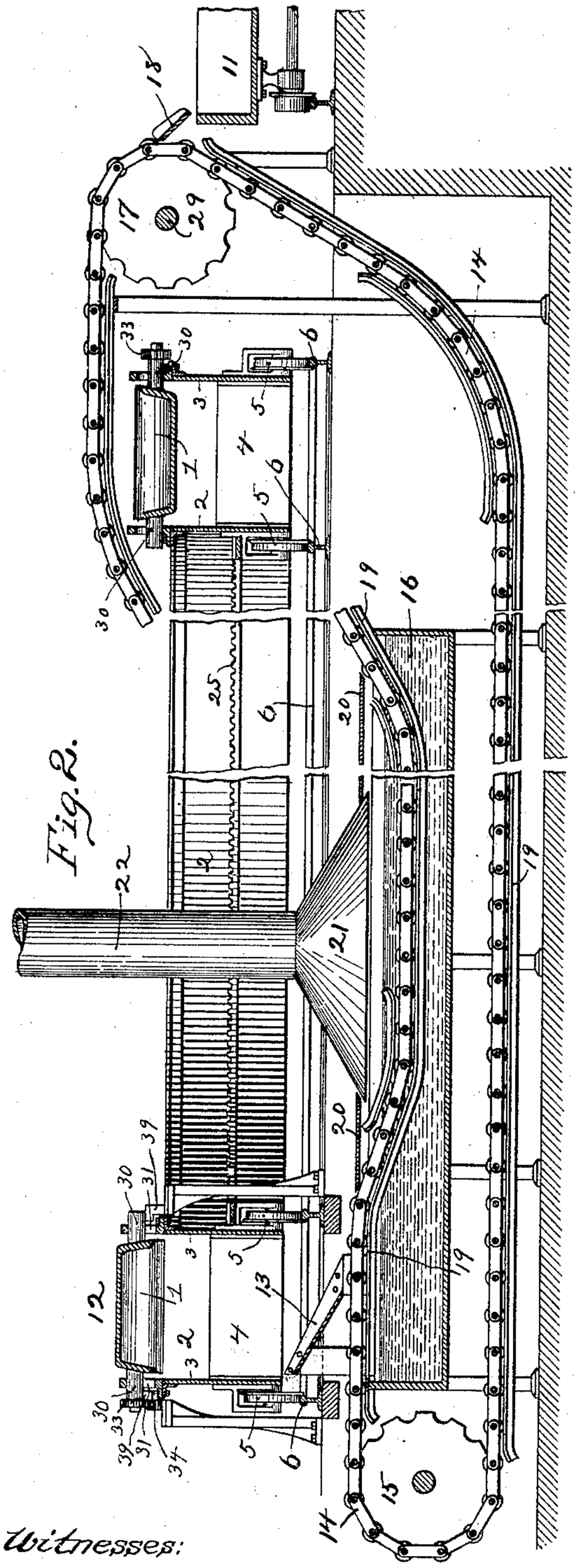

Fig. 2.

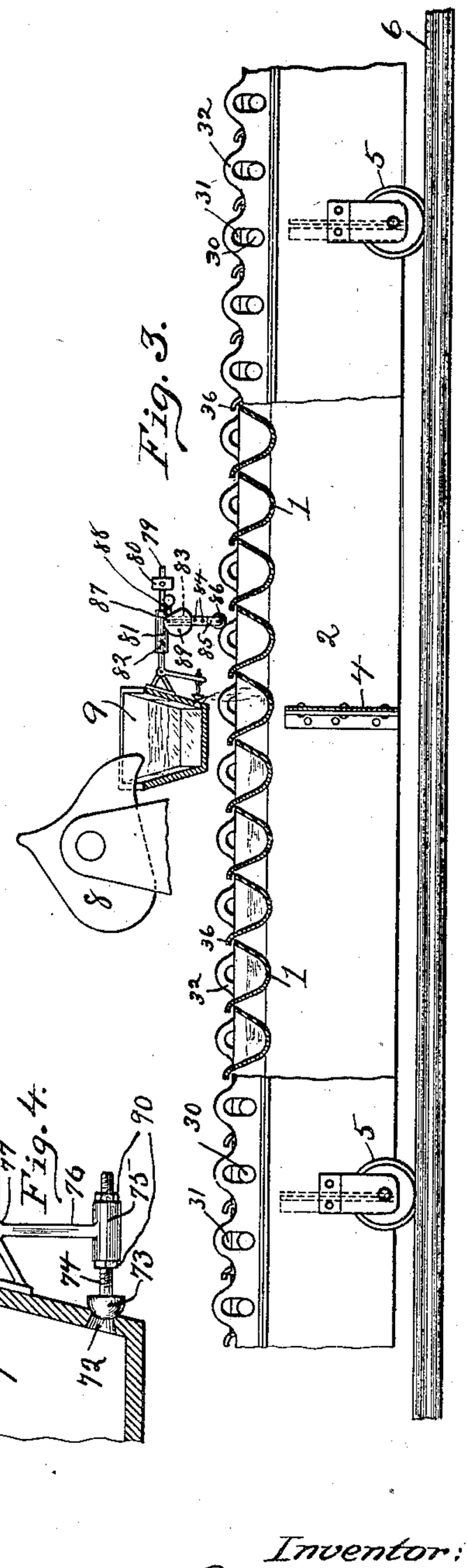

Fig. 3.

