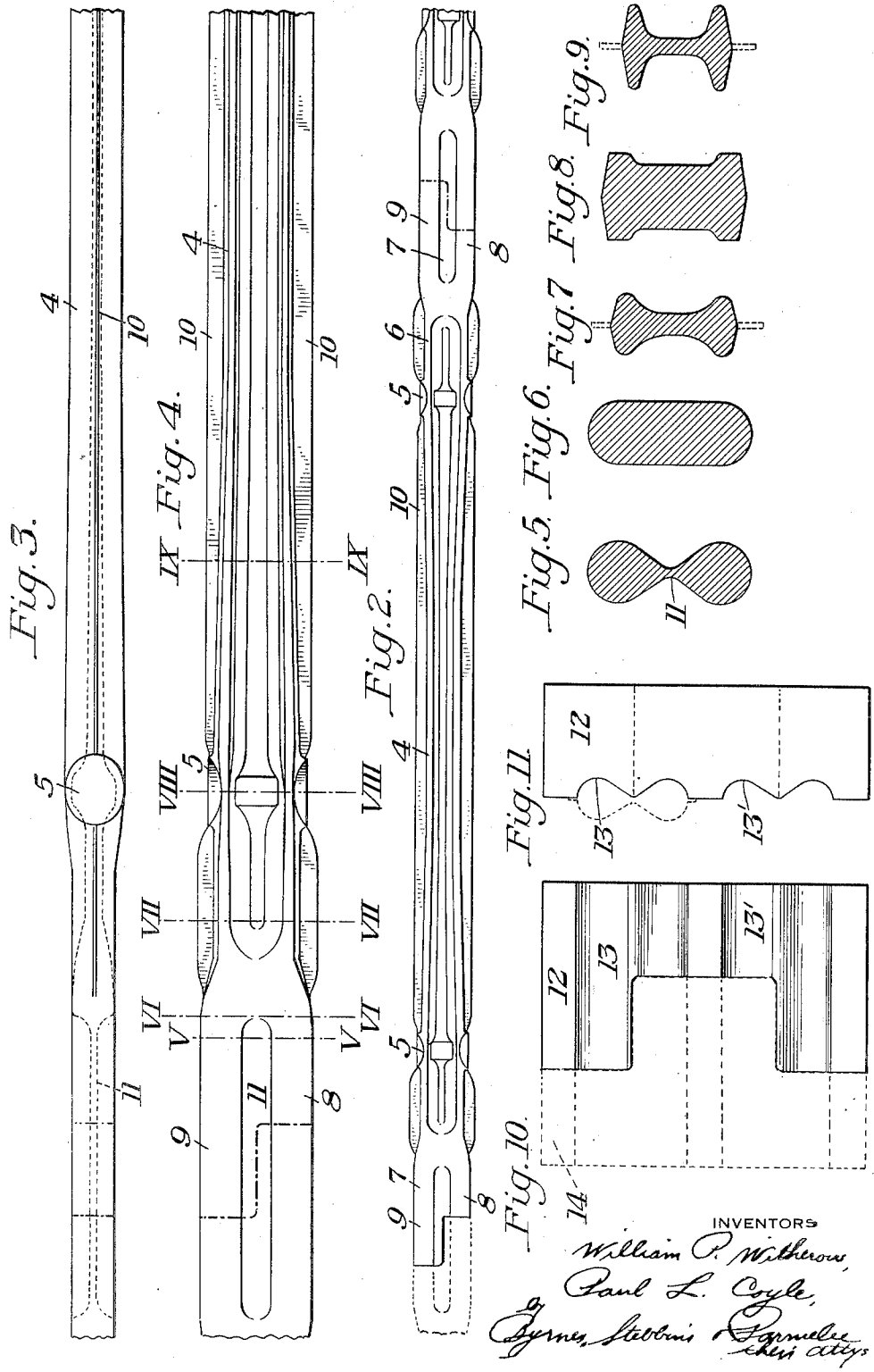
May 7, 1929. W. P. WITHEROW ET AL 1,712,286

