June 27, 1933. M. G. DUMAS 1,915,650

MULTIPLE INGOT POURING APPARATUS

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Fig. 2.

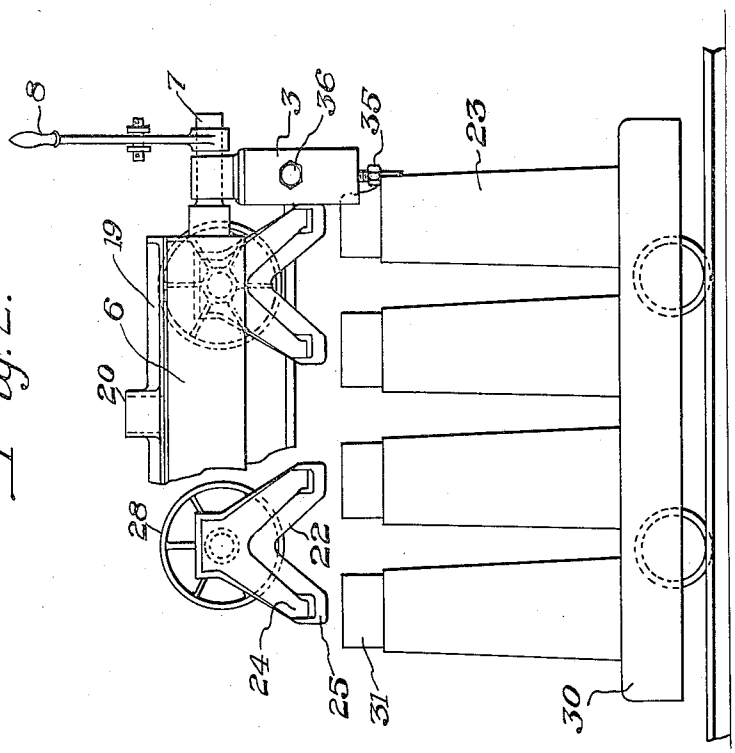
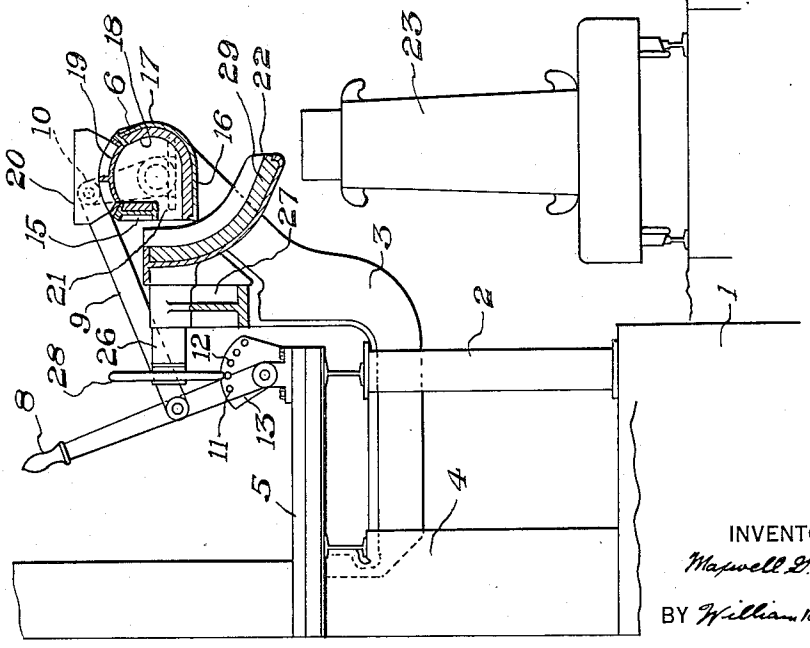


Fig. 1.



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Fig. 4.