Fig. 4.

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Fig. 5.

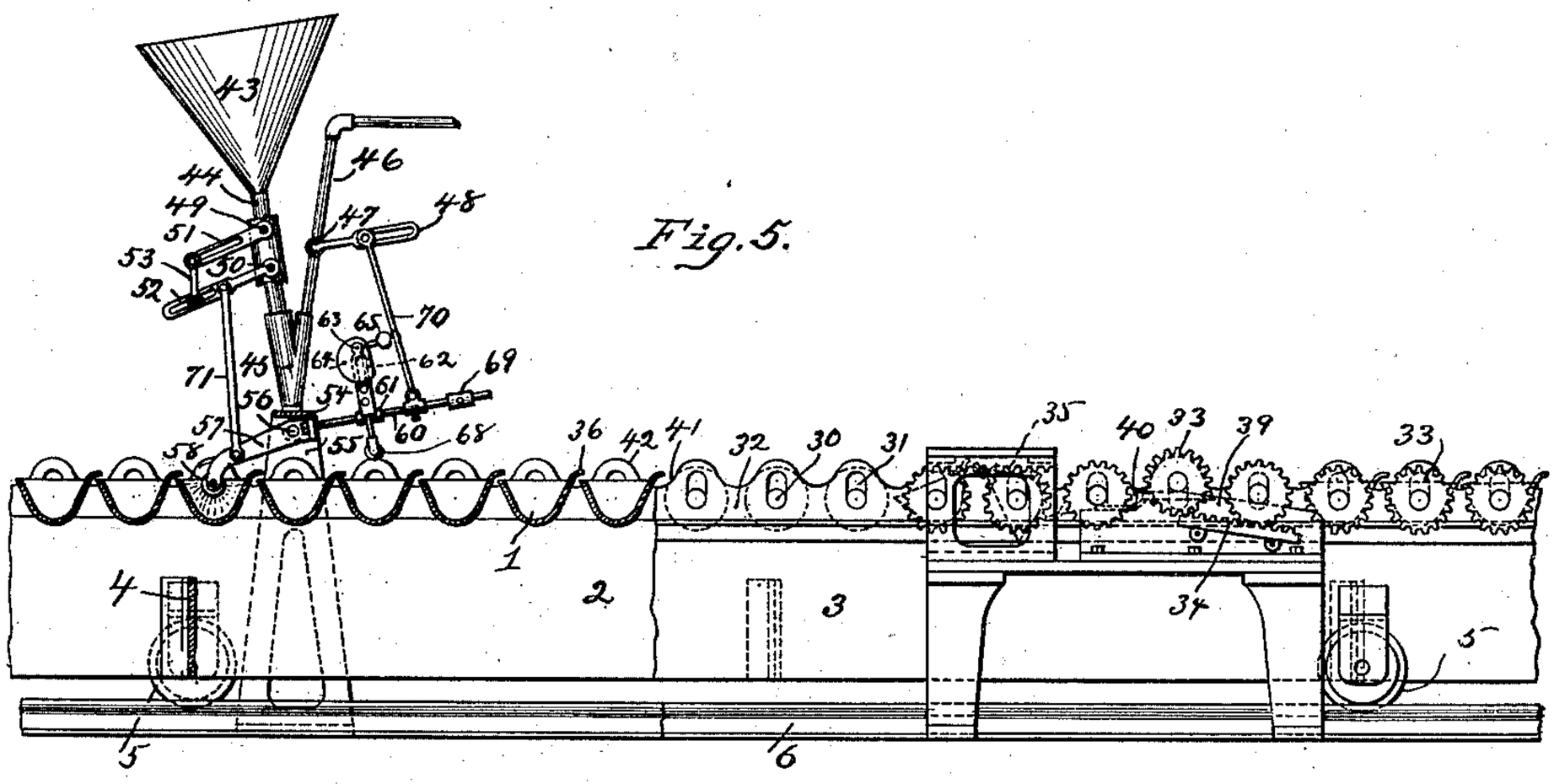


Fig. 6.