DIE ROLLED ARTICLE AND METHOD OF MAKING THE SAME

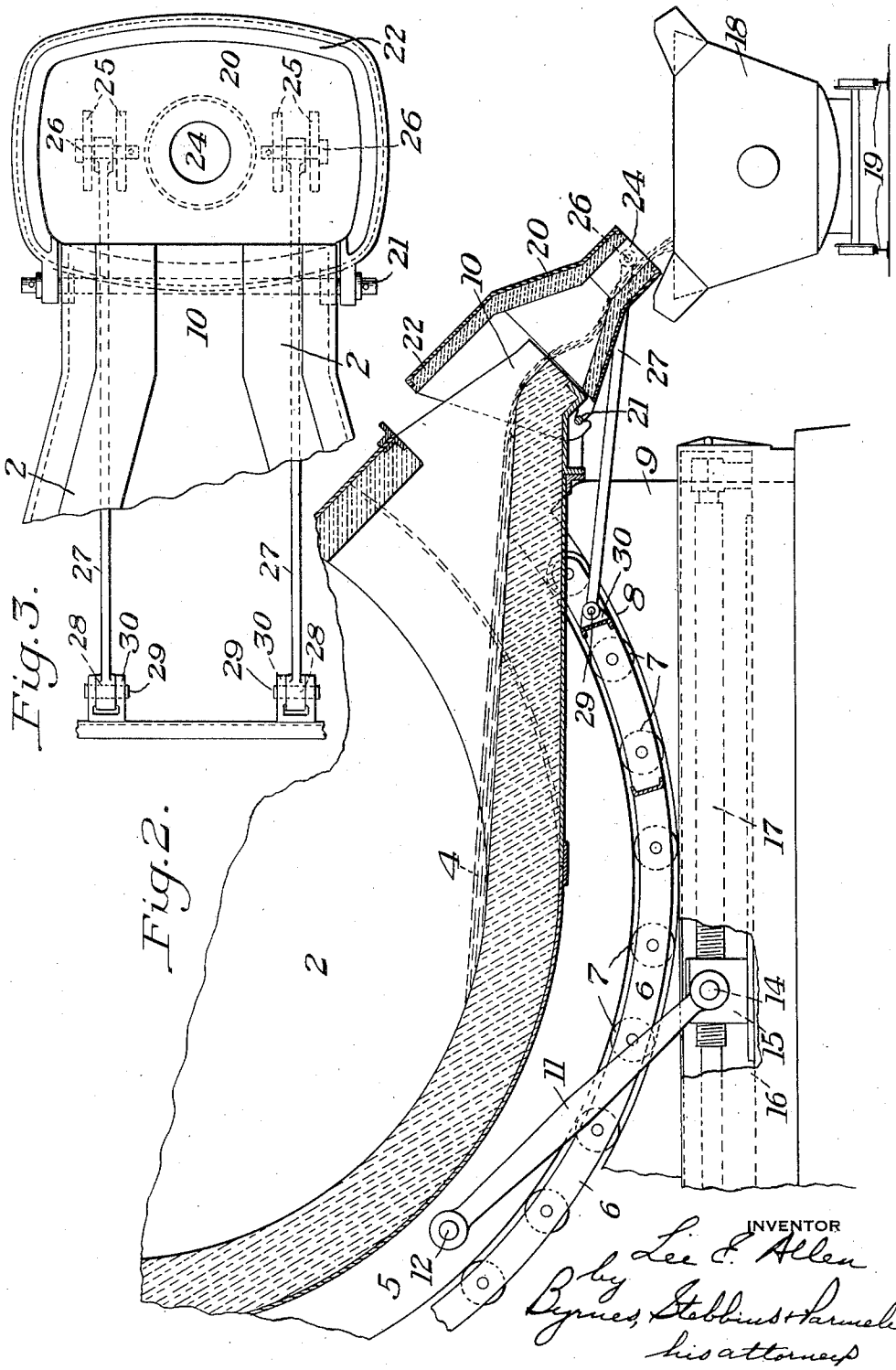
Filed May 11, 1926 2 Sheets-Sheet 2



May 7, 1929. L. E. ALLEN 1,712,287

METAL HANDLING APPARATUS

Filed Aug. 9, 1928 2 Sheets-Sheet 2



INVENTOR
Lee E. Allen
by Byrnes, Stebbins & Barnes
his attorneys

Patented May 7, 1929. 1,712,287

UNITED STATES PATENT OFFICE.

LEE E. ALLEN, OF NEW CASTLE, PENNSYLVANIA, ASSIGNOR TO PENNSYLVANIA ENGINEERING COMPANY, OF NEW CASTLE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

METAL-HANDLING APPARATUS.

Application filed August 9, 1928. Serial No. 298,542.

My invention relates to metal handling apparatus and more particularly to an improvement in pouring spouts for hot metal mixers.

Containers for molten metal such as mixers are of considerable size. They are provided with a normally horizontally extending pouring spout on one or more edges. The container is tilted sufficiently to cause the molten metal to flow from the spout into a ladle disposed to catch the discharged metal. As the radius of the arc defined by the movement of the spout is of considerable extent the projection of the end of the spout onto a plane such as a floor beneath the spout moves a distance of several feet during the emptying of the container. A receiver, such as a car or ladle, disposed to receive the discharged metal at the beginning of the pouring operation would not receive the metal at the end of the pouring operation or after the container had been tilted to bring the trajectory of the discharged metal out of line with the receiver.