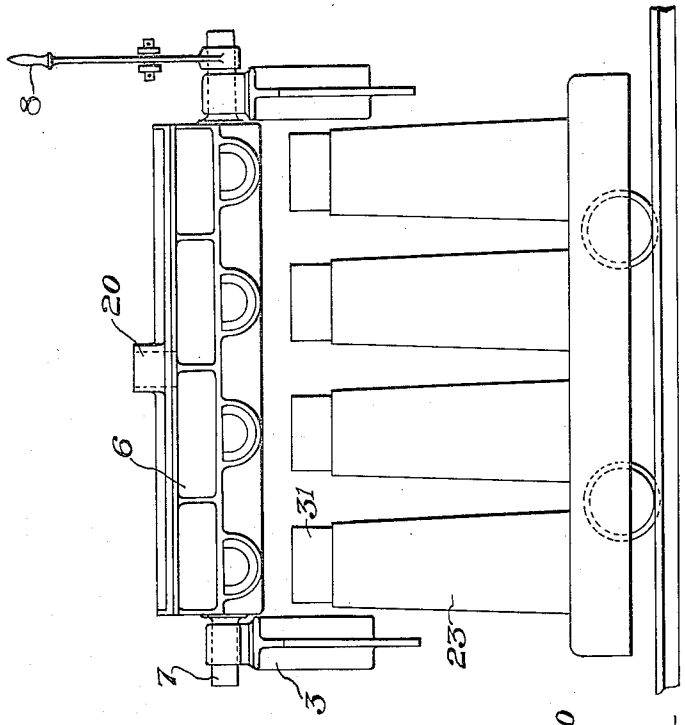
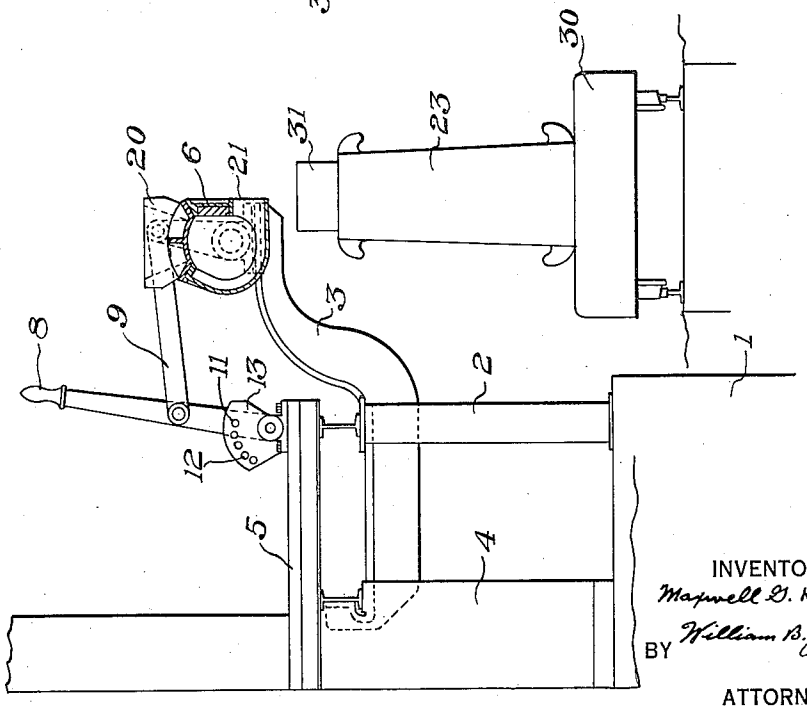


Fig. 3.



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UNITED STATES PATENT OFFICE

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MULTIPLE INGOT POURING APPARATUS

Application filed October 1, 1930. Serial No. 485,619.

This invention relates to improvements in multiple pouring devices and the present invention is for a modified form of apparatus disclosed in my co-pending application bearing Serial No. 436,055, filed under date of March 15, 1930.

In the application referred to, I have disclosed apparatus for multiple pouring of ingots whereby the difficulties inherent in the pouring of steel ingots in single molds by large ladles as heretofore practiced, were largely overcome, and the invention was particularly directed to the mechanical pouring of steel ingots in a multiplicity of molds simultaneously by means of apparatus which is capable of receiving the entire contents of a pouring ladle and to pour the metal into the molds at a uniform and desirable rate of flow.

In accordance with the present invention, I provide apparatus which functions to control the flow of the metal to the ingot molds in such manner that the plurality of molds may be filled at a uniform rate of speed and with an equal volume of metal in each mold. For this purpose, the apparatus is provided with adjustable spouts which may be manipulated to regulate the flow of the molten metal to the individual molds while maintaining the head pressure and the amount of metal uniformly constant for all of the molds.