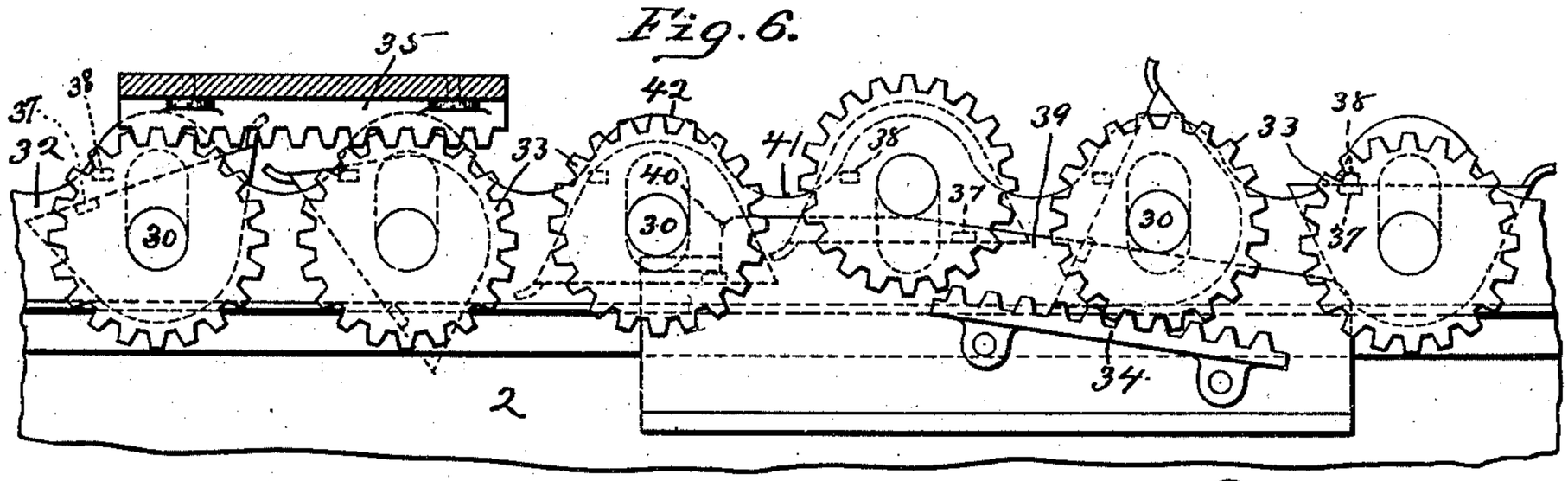


Fig. 7.

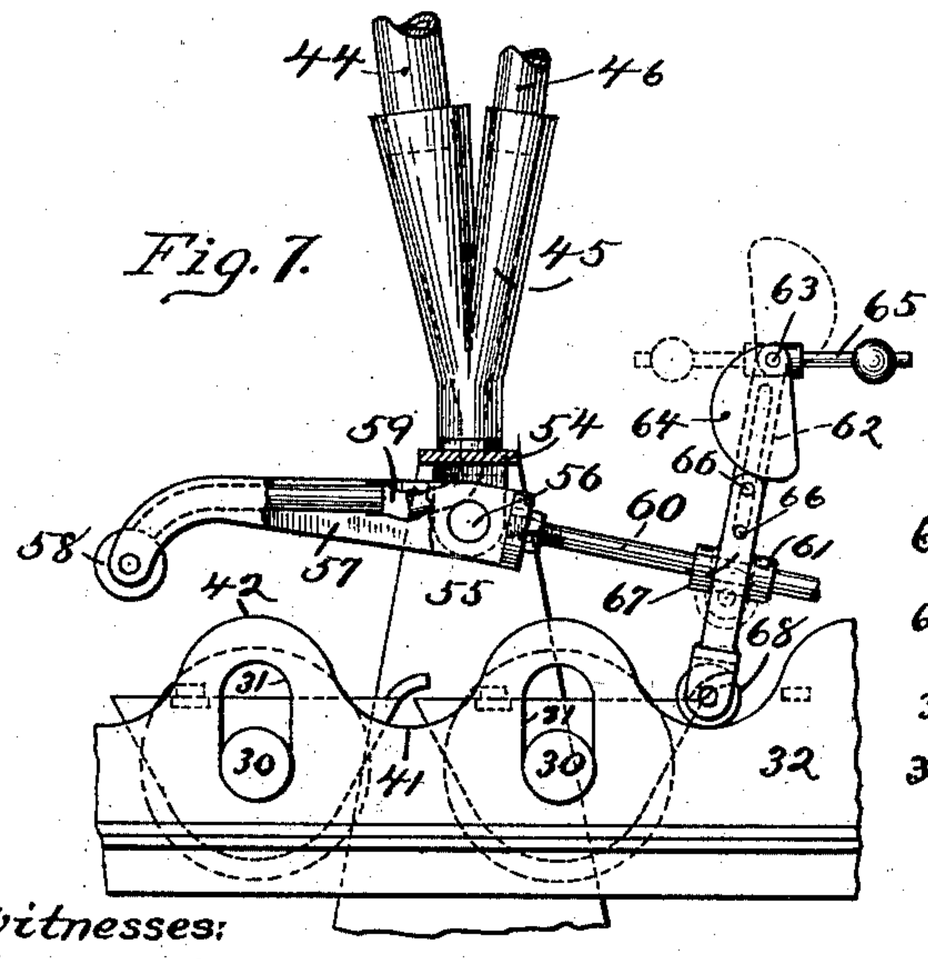
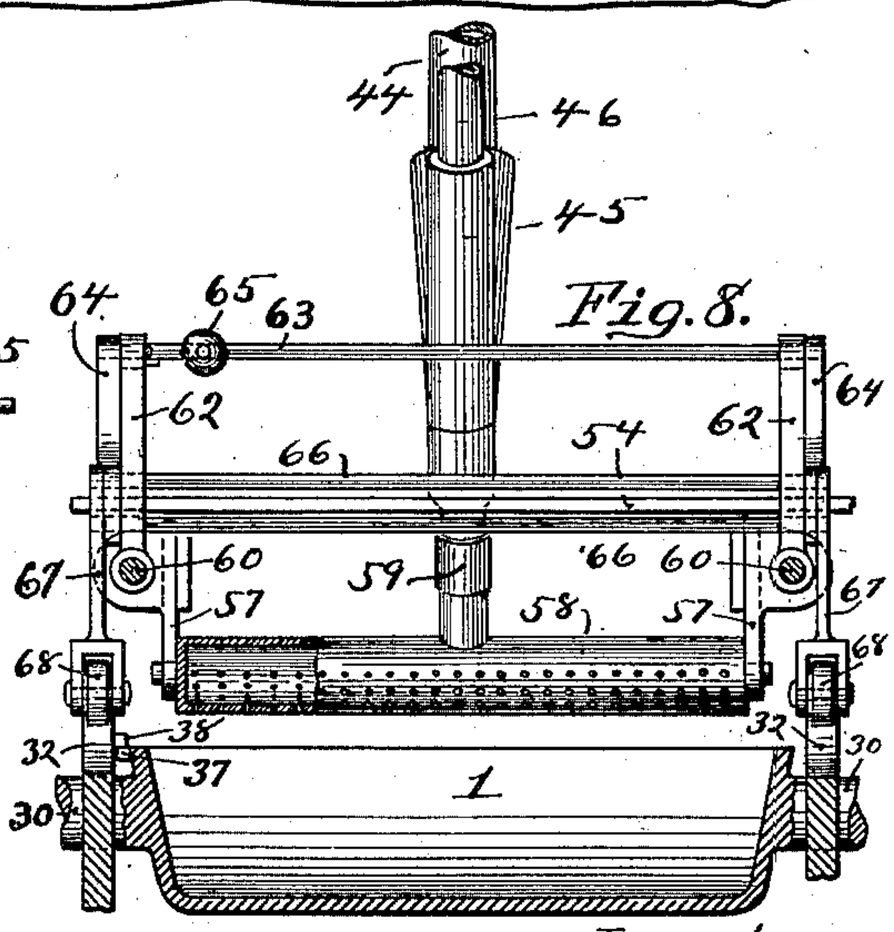


