E. W. BEARDSLEY.

APPARATUS FOR HANDLING CONTAINERS OF LIQUIDS.

APPLICATION FILED DEC. 20, 1919.

1,354,716.

Patented Oct. 5, 1920.

2 SHEETS—SHEET 1.

Fig. 1

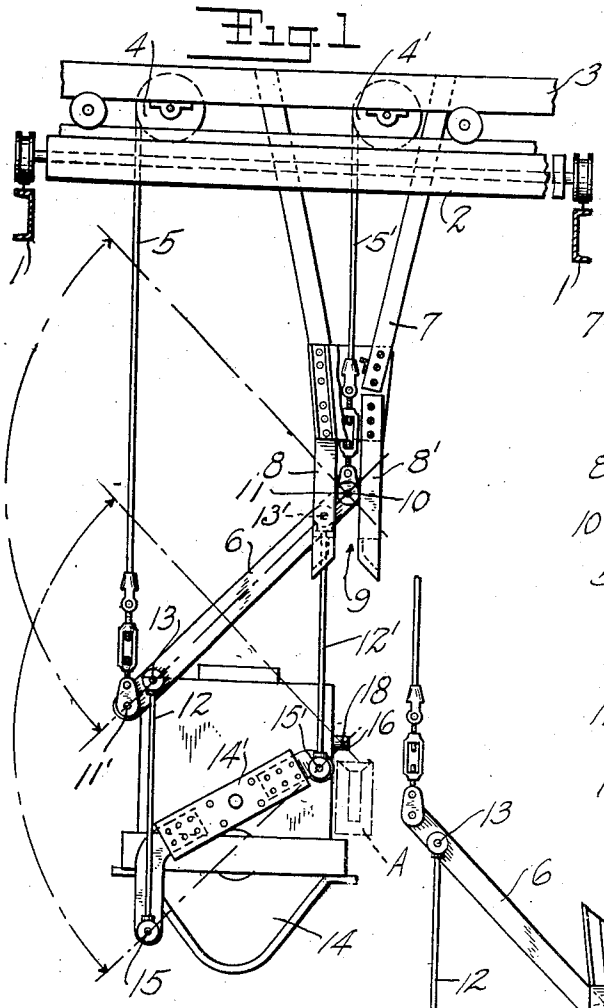


Fig. 2

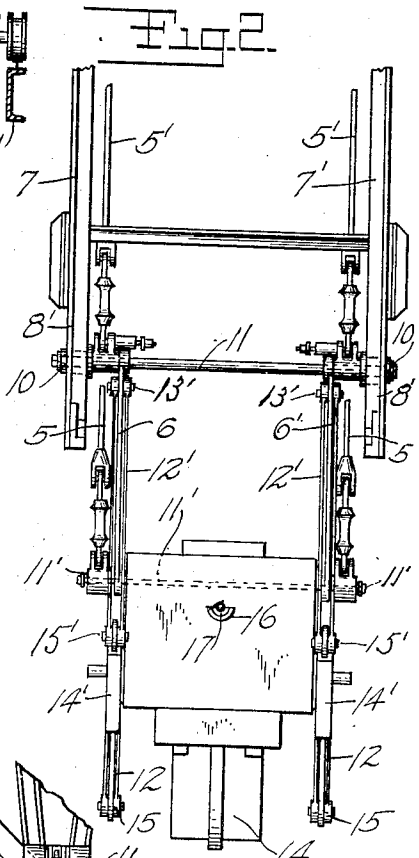
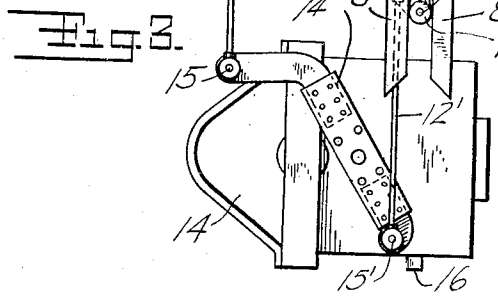


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 4.