Another object of the invention is to provide apparatus which shall be adapted to control the flow of metal to the molds independently of the flow from the ladle or other supply means, said apparatus being adapted to stop the flow to the molds entirely without interrupting the flow from the supply source.

The invention will become more apparent from a consideration of the accompanying drawings in which like reference characters designate like parts and in which:

Figure 1 is an end elevational view partially in section, of a multiple pouring device embodying the principles of this invention:

Figure 2 a side elevational view thereof with a portion of the apparatus cut away for the sake of clarity:

Figure 3 an end elevational view of a modified form of the device shown in Fig. 1: and

Figure 4 a side elevational view thereof.

With particular reference to Figures 1 and 2 of the drawings, the structure therein illustrated comprises a suitable foundation generally designated at 1, of concrete construction, from which arises a plurality of vertical supports 2 which are adapted to engage the extended portion of a pair of end brackets 3, the latter being secured in the wall structure 4, from which a platform 5 extends parallel with the brackets 3.

The end brackets are adapted to journal a trough 6 for receiving the molten metal which is provided with trunnions 7 that are pivotally supported in the brackets 3 to permit angular movement of the trough 6 in response to a manually operated lever 8 to which it is connected by a link 9 and lever 10. The operating lever 8 is adapted to be locked in its adjusting position by a pawl that interacts with angularly spaced openings 12 of a segment plate 13 which is mounted on the platform 5.

The trough 6 is shaped to have one flat side 15 and a flat bottom 16, the latter being continuous with a rounded side 17, the trough being lined with suitable refractory material 18 to provide the necessary heat insulation for the molten metal. The top of the trough is provided with a cast metal cover 19 having a hopper 20 into which the molten metal is poured from the usual ladle into which it is received from the open hearth, and with the exception of the hopper 20, the cover 19 is closed to retain the heat in the chamber of the trough. The side 15 of the trough is provided with openings 21 in longitudinally spaced relation, and a plurality of spouts 22 are mounted in cooperative alignment with the openings 21 to conduct the metal to the ingot molds 23.

The spouts 22 are bifurcated as shown in Figure 2, the spout having a pair of troughs 24 which are spaced apart a distance equal to the normal or convenient spacing of the ingot molds when mounted on trucks for pouring. The spouts consist of a casting 25 having a shaft 26 which is adapted to be journalled in a bearing 27 mounted on shoulders formed on the brackets 3 and on a cross sup-

port extending between the brackets, and a hand wheel 28 is mounted on the ends of the shafts 26 to provide for adjustment of the troughs 24 by subjecting them to angular movement. Castings 25 are lined with a suitable refractory material 29 to prevent chilling of the metal flowing to the molds 23.

As shown in Figure 2, the multiple pouring device may be adapted for the pouring of four or more ingots which are conveniently mounted on trucks 30 as is the customary practice and the ingots may or may not be provided with hot tops 31 which are employed as sink heads to prevent the formation of piping in the ingots.

Provision is made for adjusting the trough to maintain the outlet 21 in horizontal alinement with said trough so that metal flows uniformly through all the openings. To this end, adjusting screws 35 are provided to raise or lower the journals of trunnions 7 relative to each other, the movable member being secured in adjusted position by clamp bolt 36.

In the operation of the apparatus shown in Figures 1 and 2, the ingot molds are placed below the spouts 22 by moving the trucks 30 in their proper position on the tracks which are provided below the pouring device, and the lever 8 is moved to the position where the rounded portion of the walls 16 and 17 constitute the bottom of the trough. The trough is then charged with molten metal from the ladle, the metal being poured through the hopper 20 which is of such shape that the metal will flow through the opening of the cover regardless of the position of the trough, and after the trough is filled the spouts 22 are adjusted to bring their troughs 24 in horizontal alignment, after which the lever 8 is pulled forward to tilt the trough 6 sufficiently to have the metal discharged through the openings 21 at the desired rate of flow. The metal flowing from the openings 21 will flow down the insulated troughs 24 into the ingot molds at a uniform rate and the trough 6 is tilted forward by moving the lever 8 in increments corresponding to the spacing of the notches 12, until it has reached the position shown in the illustration of Figure 1.