Heretofore, ladles have been mounted on trucks for cooperation with a plurality of parallel extending tracks disposed below and to one side of the discharge spout. As the container is tilted the cars are moved onto successive tracks in order to keep the ladles within the trajectory of the molten metal. Such an arrangement requires a large amount of trackage and the extra switching of trucks during the emptying of the mixture by keeping the ladles within the trajectory of the discharged metal.

I provide a relatively movable spout mounted adjacent to the spout of the container and connected with the mechanism by which the container is tilted so that as the projection of the end of the spout moves along the floor during the movement of the end of the spout through its arc of travel, the stream of discharged metal is deflected by the relatively movable spout for discharging it into a receiver stationed at a constant distant from the axis of rotation of the container.

The accompanying drawings illustrate the present preferred embodiment of the invention in which—

Figure 1 is a fragmentary sectional view of a hot metal mixer having a spout embodying my invention attached thereto;

Figure 2 is a similar view showing the relative positions of the parts when the mixer is in a different position; and

Figure 3 is a plan view of a portion of the mixer and the discharge spouts.

Referring to the drawings, a container 2 for molten metal 4, illustrated as a hot metal mixer, is carried by a plurality of arcuate rails 5, only one of which is here illustrated. The rail 5 is, in turn, supported by a frame 6 for a plurality of spaced rollers 7. The rollers 7 in turn rest in an arcuate seat 8 in a base 9. The mixer 2 has a substantially semi-cylindrical shape in the lower portion thereof and a discharge spout 10 normally opening in a substantially horizontal direction above the level of the molten metal 4 therein. The shape of the spout 10 is such that as the spout occupies the successive positions indicated by full and dotted lines in Figure 1 and in full lines in Figure 2, the molten metal is discharged therefrom.

The mixer is rocked or tilted by links 11 pivotally connected at one end, as at 12, to each rail 5. The other end of each link 11 is pivotally connected to trunnions 14 mounted on a cross-head 15 movable in a guide-way 16. Each cross-head 15 is provided with an internal threaded bore through which an actuating screw 17 extends. Upon rotation of the several screws 17 the cross-heads 15 are moved to rock or tilt the mixer by causing it to move on the rollers 7 relative to the base 9.

The details of the mixer and the mechanism for tilting it are more fully shown and described in my co-pending application Serial No. 285,836 filed June 16, 1928.

When the spout 10 is initially tilted for discharging the metal 4 a ladle or truck 18 mounted on a track 19 directly beneath the spout receives the discharged metal. As the spout 10 continues to follow the arc through which it travels, the area of projection of the spout on the ladle moves toward the inner side of the ladle and unless the ladle is moved, the projection of the spout moves beyond the edges of the ladle and the trajectory of the discharged metal is outside of the ladle. Heretofore a plurality of parallel tracks have been provided for moving the ladles along the floor to keep them within the trajectory of the metal discharged by the spout 10.

Movement of the ladle 18 is avoided by providing a second spout 20 pivotally mounted on a shaft 21 carried by the mixer beneath the spout 10. The outer edge 22 of the spout 20 extends above the mouth of the spout 10 for preventing the overflow of metal during the pouring operation. The spout tapers downwardly and terminates in an opening 24. Near the bottom of the spout lugs 25 are provided for receiving pins 26 into which links 27 are pivotally connected. As illustrated in Figure 3, a pair of links 27 is provided for engagement with the frames 6 associated with a pair of rails 5 on opposite sides of the spout 10. The other ends of the links 27 are provided with openings 28 for pins 29. The pins 29 extend through the openings 28 and openings in lugs 30 carried by the frames 6. The length of the links 27 is such that the spout 20 extends in a vertical position when the spout 10 is in a horizontal position as shown in full lines in Figure 1.

As the mixer 2 is tilted the spout moves from the full line position shown in Figure 1 to the dotted line position. The end of the spout 10 moves to the left as viewed in Figure 1 which tends to withdraw it from above the ladle 18. As the tilting movement of the mixer 2 takes place each rail 5 moves relatively to its co-operating arcuate seat 8. As the weight of the mixer is sufficiently great to prevent slippage between the rollers 7 and the rail 5 and seat 8, the peripheral speed of the rail 5 relative to the seat 8 is substantially twice that of the frame 6 relative to the seat 8. This is caused by the rotation of the rollers 7. As the rollers 7 rotate their centers move relative to the seat 8. At the same time the rail 5 is turned relative to the center of each roller in accordance with the amount of rotation of each roller. At the same time, however, the center of each roll advances by the same amount of movement relative to the seat 8. Accordingly, the movement of the rail is a resultant movement of the shifting of the center of each roller 7 and the amount of linear movement between the surfaces of each roller and the rail which amounts to twice the movement of the frame 6 relative to the seat 8. Consequently, the shaft 21 which is carried by the mixer 2 moves downwardly and tends to catch up with the lugs 30 on the frame 6. However, as the link 27 is non-extensible, its angular relation to the spout 20 changes. The change in angular relation causes the opening 24 of the spout to move away from the body of the mixer.

