No. 866,607. PATENTED SEPT. 17, 1907.

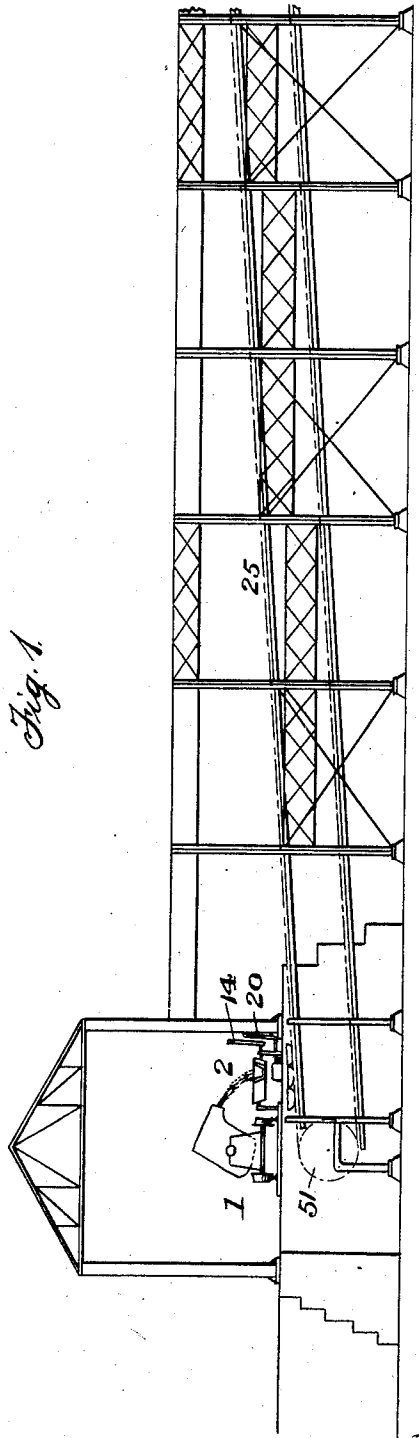
E. A. WEIMER.

APPARATUS FOR CASTING AND DELIVERING PIG METAL.

APPLICATION FILED FEB. 21, 1907.

12 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
F. L. Durand
W. Parker Reinoll

Inventor
Edgar A. Weimer.

By his Attorney
D. P. Reinoll

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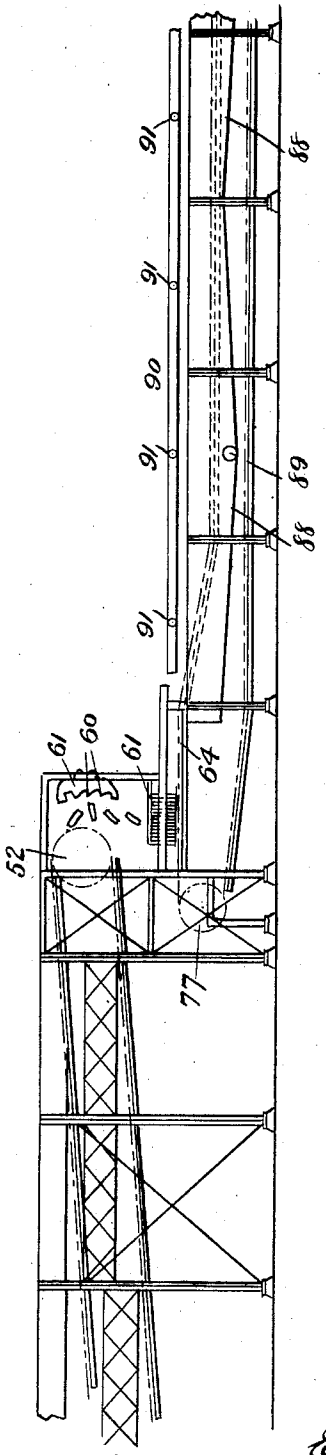

Fig. 1a

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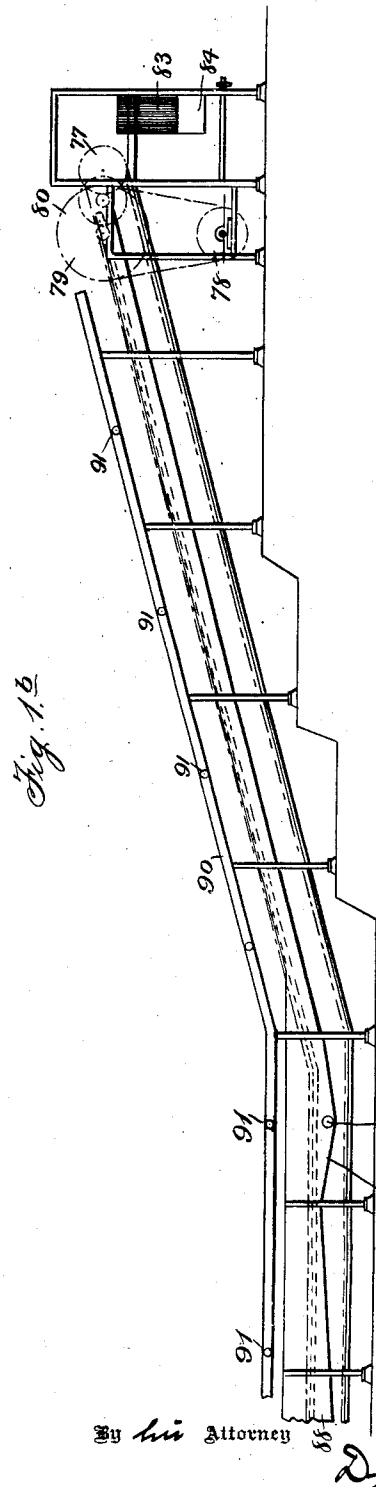

Fig. 13.