Fig. 8.



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UNITED STATES PATENT OFFICE.

PATRICK MEEHAN, OF LOWELLVILLE, OHIO.

CASTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 706,841, dated August 12, 1902.

Application filed April 21, 1900. Serial No. 13,699. (No model.)

To all whom it may concern:

Be it known that I, PATRICK MEEHAN, a resident of Lowellville, in the county of Mahoning and State of Ohio, have invented a new and useful Improvement in Casting Apparatus; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to a machine for casting metal in which a series of molds are filled in succession and carried to a suitable point of discharge, the metal solidifying in the molds during the traverse to the point of discharge, the empty molds thence returning to the point of supply and being again filled, and so on.

The objects of my invention are to prevent the formation of scrap in a continuously-operating casting-machine to insure the casting of pigs of a uniform size, but to allow of the size being varied to prevent the filling of a defective or injured mold, to insure the discharge of the pig from the mold, to restore the mold to its proper position to be recharged, and to hold it in such position.

A further object of my invention is to coat the interior of the mold with a fixed but variable quantity of refractory material, to automatically control the spraying device, to prevent the waste of the coating material, and to throw such spraying device out of operation when desired.

A further object of my invention is to provide improved means for cooling the pigs, conveying away the steam generated thereby so as not to inconvenience the workmen, and in general to provide a machine of this character which is automatic in its operation and which occupies a minimum of space.

In casting-machines of this type heretofore devised a large amount of scrap is formed, due to the metal falling between the molds by reason of the continuous flow of the metal from the pouring trough or reservoir to the molds during the travel of the latter. From this there also results the unequal filling of the molds, there being no means provided for regulating the amount of metal flowing into a mold except by regulating the rate at which the metal is poured into the charging trough or spout. The size of the pig cannot therefore be regulated, and if the rate of pouring is not uniform the pigs in successive molds will be of varying sizes. Furthermore, if a mold should become broken or defective in any way it will be filled along with the others, no means being provided for checking the flow of metal to the mold. Furthermore, in machines of this character heretofore devised the molds in dumping are given an entire rotation, the discharge of the pigs therefrom being insured by complicated mechanism for tapping or striking the molds, and no provision is made to hold them in the proper position to be again charged. As a consequence the molds are liable to be slightly out of a true horizontal position when being recharged, thereby causing the molten metal to overflow the mold and form scrap. Furthermore, in machines of this character heretofore devised the molds are coated with refractory material either by a continuous spray, thereby wasting much of the material, or by immersing the molds in a tank, thereby overcoating the same, so that the surplus has to be removed.

The objects of my invention are to overcome the defects above enumerated, and to this end it consists in automatic mechanism for checking the flow of the metal to the molds, said mechanism being so arranged that when the mold is in proper position for filling the metal will be allowed to flow to the mold and the flow cut off when the mold is sufficiently full.

A further improvement consists in making this cut-off mechanism adjustable, so that pigs of various sizes may be cast by the same machine, in providing means whereby the automatic charging mechanism may be thrown out of operation, so as to allow a defective or injured mold to pass without being filled, in providing simplified means for rotating the mold, discharging the pig therefrom, restoring the mold to the proper position for recharging, and for holding it in such position.

A further improvement consists in providing automatic means for spraying the inside of the mold with a fixed but variable quantity of refractory material, the spraying device being operative only at the time when the mold is in proper position to receive the discharge therefrom, means being also provided for throwing the spraying device out

of operation, so as to allow defective or injured molds to pass without coating the same.