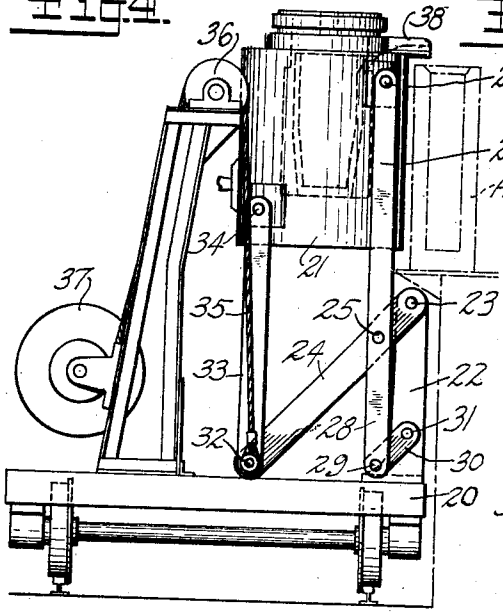


Fig. 5.

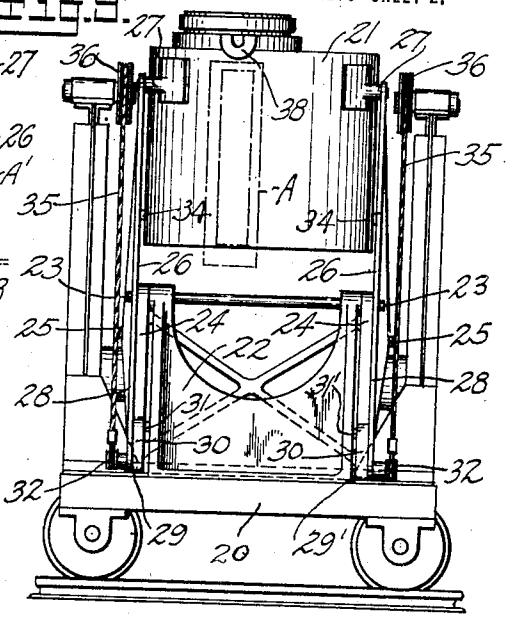
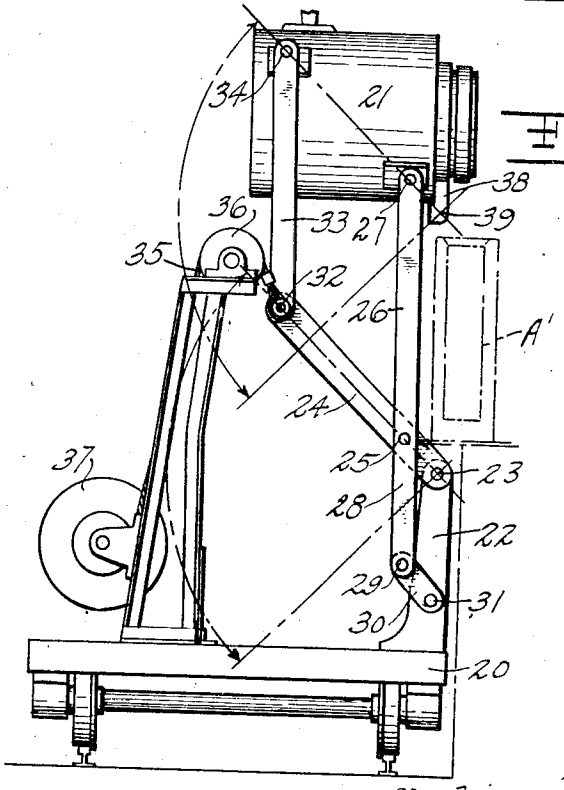


Fig. 6.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR HANDLING CONTAINERS OF LIQUIDS.

1,354,716. Specification of Letters Patent. Patented Oct. 5, 1920.

Application filed December 20, 1919. Serial No. 346,213.

To all whom it may concern:

Be it known that I, EDWIN W. BEARDSLEY, a citizen of the United States, residing at Cheshire, county of New Haven, State of Connecticut, have invented a certain new and useful Improvement in Apparatus for Handling Containers of Liquids, of which the following is a full, clear, and exact description.