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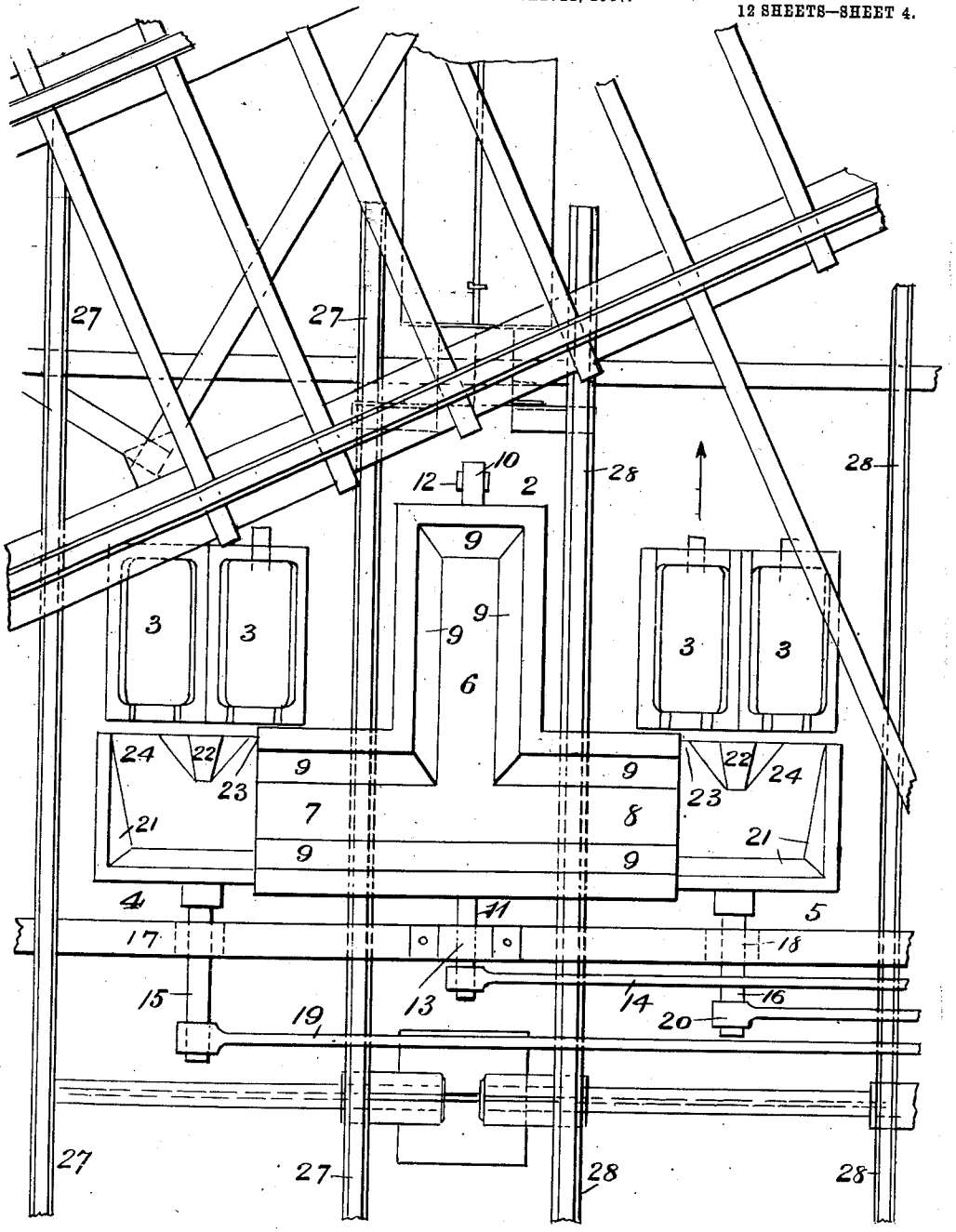

Fig 2.

Witnesses
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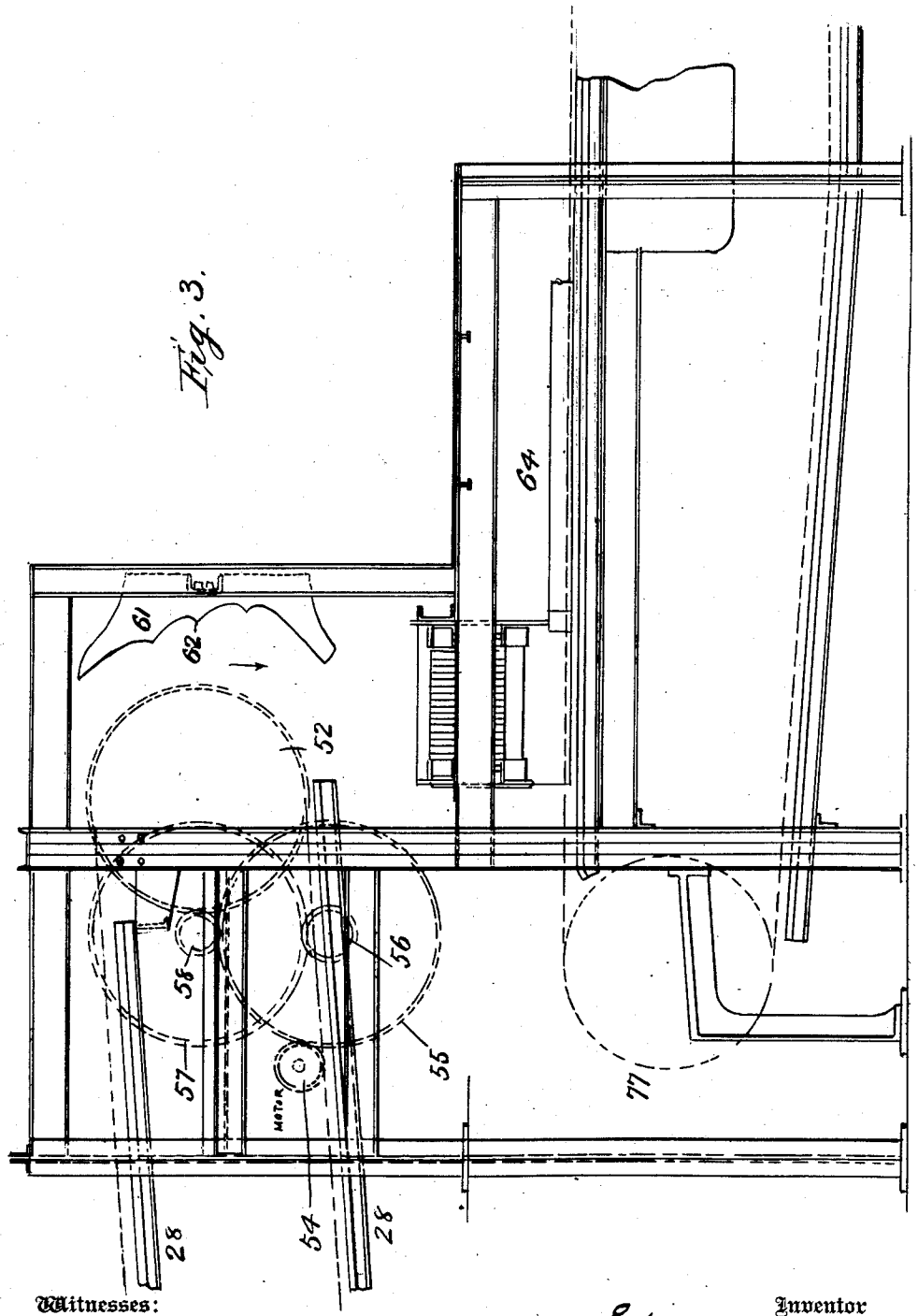
12 SHEETS—SHEET 5.

