March 15, 1932. E. A. FREY 1,849,182

LADLE TURNING MECHANISM

Filed Feb. 3, 1931

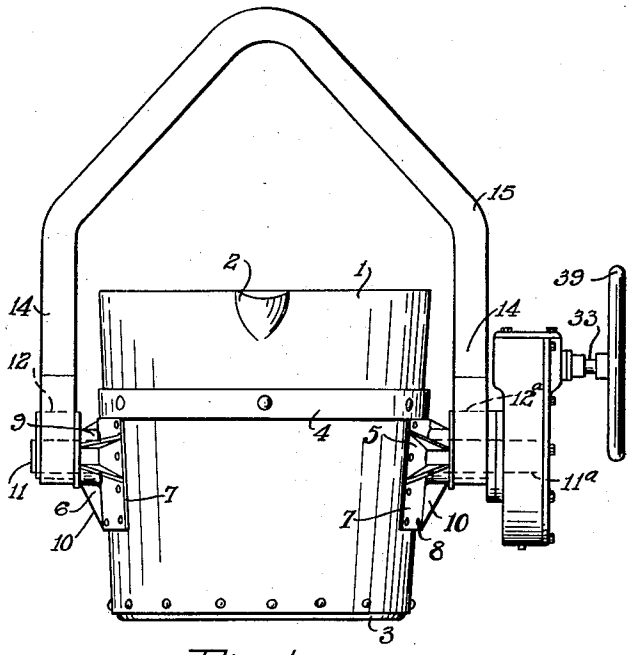


Fig. 1.

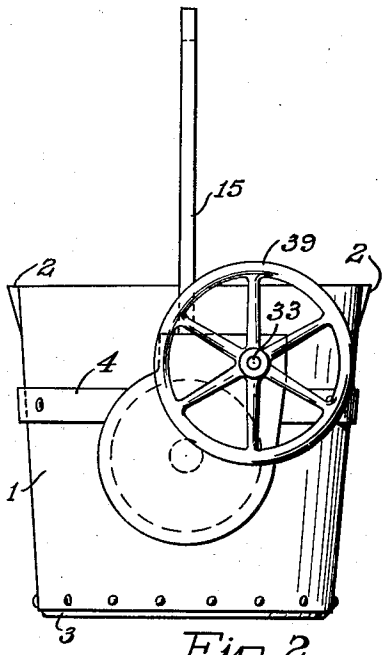


Fig. 2.

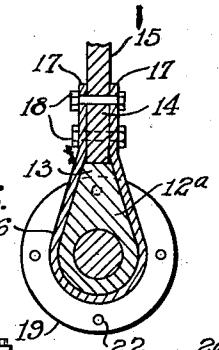


Fig. 6.

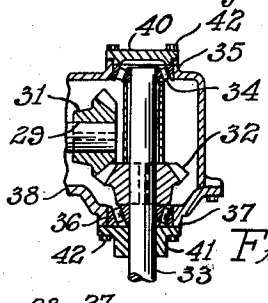


Fig. 5.

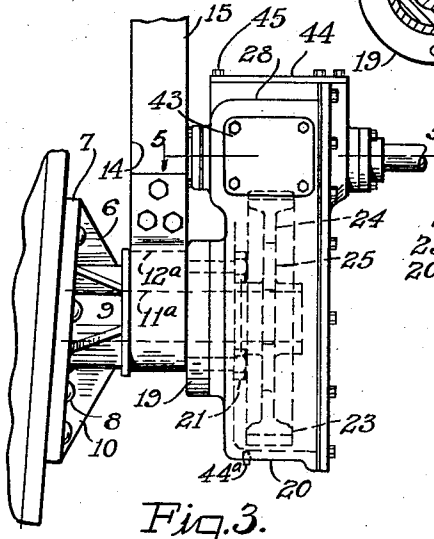


Fig. 3.