My invention relates to apparatus for handling containers of liquids and more particularly containers of molten metal, such as melting furnaces, crucibles, ladles and the like, which have to be tilted to pour out their contents, and has for its object to provide means for securing the accurate control of the motions of the container when being moved, and particularly when being tilted to pour contents into molds or other receptacles where it is desired to have the pouring lip or spout close to the receptacle during the pouring operation so that the container, while being tilted, rotates around a predetermined axis passing near the lip of the pouring spout or orifice without requiring any actual support or trunnion at or near its axis of rotation.

The following is a description of an embodiment of my invention, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of an apparatus embodying my invention;

Fig. 2 is a front view of the same;

Fig. 3 is a side elevation showing position of the parts when the container has been tilted through an angle of 90°.

Figs. 4, 5 and 6 show a modification.

Fig. 4 is a side elevation of the modification;

Fig. 5 is a front elevation of the same, and

Fig. 6 is a side elevation with the parts in the position they assume when the container is tilted.

Referring more particularly to the drawings, 1, 1 are beams supporting tracks for a bridge-crane 2 for conveying the container to the receptacles A into which the metal is to be poured. 3 is a trolley on the bridge-crane which provides for movement in a crosswise direction if desired. This trolley carries drums 4, 4′ to which are connected cables 5, 5′, the lower ends of which are connected to bars 6, 6′, through cross bars 11, 11′. The rear ends of these bars 6, 6′ slant downwardly. The drums 4, 4′ can be operated in the ordinary manner to raise or lower both ends of the bars 6, 6′ simultaneously, or to raise or lower their rear ends while their front ends remain stationary. The bridge-crane is the ordinary form of bridge-crane having independently operated cable drums 4, 4′, being shown diagrammatically in Fig. 1. Depending from the trolley are two vertical guide-supporting members 7, 7′, each having two guiding members 8, 8′, having between them a vertically extending opening 9. The forward ends of the bars 6, 6′ are provided with rollers 10, 10, which are mounted on the cross bar 11 and adapted to enter the openings 9 and move therein to the position shown in Fig. 1. The cables 5, 5′ are connected to the rear ends of the bars 6, 6′. Depending from each of the bars 6, 6′ are two pairs of parallel links 12, 12′ pivoted at their upper ends to the bars 6, 6′ at the points 13, 13′. 14 is the container, being intended to represent any suitable melting furnace, ladle or other container. This container is provided with bars 14′ rigidly secured to the sides of the body thereof, and to which the lower ends of the links 12, 12′ are pivotally connected at 15, 15′, the distance between the pivots of the links 12 being the same, or approximately the same as the distance between the pivots of the links 12′. 16 is a discharge spout of the container 14, having its lip 17 approximately in the plane passing through the four pivots 15, 15′ and located in a vertical plane passing approximately through the axis 11 about which the forward end of the links 6, 6′ rotate. The pivots 15′ are far enough back from the desired axis of rotation 18 to leave the wished for clearances, and the pivots 15 located on the back portion of the container are in such relation to the pivots 15′ that planes passing through their centers also pass through the desired axis 18 of rotation. The axis 18 is indicated by the intersection of the lower two dot-dash lines in Fig. 1, which indicate two positions of the plane passing through the pivots 15, 15′ at two positions of the furnace.

With the parts so connected and the rollers 10 in the spaces 9, when the rear ends of the rods 6, 6′ are elevated the fur-

nace 14 is rotated about the axis 18, this being due to the fact that the links 12, 12′ are of equal length, and the distance between the pivots 13, 13′ is the same as the distance between the pivots 15, 15′, and the distance between the pivots 13′ and the center of the rod 11 is equal to the distance between the axis of the pivot 15′ and the desired axis of rotation 18.