Fig. 3.



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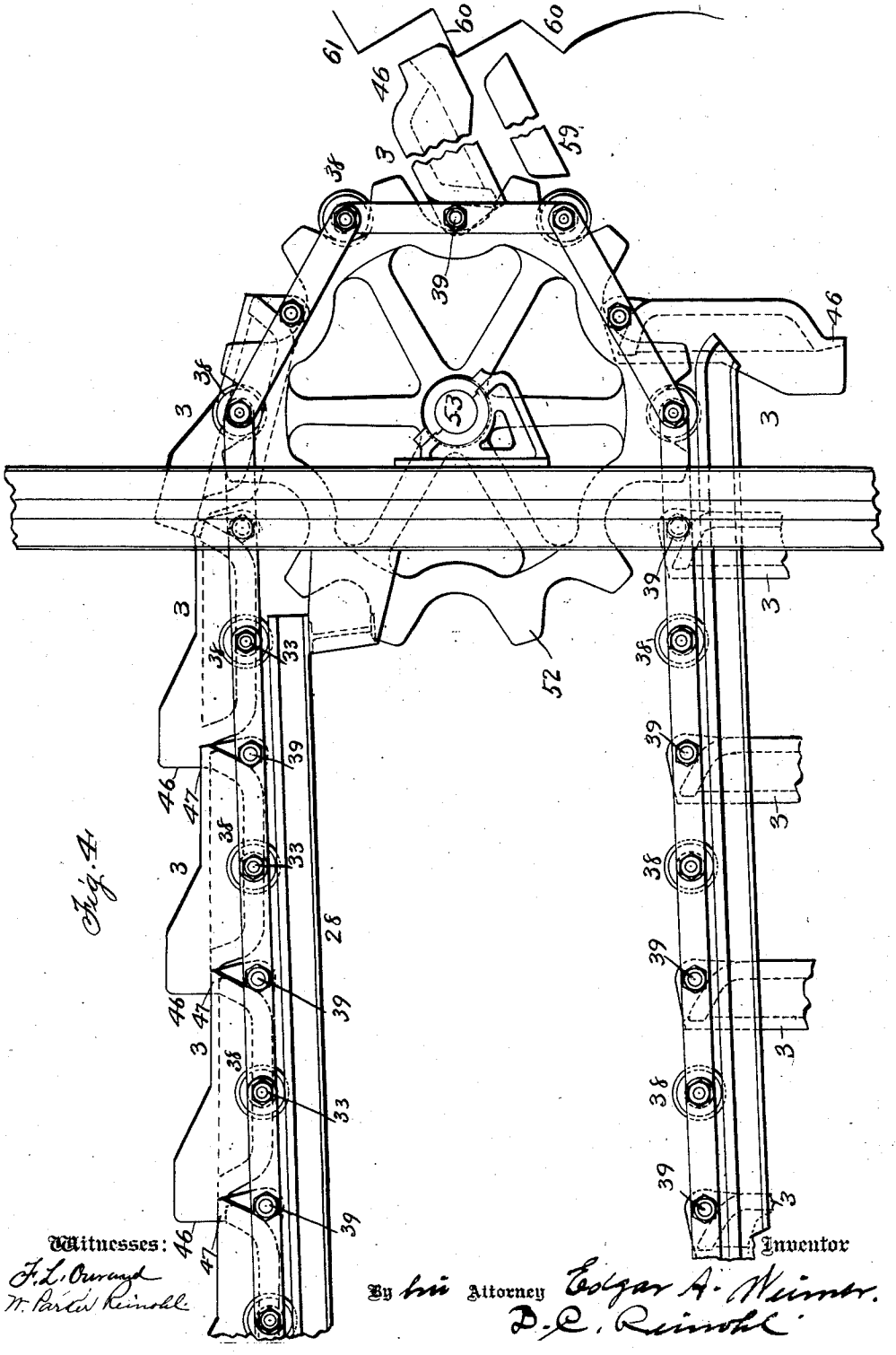

Fig. 4.

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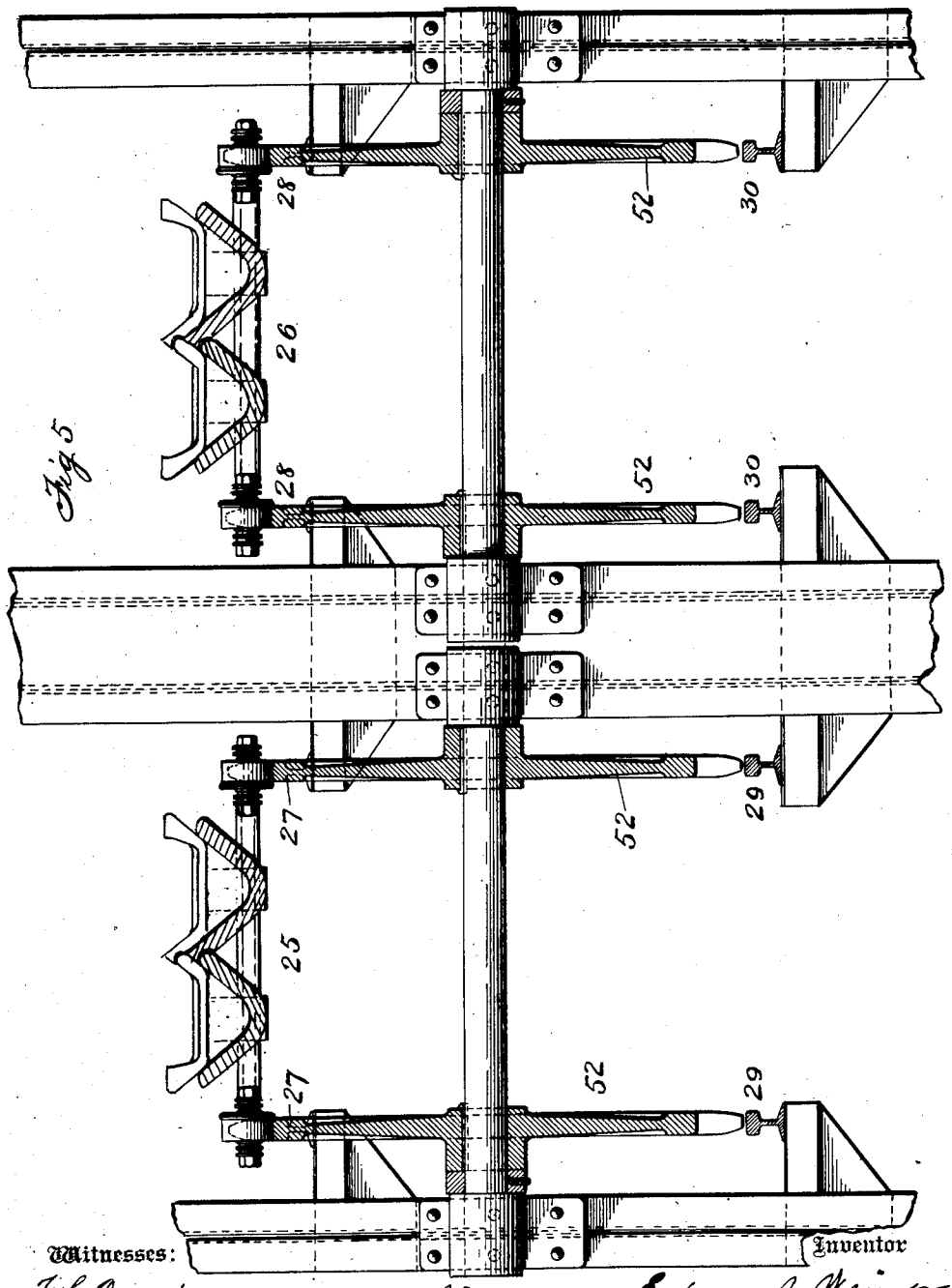
12 SHEETS—SHEET 7.