A further improvement consists in cooling the pigs after they are dumped from the molds by passing them through a water-tank and providing means for conveying away the steam generated thereby, so as not to inconvenience the workingmen, and in so arranging all the parts of the machine that the operation thereof will be continuous and automatic and occupy a minimum amount of space.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a diagrammatic plan view of my improved casting-machine. Fig. 2 is a transverse vertical section thereof on the line 2 2, Fig. 1. Fig. 3 is a side view, partly in section, of the mechanism for charging the molds. Fig. 4 is a detail view showing the adjusting means for controlling the amount of molten metal supplied to the molds. Fig. 5 is a side elevation, partly in section, showing the means for dumping the pig and the mechanism for spraying the molds with refractory material. Fig. 6 is a similar view, on an enlarged scale, of the means for dumping the pig. Fig. 7 is a detail side view of the means for spraying the interior of the molds; and Fig. 8 is a front view, partly in section, of the same.

The molds 1 are mounted upon a circular carriage or carrier 2, said carriage being composed of the side webs 3 and cross-webs 4, riveted or bolted thereto, and is provided with the wheels 5, running upon the circular track 6, all of which are well known in machines of this character and need no further description. At one side of the circular track 6 is the track 7, upon which move cars carrying ladles 8 for conveying the molten metal to the charging-trough 9, into which said molten metal is poured. The molten metal, however, may be supplied to the charging-trough directly from the furnace or by any other means than that shown. On the side of the circular track 6, ninety degrees removed from the charging-trough 9 is another track 10, upon which move cars 11 for conveying away the pigs, the tracks 6, 7, and 10 being substantially on the same level. The molds after being filled are conveyed in the direction of the arrow to the point 12, where they are inverted, and the pigs discharged upon the inclined plate 13, beneath which travels the continuous conveyer 14. This conveyer 14 passes over the carrier-wheel 15, thence under the plate 13, down into the tank 16, and thence in an upwardly-inclined direction over the circular carriage 2 on the side diametrically opposite the point where the pigs are received from the molds over the carrier-wheel 17, where the pigs are discharged upon the inclined plate 18, leading to the car 11, and then returns beneath the track 6 and tank 16 in a pit constructed for this purpose to the carrier-wheel 15. Suitable guides or tracks 19 are provided to properly support and guide the conveyer in its travel. The tank 16 is provided with a cover 20, having openings therein to allow the conveyer 14 to pass in and out of said tank and having at the center thereof an opening over which is placed the inverted funnel or hood 21 and stack 22 for conveying away the steam generated by the heated pigs. The tank 16 is supplied with water by any suitable means. (Not shown.)

23 represents a suitable motor, a steam-engine being shown by way of illustration; but it is obvious that any motor might be employed, said motor being coupled by means of a spur-wheel 24 with a rack 25 on the inner side of the circular carriage 2 for driving the latter and by means of a belt 26 to the counter-shaft 27, which is connected by suitable gears 28 with the shaft 29 of the carrier-wheel 17 of the conveyer 14 for driving the latter. It is obvious that the motor for driving the carriage 2 and conveyer 14 might be located at any suitable point and connected to drive these parts by any suitable gearing other than that shown.

The molds 1 are provided with the trunnions 30, which are mounted in vertical slots 31 in the housing 32, secured to the top of the side webs 3 of the carriage 2, and the inner trunnion of each mold is provided with a spur-gear 33 for engaging the racks 34 and 35, the rack 34 being located below the plane of the trunnion and serving to invert the mold, while the rack 35 is located above the plane of the trunnion and serves to restore the mold to its upright position. Each mold is overweighted on its rear side and is provided on its rear edge with a lip 36, which overlies the front edge of the succeeding mold, and is further provided on one end with the stop 37, which engages with a corresponding stop 38 on the inner side of the housing. The rack 34 is shown in an inclined position, and adjacent to said rack are plates 39, having similarly-inclined upper surfaces which engage with the trunnions of the mold as it is carried along, raising it in the vertical slots 31, the spur-gear 33 at the same time meshing with the inclined rack 34, so that when the mold reaches the upper end of the incline it is substantially in an inverted position, and as the trunnions pass off the end 40 of the incline 39 the mold drops the length of the vertical slots 31, thereby receiving a severe shock which dislodges the pig therefrom. The mold then passes on until the spur-gear 33 meshes with the rack 35, which restores the mold to its upright position, bringing the stop 37 on the end thereof into engagement with the stop 38 on the inside of the housing, the overweighted rear side of the mold holding it in this position.

The housings 32 are provided with the sinuous upper surfaces, comprising alternately the depressions 41 and the upwardly-project-

ing curved surfaces 42, which operate both the mechanism for charging the molds with molten metal and the mechanism for spraying the interior of the molds with refractory material, as will now be described.