In operating my apparatus the container is lifted from its normal melting, receiving or idle position by winding the cables 5, 5′ upon the drums 4, 4′ at the same rate so as to draw the rollers 10, 10 which are normally below and out of engagement with the guide members 8, 8′, up into the vertical guideways 9. After the rollers 10 are in this guideway, the container is carried by the crane 2 and trolley 3 to the desired pouring position, this being accomplished by the ordinary operation of a traveling crane, which is moved so as to locate the spout 16 in the desired relation to the mold A, whereupon the rear cables 5 are wound upon the drum 4, the drum 4′ being held stationary, with the result that the container 14 can be tipped through any angle up to 90°, as shown in Fig. 3, or even to a greater angle. After the container has been emptied to the desired extent, the lowering of the cables 5 restores the same to the position shown in Fig. 1, whereupon the crane can be operated to carry the crucible to any point desired. When the container is lowered until the rollers 10 are out of engagement with their guides 8, 8′ and the container rests upon the floor, the cables 5, 5′ can be detached from the bars 6, 6′ and the crane used to lift, convey and tilt another furnace or container in a similar manner.

Referring to the modification shown in Figs. 4, 5 and 6, the container in this instance represents a gas heated furnace containing a crucible. In this modification the bridge-crane is replaced by a car 20 upon which the container 21 is supported from beneath instead of from above. In order to accomplish this the car is provided with a support 22 to which are pivotally connected at 23, 23 bars 24, 24. Pivotally connected to these bars at 25, 25 are links 26, 26 whose upper ends are connected to the container at 27, 27, and whose lower ends are provided with extensions 28, 28, which at 29, 29 are connected to links 30, 30 pivoted at 31, 31 to the support 22, the distances between the pivots 23, 23 and 25, 25 being equal to the distances between the pivots 29, 29 and 31, 31, and the distances between the pivots 25, 25 and 29, 29 being equal to the distances between the pivots 23, 23 and 31, 31. Connected to the rear ends of the bars 24, 24 at 32, 32 are two other links 33, whose upper ends are connected at 34 to the container, the distances between the pivots 32 and 34 being equal to the distances between the pivots 25 and 27. To the rear end of the bars 24 are connected cables 35 which pass over sheaves 36 to a drum 37 so that by winding up the cable upon the drum the rear end of the bars 24, together with the rear end of the container 21 can be lifted from the position shown in Fig. 4 to the position shown in Fig. 6. In this case also the container is provided with a discharge spout 38 whose discharge lip is adjacent to a desired axis of rotation 39 indicated by the intersection of the upper dot-dash lines in Fig. 6, and the plane passing through the pivots 27 and 34 passes through that desired axis of rotation. This desired axis of rotation also lies in a vertical plane passing through the pivots 23 and 31, the result being that as the rear ends of the bars 24 are raised, the container is rotated about that desired axis of rotation. By these means also the container can be rotated about a desired axis although there are no trunnions in line with said axis.

As will be evident to those skilled in the art, my invention permits of various modifications without departing from the spirit thereof or the scope of the appended claims.

What I claim is:

1. In an apparatus for pouring liquids, the combination of a container having a poring lip adjacent to its upper end, approximately parallel links of approximately equal length, each pivotally connected to said container at one end, and a bar pivotally connecting the other ends of said links, a bearing on said bar in front of said links and in a plane substantially parallel to said links and passing approximately through said lip, means for holding said bearing in said plane, and means for lifting the rear end of said bar independently of said bearing.

2. In an apparatus for pouring liquids, the combination of a container having a pouring lip adjacent to its upper end, approximately parallel links of approximately equal length, each pivotally connected to said container at one end, a bar pivotally connecting the other ends of said links, a bearing on said bar in front of said links and in a vertical plane substantially parallel to said links and passing approximately through said lip, means for holding said bearing in said plane, means for lifting the rear end of said bar independently of said bearing, and means for simultaneously raising and lowering said bearing and the rear end of said container when desired.

3. In an apparatus for pouring liquids, the combination of a container having a pouring lip adjacent to its upper end, approximately parallel links of approximately equal length, each pivotally connected to said container at one end, a bar pivotally connecting the other ends of said links, a

bearing on said bar in front of said links and in a vertical plane substantially parallel to said links and passing approximately through said lip, means for holding said bearing in said plane, means for lifting the rear end of said bar independently of said bearing, and means for simultaneously raising and lowering the front end of said bar and the rear end of said container so as to bring said bearing into and out of engagement with said holding means, said holding means having vertical surfaces guiding the bearing on said bar while being raised and lowered.