Fig 5



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12 SHEETS—SHEET 8.

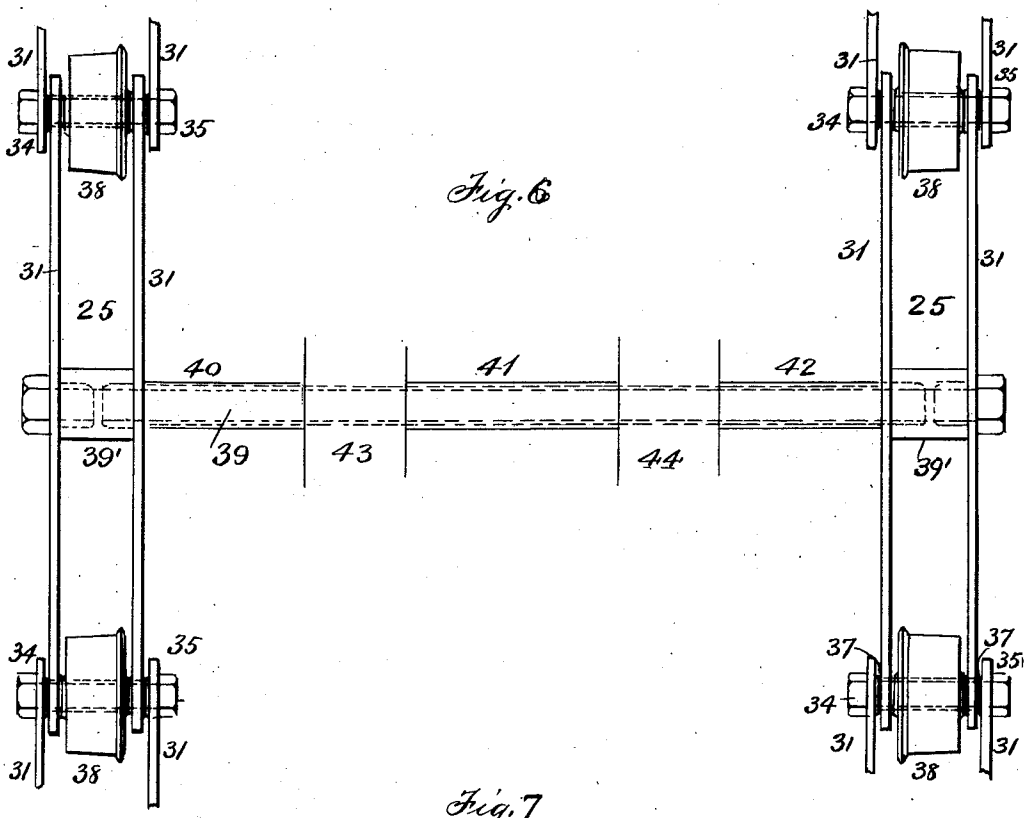

Fig. 6

Fig. 7

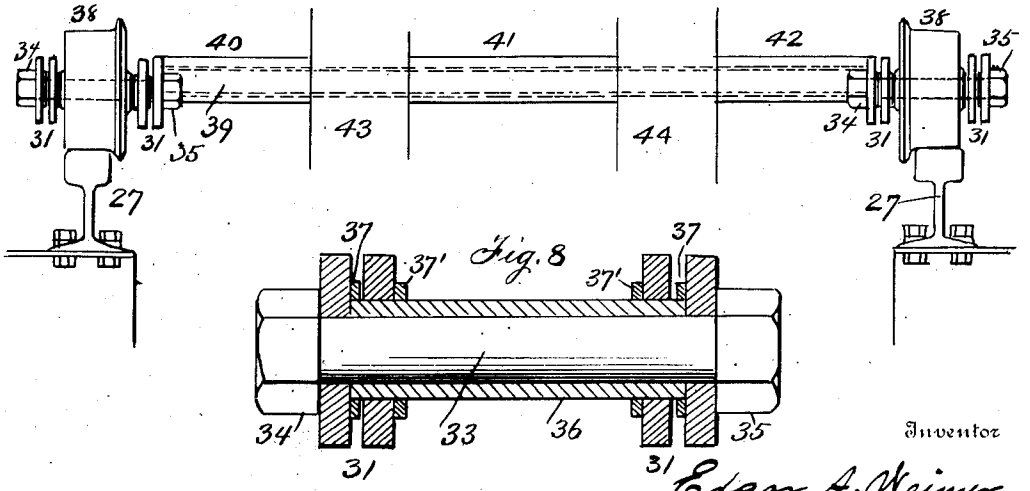

Fig. 8

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12 SHEETS—SHEET 9.