This movement continues until the container is substantially empty as shown in Figure 2, when the link 27 occupies substantially a horizontal position and the axis of the spout 20 has shifted from substantially a vertical position to a position illustrated at approximately 45° to the perpendicular. In this position the mouth 24 of the spout 20 still engages a ladle on the track 19, although the projection of the end of the spout 10 onto a horizontal plane does not intersect the latter. It is to be understood that the exact angular movement of the spout 20 may be varied as desired and the value of 45° is given by way of illustration and not by way of limitation.

During the return movement of the mixer 2 the rail 5 moves faster than the frame 6 with the result that the distance between the shaft 21 and the lugs 30 increases as the spout 20 is turned into substantially a vertical position.

It is to be understood that while I have described a specific form of my invention it may be otherwise embodied within the scope of the following claims.

I claim:

1. Metal handling apparatus comprising a base, a container having a pouring spout, a support for the container movable on said base, a second spout movably mounted adjacent to the pouring spout for receiving material therefrom, and means for varying the relative positions of the spouts in accordance with relative movement between the container and support.

2. Metal handling apparatus comprising a base, a container having a semi-cylindrical portion and a spout, a support for the container movable on said base, a second spout movably mounted adjacent to the pouring spout for receiving material therefrom, and means for varying the relative positions of the spouts in accordance with the relative movement between the container and the base.

3. Metal handling apparatus comprising a base, a container having a semi-cylindrical portion and a pouring spout, a support of arcuate shape co-operating with said semi-cylindrical portion of the container and movably mounted on said base, a second spout movably mounted adjacent to the pouring spout and adapted to receive material therefrom, and means for varying the relative positions of the spouts in accordance with movement of the support.

4. Metal handling apparatus comprising a base, a semi-cylindrical container having a pouring spout, an arcuate support co-operating with the semi-cylindrical outer wall of the container, a second spout movably mounted adjacent the pouring spout for receiving material therefrom and means for varying the relative positions of the spouts in accordance with the movement of the support.

5. Metal handling apparatus comprising a base, a container having a pouring spout, a support for the container movable on said base, a second spout movably mounted adjacent to the pouring spout for receiving material therefrom, and means for varying the

position of the axis of the second spout relative to a vertical plane in accordance with the movement of the container relative to the base.

6. Metal handling apparatus comprising a base having an arcuate seat therein, a container having a portion of semi-cylindrical shape and a pouring spout, a support comprising a plurality of rollers disposed between the container and the base, a second spout movably mounted adjacent to the pouring spout for receiving material therefrom, and means for varying the relative positions of the spout in accordance with movement of the support.

7. Metal handling apparatus comprising a base, a container having a pouring spout, means for tilting the container for discharging metal through the spout and causing the end of the spout to travel in an arc, a receiver for the discharged material, means for maintaining the receiver at a definite distance from the tilting means, and a second spout carried by the container adjacent to the pouring spout for receiving material therefrom and conveying it to the receiver, said second spout being adapted to change the direction of its axis relative to the axis of the receiving device during the movement of the container.

8. Metal handling apparatus comprising a base, a container having a normally horizontally projecting spout adapted to move in an arc, a support for the container, means for tilting the container and the support for moving the end of the pouring spout, receiving means for material discharged from the spout at a definite distance from the tilting means, and a compensating spout for conveying material from the pouring spout to the receiving means while the pouring spout moves along said arc.

9. Metal handling apparatus comprising a base, a container having a pouring spout, a support for the container movable on said base, a second spout movably mounted adjacent to the pouring spout for receiving material therefrom, and means connecting the second spout to said support.

10. Metal handling apparatus comprising a base, a container having a pouring spout, a support for the container movable on the base and comprising rollers, means for moving the support relative to the base and causing the peripheral speed of the container relative to the base to be substantially twice the peripheral speed of the support relative to the base, a second spout mounted on the container and movable relatively to the pouring spout and the support, and means connecting the second spout to the support for causing the second spout to assume different angular positions relative to the pouring spout during the movement of the container.

11. Metal handling apparatus comprising a base, a container having a pouring spout movable in an arc, a support for the container movable on said base, a second spout pivotally mounted on the container adjacent to the pouring spout for receiving material therefrom and a link for connecting the second spout to the support for causing the free end of the spout to move away from the body of the container as the latter is tilted downwardly.

12. Metal handling apparatus comprising a tiltable container having a pouring spout movable in an arc, a second spout movable relative to the first spout for receiving material therefrom during its travel, and means for moving the second spout.

In testimony whereof I have hereunto set my hand.

LEE E. ALLEN.