As the ingot molds fill to their tops, it may be desirable to have them fill up equally, and for this purpose the spouts 22 are manipulated through the hand wheel 28 so that the streams of metal flowing out of the troughs 24 may be regulated to cause an increased flow into one of the molds and a correspondingly reduced flow into the other mold whereby the volume of metal in the molds may be balanced. This is especially important where hot tops are employed as it is desirable to bring the ingots up to the same level once the metal contacts with the bottom of the hot tops and to then interrupt the pouring a sufficient length of time to permit the metal to freeze around the spacing between the hot top and the mold to form a seal before filling the hot tops with molten metal.

By means of the adjustment on the spouts 22 the flow may be so controlled that the metal in the ingots is at the same level in the respective molds and the adjustment can be conveniently made without interrupting the pouring operation.

Pouring of metal from the ladle into trough 6 may be conducted regardless of the angular position of the trough and may be continued during the changing of the molds. For example, the flow of metal from the ladle to trough 6 may be initiated when the latter is in the position shown in Figure 1 with openings 21 in a horizontal plane with metal flowing almost immediately to the molds. The outstanding advantage of the angular adjustment of trough 6 is the flow regulation and the feature of stopping the flow entirely without the necessity of employing plugs with all its attendant hazards, as in ladle pouring.

In the modification illustrated in Figures 3 and 4, the trough is shown in the reversed position with the opening directly over the ingot molds and in the construction shown, the spouts are eliminated. This construction is a simplification of the apparatus disclosed in Figures 1 and 2 of the drawings, and has the disadvantage of lacking the flexible adjustment of the movable spouts for regulating the flow of the metal to the ingot molds for the purpose described. However, it illustrates that the principle of the rounded wall of the trough and the lever operated tilting feature, may be employed without the use of adjustable spouts.

It is evident from the foregoing description of this invention that a plurality of ingots may be poured simultaneously and at uniform levels by the simple adjusting mechanism which provides for the pouring of two or any increased number of ingots in multiples of two ingots, because of the fact that the filling of each pair of the molds is separately regulable.

It is also evident that the trough when rounded in the manner shown, permits emptying all of the metal therefrom as it can be entirely discharged by tilting it through a relatively small angle.

Although one modification of the invention has been herein illustrated and described, it will be obvious to those skilled in the art that various modifications may be made in the details of construction without departing from the principles herein set forth.

I claim:

1. Apparatus for pouring ingots comprising a receptacle for molten metal adapted for rotary movement on its horizontal axis and having an opening for delivering metal to a spout, a spout in position to receive

the metal from the receptacle and conduct it to an ingot mold means for adapting said receptacle to simultaneously receive molten metal from a ladle and feed it to said spout, and means to rotate the receptacle for stopping the flow to said spout without interrupting the flow from the ladle to the receptacle.

2. Apparatus for pouring ingots comprising a receptacle for molten metal adapted for rotary movement on its horizontal axis and having an opening for delivering metal to a spout, a spout in position to receive the metal from the receptacle, said spout having a plurality of troughs for conducting the metal to a plurality of ingot molds, means for adapting said receptacle to simultaneously receive molten metal from a ladle and feed it to said spout, means for regulating the flow of metal in the several troughs of said spout, and means to rotate the receptacle for stopping the flow to said spout without interrupting the flow from the ladle to the receptacle.

3. Apparatus for pouring ingots comprising a receptacle for molten metal adapted for rotary movement on its horizontal axis and having an opening for receiving metal from a ladle and an opening for feeding metal to a mold, said receiving opening being elongated in a direction transverselv of the rotating axis of said receptacle to adapt said receptacle to continuously receive molten metal from a ladle while the receptacle is subjected to rotary movement through a predetermined angle and said metal feeding opening being located at substantially right angles to said receiving opening to regulate or stop the flow of metal from the receptacle by rotary movement of the receptacle without interrupting the flow from the ladle to the receptacle.

In testimony where I have hereunto set my hand.

MAXWELL G. DUMAS.