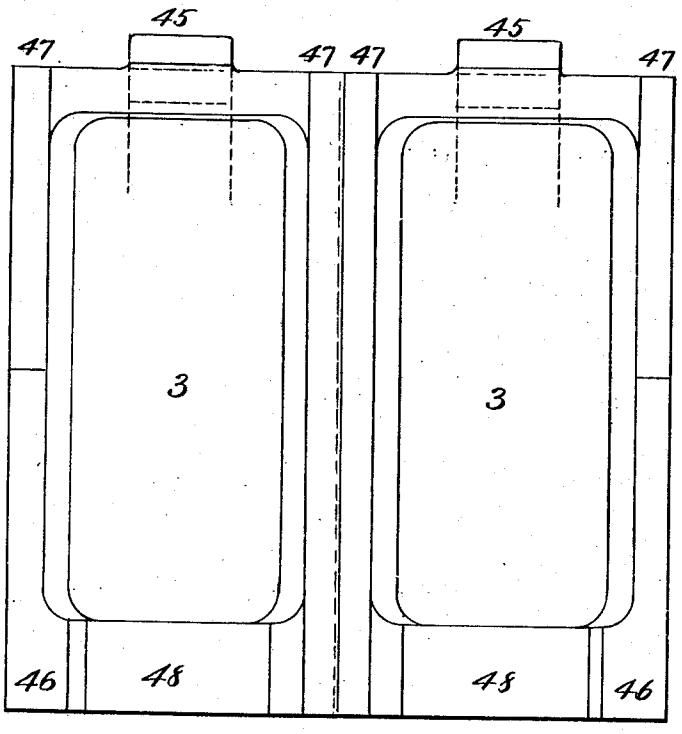

Fig. 9

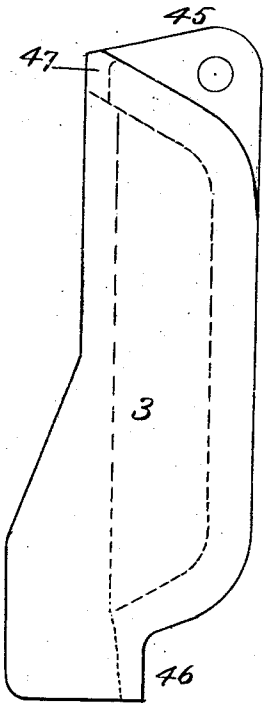

Fig. 10

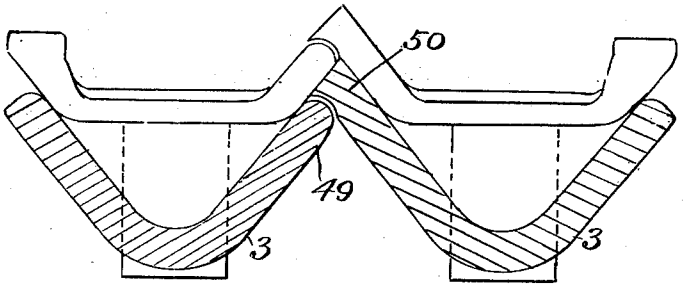

Fig 11

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Fig 14

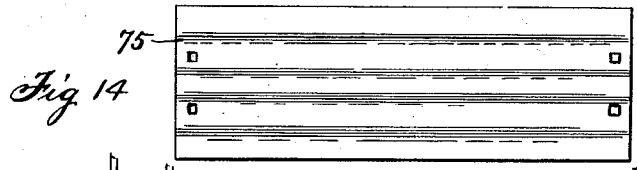


Fig 15

Fig 12

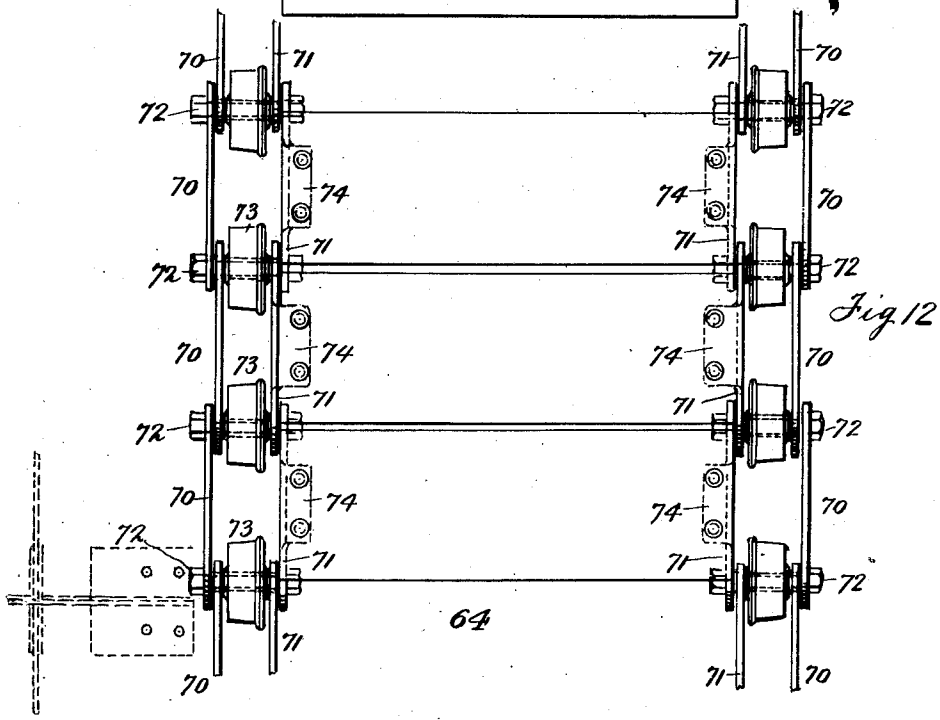
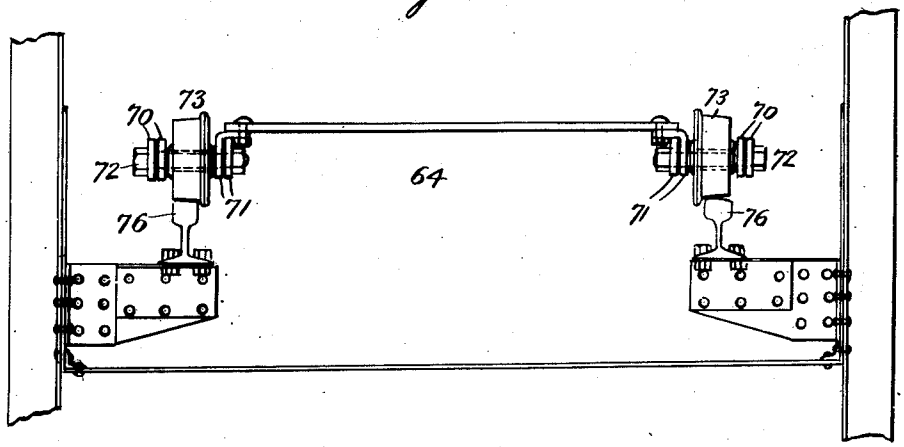


Fig 13



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12 SHEETS—SHEET 11.