4. In an apparatus for pouring liquids, the combination of a container having a pouring lip adjacent to its upper end, approximately parallel links of approximately equal length, each pivotally connected to said container, a bar connecting the other ends of said links, and having in front of said links and in a vertical plane a bearing substantially parallel to said links and passing approximately through said pouring lip, means for holding said bearing in said plane, means for lifting the rear end of said bar independently of said bearing, a crane located above said container, and cables depending therefrom and suspending said container, said crane having winding drums to which said cables are connected.

5. In means for handling liquids, tilting means comprising four pivotally connected members the axes of whose pivots lie substantially at the angles of a parallelogram having two sides parallel to a substantially vertical plane, the member constituting one of the other two sides comprising a container having a pouring lip adjacent to its front upper side and the member constituting the other of said two sides having an extension provided with a bearing in substantially the same plane as the axes of its pivotal connections, in combination with means for holding said bearing in a definite lateral position, and means for raising and lowering the pivotal connections at the rear of said parallelogram more rapidly than the pivotal connections at the front of said parallelogram and adjacent to the vertical plane passing through the pouring lip of said container.

6. In means for handling liquids, tilting means comprising four pivotally connected members the axes of whose pivots lie substantially at the angles of a parallelogram having two sides maintained parallel to a fixed plane, the member constituting one of the other two sides comprising a container having a pouring lip adjacent to its front upper side and the member constituting the other of said other two sides having an extension provided with a bearing in the same plane as the axes of its pivotal connections, in combination with means for holding said bearing in a definite lateral position, means for raising and lowering the pivotal connections at the rear of said parallelogram more rapidly than the pivotal connections at the front of said parallelogram, and means for raising all of said pivotal connections simultaneously so as to cause said bearing to move upwardly relative to said holding means.

7. The combination of a slanting bar having its rear end lower than its front end, a traveling crane provided with winding drums and located above said bar, cables depending from said drums and suspending said bar, depending links pivotally connected to said bar, a container to which the lower end of said links is pivotally connected, the pivotal connections lying substantially at the angles of a parallelogram, and means for raising the rear end of said bar and container, said container having a pouring lip located adjacent to the top of its front side.

8. The combination of a slanting bar having its rear end normally lower than its front end, a traveling crane provided with winding drums and located above said bar, cables depending from said drums and suspending said bar, depending links pivotally connected to said bar, a container to which the lower ends of said links are pivotally connected, the pivotal connections of said links lying substantially at the angles of a parallelogram, and means for raising the rear end of said bar and container, said container having a pouring lip located adjacent to the top of its front side, the front end of said bar having an extension projecting beyond the front link and the front cable being connected to said extension at a point lying in a vertical plane passing approximately through said pouring lip.

9. The combination of a slanting bar having its rear end normally lower than its front end, a traveling crane provided with winding drums and located above said bar, cables depending from said drums and suspending said bar, depending links pivotally connected to said bar, a container to which the lower ends of said links are pivotally connected, the pivotal connections of said links lying substantially at the angles of a parallelogram, means for raising the rear end of said bar and container, said container having a pouring lip located adjacent to the top of its front side, the front end of said bar having an extension projecting beyond the front link and the front cable being connected to said extension at a point lying in a vertical plane passing approximately through said pouring lip, a bearing on said extension, and means for holding said bearing in a fixed vertical plane.

10. The combination of a bar normally slanting rearward, a traveling crane pro-

vided with winding drums and located above said bar, cables depending from said drums and suspending said bar, depending links pivotally connected to said bar, a container to which the lower end of said links is pivotally connected, the pivotal connections of said links lying substantially at the angles of a parallelogram, means for elevating the rear end of said bar and container, said container having a pouring lip located adjacent to the top of its front side, the front end of said bar having an extension projecting beyond the front link and the front cable being connected to said extension at a point lying in a vertical plane passing approximately through said pouring lip, a bearing on said extension, and means for holding said bearing in a fixed vertical plane, said front cable being in the vertical plane passing through the axis of said bearing.

EDWIN W. BEARDSLEY.