After the pigs have been discharged from the molds and the latter restored to their upright positions the insides thereof are coated with lime-water, clay, powdered refuse of furnaces, or other suitable refractory material to prevent the pigs adhering thereto by the following mechanism: The refractory material after being moistened, if desired, is placed in the hopper 43, from which it passes by the pipe 44 to the Y 45. 46 is a steam-pipe also leading to the Y 45 and is provided with a valve 47, to the stem of which is secured the slotted arm 48. In the pipe 44, leading from the hopper 43 to the Y 45, are two valves 49 and 50, to the stems of which are secured, respectively, the slotted arms 51 and 52, connected by means of the link 53. The Y 45 is supported upon a suitable cross-bar 54, secured to the top of the supports 55. (See Fig. 5.) Mounted in bearings secured to the cross-bar 54 is the rock-shaft 56, carrying the forwardly-projecting arms 57, which are curved downwardly at their outer ends and carry the perforated spraying-tube 58, which is connected by means of a flexible tube 59 with the lower end of the Y 45. Also secured to the rock-shaft 56 and projecting in a rearward direction are the arms 60, on which are mounted the sleeves 61, said sleeves being adjustably secured to the arms 60 by any suitable means—such, for instance, as a set-screw. Secured to the sleeves 61 are the slotted arms 62, in the upper ends of which is mounted the rock-shaft 63, to which are secured the cam-segments 64 and the lever 65. Sliding in the slots of the arms 62 are the cross-rods 66, having secured to their outer ends the arms 67, said arms bearing at their lower ends the rollers 68, traveling on the sinuous upper surfaces of the housings 32 and contacting with their upper ends against the cam-segments 64. One of the arms 60 carries at its rear end a counterweight 69 and is connected by means of the rod 70 to the slotted arm 48 of the valve 47 in the steam-pipe. By adjusting the rod 70 on the arm 60 and in the slot of the arm 48 the degree to which the valve 47 is opened may be regulated and the required quantity of steam insured. The forwardly-projecting arms 57 are connected by means of the rod 71 to the slotted arm 52 of the valve 50. The operation of this part of the mechanism is as follows: When the rollers 68 travel up the inclined projection 42, the shaft 56 is rocked, carrying the spraying-tube 58 downward into the mold. At the same time the arm 52 of the valve 50 is drawn down and the arm 51 of the valve 49 is moved in the same direction. These valves, however, are so constructed that this movement will open the valve 50 and close the valve 49, the reverse movement opening the valve 49 and closing the valve 50. As above stated, when the spraying-tube 58 is moved down into the mold the valve 49 is closed and the valve 50 is opened, thereby allowing the coating material in that portion of the pipe 44 between these valves to fall into the Y 45. At the same time the arm 48 is raised, thereby opening the valve 47, allowing steam to flow into the Y 45, and blowing the coating material through the perforated spraying-tube 58 into the interior of the mold. As the rollers 68 travel downwardly into the depressions 41 the reverse movement takes place, the valve 47 being closed, cutting off the steam, the spraying-tube 58 raised out of the mold, the arms 51 and 52 raised, closing the valve 50 and opening the valve 49, thereby allowing a fresh charge of coating material to feed past the valve 49 into position to be released by the valve 50 at the next depression of the spraying-tube 58. By adjusting the link 53 in the slots of the arms 51 and 52 the extent to which the valve 49 is opened may be varied, thereby regulating the amount of coating material discharged into the molds at each operation. By adjusting the sleeves 61 on the arms 60 the time of lowering the spraying-tube 58 into the mold and of opening the valves 47 and 50 may be accurately regulated, so as to blow the coating material into the molds only when the latter are in the proper position, thereby preventing waste of the coating material. In case any of the molds are injured or are broken, so that the same need not be filled, the spraying apparatus can be thrown out of operation by throwing the lever 65 into the dotted-line position, Fig. 7, thereby relieving the arms 67 and cross-rods 66 from the pressure of the cams 64, permitting the cross-rods to reciprocate idly in the slots of the arms 62, the counterweight 69 being sufficient to overcome any friction of the parts and hold the various devices in their inoperative position.

As before stated, the molten metal is poured into the charging-trough 9, and it is immaterial at what rate it is poured into said trough, the flow of the metal into the molds being automatically controlled by the following mechanism: The charging-trough 9 is provided on one of its sides with an orifice 72, which is closed by means of a plug-valve 73, secured to the stem 74, said stem being adjustably mounted in the sleeve 75 on the end of one arm 76 of the bell-crank lever 77, pivoted on the bracket 78, secured to the trough 9, the opposite arm 79 of the bell-crank lever carrying the counterweight 80, which holds the valve 73 seated in the orifice 72. On the arm 79 of the bell-crank lever 77 is the sleeve 81, which may be secured to said arm in any desired position, as by means of an ordinary set-screw 82 or other suitable means. Secured to the sleeve 81 are the slotted arms 83, in the slots of which slide cross-rods 84, to the ends of which are secured the arms 85, bearing on their lower ends the rollers 86, which travel on the sinuous upper surfaces

of the housings 32. Journaled in the upper ends of the arms 83 is the rock-shaft 87, carrying the lever 88 and the cam-segments 89, which latter bear upon the upper ends of the arms 85. The construction and operation of this part of the mechanism are the same as the corresponding mechanism described in connection with the spraying mechanism, with the exception that in the spraying mechanism the rock-shaft, on which are secured the cam-segments for throwing the mechanism out of operation, is mounted below the adjusting-sleeves, whereas in the mechanism just described the corresponding rock-shaft is mounted above said sleeves. In all other respects the mechanisms are the same.

The operation of the charging mechanism is as follows: The rollers 86, traveling on the sinuous upper surfaces of the housings 32, alternately raise and lower the arm 79 of the bell-crank lever 78, thereby alternately opening and closing the orifice 72 in the charging-trough. When the rollers 86 rest in depressions 41, the plug-valve 73 is seated in said orifice; but as said rollers travel up the inclined surfaces of the projections 42 the plug-valve is withdrawn from the orifice, as will be readily understood, and the molten metal allowed to flow into the molds. By adjusting the sleeve 81 along the arm 79 of the bell-crank lever it is possible to regulate the time at which the plug-valve is withdrawn from the orifice so as to allow the molten metal to flow into the mold only when the latter is in the proper position and to cut off said flow before the mold has traveled out of this position. By this means none of the molten metal is discharged between the molds and the formation of scrap entirely prevented.