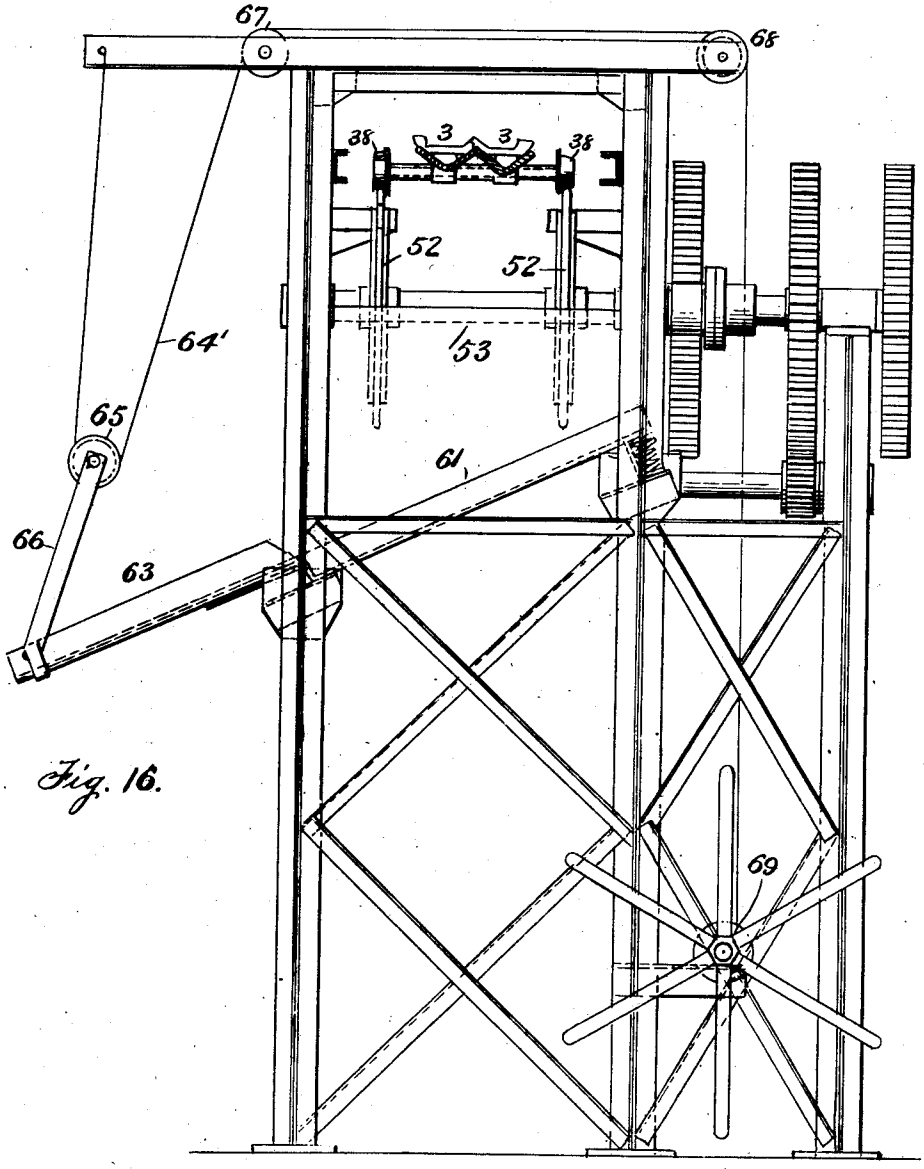

Fig. 16.

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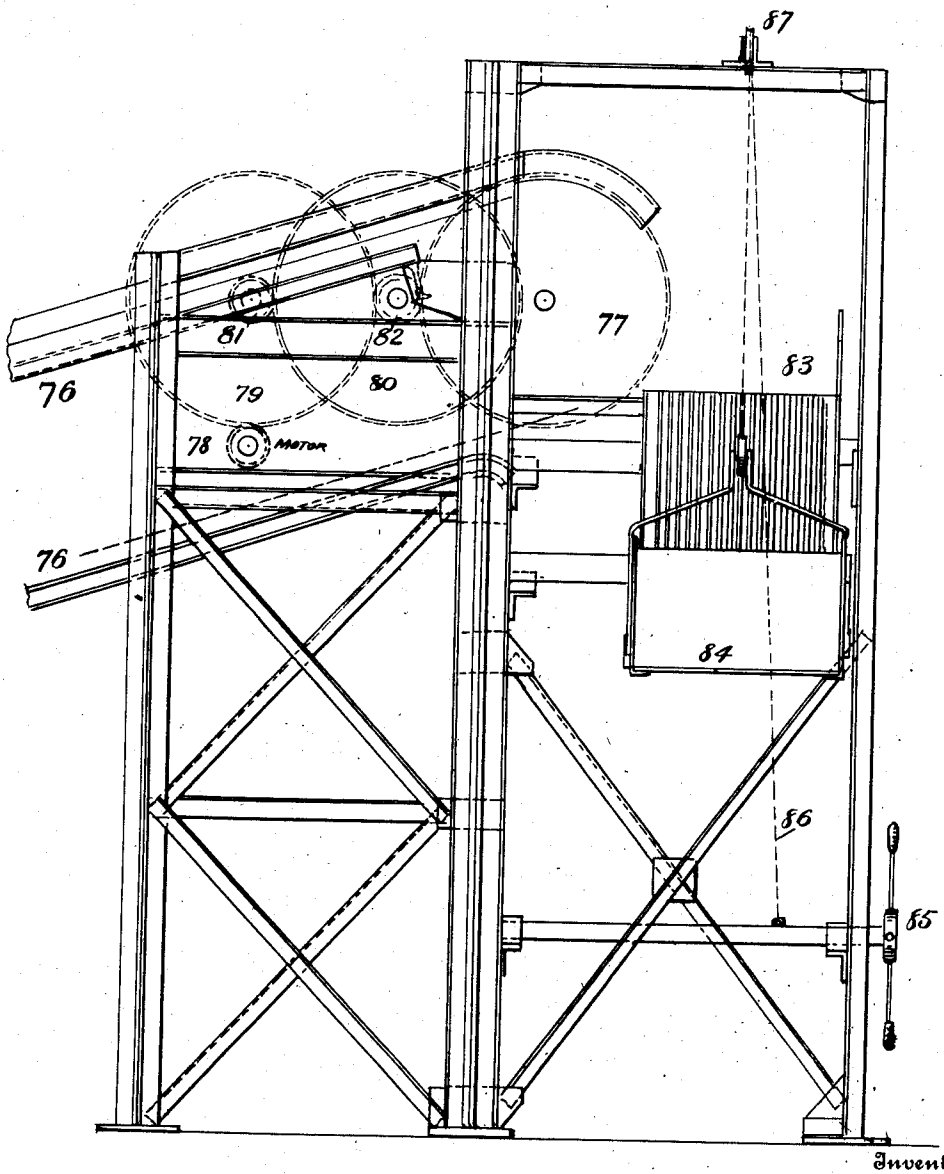
12 SHEETS—SHEET 12.