Should a mold be defective or broken, it is only necessary to throw the lever 88 into the position opposite to that shown, thereby removing the pressure of the cam-segments 89 from the arms 85 and cross-rods 84, permitting the latter to reciprocate idly in the slots of the arms 83, the counterweight 80 being sufficient to overcome any friction of these parts and hold the plug-valve seated in the orifice of the charging-trough.

To regulate the size of the pig, the plug-valve is adjusted in the sleeve 75 on the end of the arm 76 of the bell-crank lever 77 by means of the jam-nuts 90, working on the threaded stem 74 of the valve and bearing against the ends of the sleeve 75, as will be readily understood. By this adjustment the distance which the plug-valve is withdrawn from the orifice 72 may be varied, thereby permitting the rate of flow of metal into the mold to be accurately regulated.

The operation of the machine will be readily gathered from the foregoing description. After the molds are filled by the mechanism illustrated in Fig. 3 and in the manner heretofore specifically set forth they are conveyed in the direction of the arrow to the point 12, the interval of time being sufficient to allow the pigs to set firmly; but, if desired, any form of mechanism for spraying water on the molds may be applied at any convenient point of the traverse of the molds. At the point 12 the pinions 33 on the trunnions of the molds engage the inclined rack 34, gradually inverting the molds, the inclines 39 at the same time raising them in the slots 31 of the housing 32. When fully inverted, the pinions pass out of engagement with the rack 34, and the trunnions then pass off the ends 40 of the inclines 39, allowing the molds to drop, and thus discharge the pigs, if the same have not been already discharged. The molds then pass forward until the pinions 33 engage with the inverted rack 35, which reverses the rotation of the molds and restores them to their original position. Passing on a short distance farther the molds are sprayed with the refractory material by the mechanism and in the manner hereinbefore specifically described, after which they return to the charging position and are again filled with molten metal, and so on in succession. The pigs upon being discharged from the molds fall upon the inclined plate 13 and from this pass to the conveyer 14 through the cooling-tank and to the car, as heretofore pointed out. By having the conveyer 14 pass over the circular carriage 2 instead of under the same it is possible to have the track 10 on substantially the same level as the tracks 6 and 7 and very close to the circular carriage 2, thereby obviating the necessity of having a deep pit for the track 10 or the other alternative of having said track removed a considerable distance from the carriage 2. By this arrangement considerable space is saved. The funnel 21, together with the cover for the tank, prevents the escape of steam in such a position that it will inconvenience the working-men.

It will be noted that in dumping the molds they are rotated in one direction and in being restored they are rotated in the opposite direction. By this construction I am enabled to overweight the rear side of the mold and provide the stops 37 and 38 for preventing the molds falling too far in a rearward direction, thereby insuring the molds being in a proper position when being filled. If the molds were restored to an upright position by being rotated in the same direction as when being dumped, as is common in the old type of machines, the stops 37 and 38 would interfere, and it would be impossible to use this means for holding the molds in their upright position.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a casting-machine, the combination with a series of open molds, of a trough or spout for conveying molten metal to the molds without permitting contact of the molten metal with the mold-carrier, means for mov-

ing the molds adjacent to the trough or spout, and automatic means for periodically checking the flow of metal to the machine.

2. In a casting-machine, the combination with a series of open molds, of a trough or spout for conveying molten metal to the molds without permitting the molten metal to contact with the mold-carrier, means for moving the molds adjacent to the trough or spout, and mechanism controlled by the moving part of the machine for periodically checking the flow of the metal to the machine.

3. In a casting-machine, the combination with the series of open molds, of a trough or spout for conveying molten metal to the molds, without permitting the molten metal to bear against the mold-carrier, means for moving the molds adjacent the trough or spout, and adjustable mechanism controlled by a moving part of the machine for periodically checking the flow of metal to the molds.

4. In a casting-machine, the combination with a series of open molds, of a trough or spout for conveying molten metal to the molds without permitting the molten metal to contact with the mold-carrier, means for moving the molds adjacent to the trough or spout, and means controlled by the mold-carrying means for periodically checking the flow of the metal to the machine.

5. In a casting-machine, the combination with the series of open molds, of a carrier therefor, a pouring-trough provided with an opening, for supplying molten metal to the molds without permitting the molten metal to bear against the mold-carrier, means for closing said opening, and automatic means for periodically actuating said closing means.

6. In a casting-machine, the combination with the series of open molds, of a carrier therefor, a pouring-trough provided with an opening for supplying molten metal to the molds without permitting the molten metal to bear against the mold-carrier, adjustable means for closing said opening, and automatic means for periodically actuating said closing means.

7. In a casting-machine, the combination with the series of open molds, of a carrier therefor, a pouring-trough provided with an opening for supplying molten metal to the molds without permitting the molten metal to bear against the mold-carrier, means for closing said opening, and adjustable means actuated by a moving part of the machine for periodically actuating said closing means.

8. In a casting-machine, the combination with the series of open molds, of a carrier for the molds, a pouring-trough provided with an opening for supplying molten metal to the molds without permittting the molten metal to bear against the mold-carrier, means for closing said opening, and means controlled from the mold-carrier for periodically actuating said closing means.