Fig. 17



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UNITED STATES PATENT OFFICE.

EDGAR A. WEIMER, OF LEBANON, PENNSYLVANIA.

APPARATUS FOR CASTING AND DELIVERING PIG METAL.

No. 866,607. Specification of Letters Patent. Patented Sept. 17, 1907.

Application filed February 21, 1907. Serial No. 358,647.

To all whom it may concern:

Be it known that I, EDGAR A. WEIMER, a citizen of the United States, residing at Lebanon, in the county of Lebanon and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Casting and Delivering Pig Metal; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to machinery for the continuous casting of pig metal and delivering the same, comprising a continuous chain of molds, which are filled from a pouring apparatus, means for discharging the pigs from the molds, means for cooling the pigs, and means for conveying the pigs to a place of delivery upon cars or other receptacles.

The invention has for its object economy in time and labor, and consists in certain improvements which will be fully disclosed in the following specification and claims.

In the accompanying drawings, which form part of this specification:—Figures 1, 1ª and 1ᵇ represent a side elevation of a casting apparatus embodying my invention, the mold carrier and the pig conveyer being indicated by dotted lines. Fig. 2 represents an enlarged plan view of the metal pouring apparatus. Fig. 3 a side elevation on an enlarged scale representing the discharge end of the mold carrier section and the receiving end of the pig conveyer, the mold-carrier and the pig-conveyer being omitted. Fig. 4 a side elevation of the mold-carrier on an enlarged scale, showing the discharge end of the mold-carrier. Fig. 5 a vertical transverse section of the mold-carrier showing the molds in position on the upper side of the structure only. Fig. 6 a top plan view of a section of the mold-carrier, the molds being omitted. Fig. 7 an end view of the same. Fig. 8 a vertical longitudinal section, partly in elevation of the axle for the wheels of the mold-carrier. Fig. 9 a top plan view of a pair of molds on an enlarged scale. Fig. 10 a side elevation of one of the molds. Fig. 11 a vertical transverse section of a pair of molds. Fig. 12 a top plan view of a section of the pig-conveyer, the bottom or pig supporting plates being removed and the track omitted. Fig. 13 an end view of the pig-conveyer and its supporting track. Fig. 14 a plan view of one of the bottom or pig supporting plates detached. Fig. 15 a transverse section of the same. Fig. 16 an enlarged end view of the discharge end of the mold-carrier, only one of the mold-carriers and its molds being shown, the molds being shown on the upper side of the drum or sprocket-wheel only and the buffer omitted to avoid confusion of the drawing, and Fig. 17 an enlarged side view of the discharge end of the pig-conveyer structure, the conveyer being omitted.

Reference being had to the drawings and the designating characters thereon, the numeral 1 indicates a car from which molten metal is poured into a trough 2, and distributed in molds 3 by supplemental troughs 4, 5, one on each side of the main trough 2. See Figs. 1 and 2. The trough 2 is provided with a longitudinal channel 6, and lateral discharge channels 7, 8, and all of the channels are provided with inclined walls 9. The trough 2 is supported on trunnions 10, 11, in bearings 12, 13 respectively, and the trough is tilted to discharge metal in either trough 4, 5, and set of molds alternately by a lever 14 operated manually, and the supplemental troughs 4, 5, are provided with trunnions 15, 16, supported respectively in bearings 17, 18, and are manipulated by levers 19, 20, to produce an even flow of the metal. The troughs 4, 5, have inclined walls 21, and a vertical projection 22 having like inclined walls 21, and forms two passages 23 and 24 for the discharge of the metal into the molds 3, arranged in pairs on two separate endless flexible mold-carriers 25, 26 which travel on suitable upper rails or tracks 27, 28, and lower rails or tracks 29, 30.

The mold-carriers are composed of links or bars 31, 31, in each end of which is an axle which passes through the adjacent and overlapping ends of the links 31, as shown in Fig. 6. The axle is composed of a bolt 33 having a head 34 at one end and a nut 35 at the opposite end and is surrounded by a sleeve 36 of pipe or tubing, the outer links 31 are held between the bolt head and the nut respectively, with a washer 37 interposed between the links 31, and a washer 37′ between the inner bar 31 and the wheel 38, as shown in Figs. 6, 7 and 8, the wheel being omitted in the latter figure. The washers 37 take the lateral wear on the links 31 and prevent the ends of the outer bars being pressed in and binding against the inner bars, and the washers 37′ take the wear between the inside bars and the ends of the wheel. The pairs of links 31 on each side of the mold-carrier are secured together by a transverse rod or bolt 39, on which are spreaders 39′ between the links, and thimbles 40, 41 and 42 on the bolt arranged to leave spaces 43 and 44, to receive the lugs 45 on the lower side of the front end of the molds 3. The bolt 39 may be removed for repairs or renewal without affecting the mold-carrier. The mold-carrier thus constructed is composed of merchantable iron, and the parts may be readily removed as they become worn.

The molds 3 extending lengthwise of the carrier and being secured to the carrier at one point only, are free to expand without distorting or straining or disturbing the alinement of the carrier. The rear end of each mold 3 is provided with an extension 46 which overlaps and rests upon the front or adjacent end 47 of the next mold, as shown in Fig. 4, and in said extension 46, is formed a trough 48, see Fig. 9, through which molten metal is discharged or overflows from one mold into the next mold as one mold is being poured or filled, to form an

initial bath of metal in the molds to prevent the stream of metal from the pouring trough cutting the molds, and diffuses or distributes the heat equally over the full length of the molds, which results in equal expansion of the molds. The overflow of the molten metal from one mold into the next adjacent mold is caused by the angle or inclination of the mold-carrier, the front end of the molds being highest as they pass under the pouring troughs, as shown in Fig. 1. The adjacent edges or sides of each pair of molds are made to lap one over the other, as shown at 49 and 50 in Fig. 11 to prevent the metal being poured falling between the molds and separating them laterally.

The mold-carriers are supported on a drum or sprocket wheel 51 at the lower or pouring end and on like drums or sprocket wheels 52 at the upper or discharge end in the usual manner, the drums being mounted on shafts 53, as shown in Figs. 3 and 5, and the mold-carriers are propelled by a suitable motor 54 and gearing 55, 56, 57 and 58, shown in Fig. 3, or in any preferred manner. In the shrinking of the pigs they leave both ends of the molds 3, and the molds travel over the drum or sprocket 52, the pigs 59 slip forward in the molds, and when the molds swing outward on the bolts 39, the free ends of the molds strike against projections 60 on a buffer 61 and dislodge the pigs from the molds, when they fall upon an inclined grating 62 through which dirt and scale fall, and from the grating the pigs gravitate over a chute 63 and are discharged upon an endless pig-conveyer 64.

The chute 63 is raised and lowered by a chain, or wire rope 64′ engaging a sheave 65 on arms 66, only one of which is shown, sheaves 67 and 68 and is connected to a windlass 69, as shown in Fig. 16.

The endless flexible pig-conveyer is constructed in like manner as the mold carrier with the exception that the transverse rod on which the molds are pivoted is omitted, see Figs. 12, 13, 14 and 15.

70, 71 indicate the links connected to the axles 72 supporting the wheels 73 and are provided with washers, not shown, between the overlapping ends of the links and between the ends of the hubs of the wheels and the inner link. Each inner link is provided with a horizontal flange 74 to which a corrugated plate or bottom 75 is secured by bolts. The wheels 73 engage rails on a track 76 and the pig-conveyer travels over drums or sprocket wheels 77; one at each end of the conveyer, propelled by a suitable motor 78 and suitable gearing, such as 79 and 80, which may be connected as shown in Fig. 1[b] or as shown in Fig. 17, or in any other approved manner. In the latter form, pinions 81, 82 are interposed. The pigs are discharged from the conveyer as the latter passes over the drum 77 at the outer end of the conveyer and fall upon a grating 83 from which they gravitate to a chute 84 and are discharged from the chute into a car or other receptacle, not shown. The chute is raised and lowered by a windlass 85, and a wire rope 86 passing over a sheave 87.

88 indicates baths or tanks for the pigs inclined longitudinally toward the center of the tank to cause any deposit from the pigs to gravitate to the lowest point in the tank, from which they are discharged through an opening 89 in the side of the tank, provided with a suitable valve, not shown.

90 indicates a pipe, leading to a suitable source of supply, not shown, provided with ejectors or nozzles 91 for cooling the pigs by blasts of air, or water projected against the pigs while in transit.

In the practical operation of casting machines, a large proportion of the pigs are broken by immersing them in water, due to the fact that the pigs lie on flat conveyer plates. The film space between the pigs and the plates being filled with steam or gas, will not allow the water to enter and cool the pig on all sides, and as a result, unequal contraction of the pigs takes place, breaking them into pieces. Miniature explosions also occur under the pigs, which have a tendency to float the pigs. This floating or "kicking" of the pigs is detrimental to the life or durability of the conveyer, as the pigs jam against each other to the injury of the conveyer. To overcome this difficulty the corrugated plates 75 have been employed, on which the pigs are supported on the crowns of the corrugations, thus allowing free circulation of the water or air as the case may be around the pig. Furthermore, the corrugated plates do not bend as readily as flat plates, and by keeping their shape the conveyer will be kept in alinement and its life prolonged.

It is obvious that the pig supporting plate may be made of parallel bars of metal, or that a flat plate may be perforated or indented to allow the water access to the lower side of the pigs, without departing from the spirit of my invention.

In iron high in silica and containing a certain percentage of sulfur, the pigs in passing through water disintegrate and are reduced in some instances to granules. To avoid this it is my purpose to cool the pigs by the use of finely divided sprays of water supplied through pipe 90 and ejectors or nozzles 91 from the time the pigs leave the molds until they are discharged from the pig-conveyer. Or water may be sprayed by the use of ejectors operated by air pressure. The cooling effect of the re-expansion of the air upon the water reduces the temperature of the water, and thereby cools the pigs with a greatly reduced expenditure of water, as the water is used over repeatedly.

The mold-carrier may be made long enough to take in a cast of a furnace, and the pigs cooled on the pig-conveyer by exposure to the atmosphere.

The molds may be treated with a refractory material on their way back to the pouring apparatus in any approved manner.

The pig-conveyer, the means for cooling the pigs, and the means for discharging and delivering the pigs, form subject matter of a divisional application for a patent, filed on the 17th day of June, 1907, and numbered 379,354.

Having thus fully described my invention, what I claim is

1. In a casting apparatus, a metal pouring device comprising a primary or receiving trough pivotally supported to be tilted laterally in opposite directions and having lateral discharge passages, supplemental distributing troughs pivotally supported to be tilted laterally in opposite directions under the discharge ends of the primary trough, means for tilting said troughs, and a mold carrier under each supplemental trough.

2. In a casting apparatus, a metal pouring device comprising a primary or receiving trough pivotally supported to be tilted laterally in opposite directions and have lateral

discharge passages, supplemental distributing troughs pivotally supported to be tilted laterally in opposite directions under the discharge ends of the primary trough, and provided with discharge passages at their front ends, and a mold carrier under each supplemental trough.

3. In a casting apparatus, a pouring device, a flexible mold-carrier provided with side links, and transverse rods, and having longitudinally extending molds pivotally supported on the rods of the carrier at one end only to allow free expansion of the molds.

4. In a casting apparatus, a pouring device, a flexible mold-carrier provided with side links and transverse rods, and having longitudinally extending molds pivotally supported on the rods of the carrier at their front ends and overlapping the front ends of the next molds at their rear ends.

5. In a casting apparatus, a pouring device, a flexible mold-carrier provided with side links and transverse rods, and having longitudinally extending molds pivotally supported on the rods of the carrier at their front ends, overlapping the front ends of the next molds at their rear ends, and having a passage at the rear end of the mold to discharge metal into the next mold.

6. In a casting apparatus, a pouring device, a mold-carrier comprising longitudinal links, wheels at both ends and on both sides of the transverse center of each section of the carrier, transverse rods extending through said links between the wheels of each pair of links, and longitudinally extending molds pivotally supported at their front ends on said rods.

7. In a casting apparatus, a pouring device, a mold-carrier comprising parallel longitudinal links, wheels between the ends of said links, an axle for each wheel surrounded by a thimble extending to the outside links, a washer between the links at both ends of said thimble, a washer between the inner link and each end of the hub of the wheel, transverse rods between the wheels, and molds pivotally secured to said rods.

8. In a casting apparatus, a pouring device, a flexible mold-carrier comprising longitudinal links and transverse rods, and having longitudinally extending molds pivotally supported at one end on the rods of the carrier, and a buffer in the path of the molds and against which the molds strike to dislodge the pigs therefrom.

9. In a casting apparatus, a pouring device, an upwardly inclined mold-carrier provided with longitudinally arranged molds overlapping the front end of the next succeeding mold, for supplying an initial charge of molten metal from the rear end of one mold to the front end of the succeeding mold.

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

EDGAR A. WEIMER.

Witnesses:
EDWIN H. SHROFF,
CHARLES FORSTER.