9. In a casting-machine, the combination with the molds, of a carrier therefor for carrying them beneath the charging-trough, a charging-trough provided with an opening, a valve for closing said opening, means adjustably connected to the valve for holding the same closed, and means adjustably connected with said holding means and actuated by a moving part of the machine for opening said valve.

10. In a casting-machine, the combination with the molds, of continuously-acting means for moving the molds adjacent the charging mechanism, automatic mechanism for charging molten metal into said molds without permitting the molten metal to bear against the mold-carrier, and means for throwing said charging mechanism out of operation to allow a mold or molds to pass without being charged.

11. In a casting-machine, the combination with the molds, of continuously-acting means for moving the molds adjacent the charging mechanism, mechanism controlled by a moving part of the machine for charging a fixed quantity of molten metal into the molds without permitting the molten metal to bear against the mold-carrier, and means for rendering said charging mechanism inoperative to allow a mold or molds to pass without being charged.

12. In a casting-machine, the combination with the molds, of means for moving the molds adjacent the charging mechanism, a charging-trough provided with a discharge, a weighted lever for closing said discharge, an arm actuated by a moving part of the machine, and means on said arm for connecting the same to the lever or disconnecting it therefrom at will.

13. In a casting-machine, the combination with the carrier provided with vertical slots, of molds trunnioned in said slots, an inclined plane arranged to engage the molds and raise the same in said slots, and means for simultaneously inverting the molds.

14. In a casting-machine, the combination with the molds, of means for moving the same, and automatic means for measuring out different portions of refractory material from a mass and spraying them in succession into the molds.

15. In a casting-machine, the combination with the molds, of means for moving the same, and intermittently-actuated means for measuring out different portions of refractory material from a mass and spraying them in succession into the molds.

16. In a casting-machine, the combination with the carrier, and the molds mounted thereon, of means intermittently actuated by a moving part of the machine for spraying refractory material into the molds.

17. In a casting-machine, the combination with the carrier, of the molds mounted thereon, means for spraying the molds, and means actuated by a moving part of the machine for moving said spraying means toward and from the molds.

18. In a casting-machine, the combination with the carrier, of the molds mounted thereon, a spraying device, means for moving said device toward and from the molds, and means for rendering said spraying device operative when moved toward the molds and inoperative when moved from the molds.

19. In a casting-machine, the combination with the carrier, of the molds mounted thereon, means intermittently actuated by a moving part of the machine for spraying the mold with a fixed quantity of refractory material, and means for rendering said spraying means inoperatvie at will.

20. In a casting-machine, the combination with the carrier, of the molds mounted thereon, a spraying device, means actuated by a moving part of the machine for moving the spraying device toward and from the molds, means connected with said last-named means for rendering the spraying device operative when moved toward the molds and inoperative when moved from the molds, and means for rendering the first-named means inoperative at will.

21. In a casting-machine, the combination with the carrier, of the molds mounted thereon, a spraying device, means actuated by a moving part of the machine for moving the spraying device toward and from the molds, and means connected with said last-named means for rendering the spraying device operative when moved toward the molds and inoperative when moved from the molds.

22. In a casting-machine, the combination with the carrier, and the molds mounted thereon, of adjustable means intermittently actuated by a moving part of the machine for spraying the molds with a fixed quantity of refractory material.

23. In a casting-machine, the combination with the carrier, of the molds mounted thereon, a spraying device, and adjustable means actuated by a moving part of the machine for moving said spraying device toward and from the molds.

24. In a casting-machine, the combination with the carrier, of the molds mounted thereon, a spraying device, adjustable means actuated by a moving part of the machine for moving the spraying device toward and from the molds, and means connected with said last-named means for rendering the spraying device operative when moved toward the molds and inoperative when moved from the molds.

25. In a casting-machine, the combination with the circular carrier, of the molds mounted thereon, a conveyer beneath the circular carrier and extending across the area inclosed thereby, means for discharging the pigs onto the conveyer on one side of the area inclosed by the circular carrier, means for discharging the pigs from the conveyer on the opposite side thereof and means in said area for cooling the pigs.

26. In a casting-machine, the combination with the circular carrier, of the molds mounted thereon, a conveyer extending across the area inclosed by the circular carrier and passing underneath the same on one side and over the same at the opposite side, means for discharging the pigs upon the conveyer on one side of the area inclosed by the circular carrier, means for discharging the pigs from the conveyer on the opposite side thereof, and means in said area for cooling the pigs.

27. In a casting-machine, the combination with the circular carrier, of the molds mounted thereon, a conveyer beneath the circular carrier and extending across the area inclosed thereby, means for discharging the pigs onto the conveyer on one side of the area inclosed by the circular carrier, means for discharging the pigs from the conveyer on the opposite side thereof, and a cooling-tank in said area through which the conveyer passes.

28. In a casting-machine, the combination with the circular carrier, of the molds mounted thereon, a conveyer extending across the area inclosed by the circular carrier and passing underneath the same on one side and over the same at the opposite side, means for discharging the pigs upon the conveyer, of a cooling-tank located within the said area and through which the conveyer passes, and a motor also located in said area for driving the carrier and conveyer.

In testimony whereof I, the said PATRICK MEEHAN, have hereunto set my hand.

PATRICK MEEHAN.

Witnesses:
F. W. WINTER,
ROBERT C. TOTTEN.