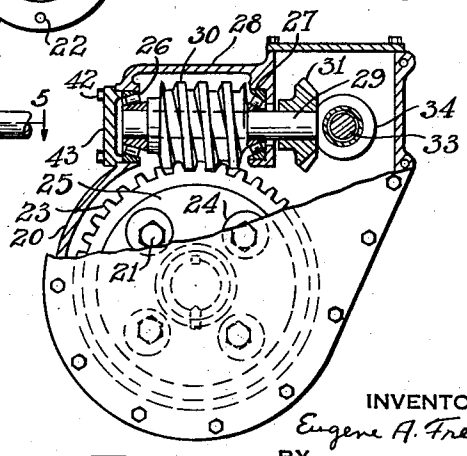


Fig. 4.

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UNITED STATES PATENT OFFICE

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LADLE TURNING MECHANISM

Application filed February 3, 1931. Serial No. 513,183.

This invention relates to improvements in crane ladle gearing and the like.

It is one of the principal objects of my invention to provide a ladle gearing that is anchored to and operates through a trunnion bushing, and has no connection with the bail.

It is another important object of my invention to provide a self-contained, self-locking ladle gearing that is not affected by the expansion of the ladle and bail when filled with molten metal, which usually results in distortion and misalinement in the tilting mechanism.

Other important and incidental objects of my invention will be brought out in the following specification and annexed claims.

In the accompanying drawings, Figure 1 is a side view of my tilting mechanism applied to a crane ladle. Figure 2 is an end view of my tipping mechanism applied to a crane ladle. Figure 3 is a side view of the tipping mechanism. Figure 4 is an end view of the tipping mechanism, partly broken away to disclose the gearing. Figure 5 is a sectional view on the line 5—5 of Figure 3, showing the hand wheel gearing. And Figure 6 is a sectional view through the trunnion bushing and strap connection on the gear side of the ladle.

Referring now to the drawings, the numeral 1 indicates a conventional ladle or bowl having oppositely disposed spouts 2—2 to facilitate pouring. The ladle is provided with a riveted bottom 3 and is surrounded below its top with a reinforcing band 4.

Riveted to the opposite sides of the ladle and positioned midway between the spouts 2—2 and below the band 4, are steel trunnions 5 and 6. These trunnions comprise a curved face plate 7 that is secured to the ladle by rivets 8 and having a radially projecting trunnion boss 9. Each of the bosses is stiffened by webs 10 that extend to the edges of the plates 7. (See Figures 1, 2 and 3).

Each of the bosses 9 has secured therein trunnion shafts 11 and 11ª that are received by flanged bail bushings 12 and 12ª. Each of these bushings is semi-circular at the lower end and tapers above the trunnion to a narrow upper end 13 at its junction with the lower end 14 of an inverted V shaped bail 15. The bushings 12 and 12ª are connected with the bail 15 by a yoke-shaped strap 16 that surrounds the bushings between its flanges and whose upper converging ends 17—17 are bolted to the bail 15 by through bolts 18. (See Figures 1, 3 and 6.)

The bushing 12ª has a heavy outer flange 19 of greater diameter than the inner flange. This flange 19 is secured to a gear housing 20 by bolts 21 that are received by tapped holes 22 in the flange 19.

The lower half of the housing 20 is of circular section to receive therein a worm gear 23 mounted on the end of the trunnion shaft 11ª to which it is keyed. The gear 23 is provided with holes 24 in its web 25 for easy access to the bolts 21 to permit their removal or tightening without removal of the gear. (See Figures 3 and 4.)

Mounted on roller bearings 26 and 27 within an upper elongated portion 28 of the housing 20 is a worm shaft 29. This shaft has keyed thereto and positioned between the bearings 26 and 27 a worm shaft 30 in driving engagement with the worm gear 23. (See Figures 3 and 4.)

Secured to the shaft 29 beyond the bearing 27 is a bevel gear 31 that meshes with another bevel gear 32. The gear 32 is keyed to a hand wheel shaft 33 that parallels the shaft 11ª.

The shaft 33 is mounted on a roller bearing 34 that is mounted in a boss 35 on the side of the housing 20 and another roller bearing 36 that is received by a boss 37 formed in the cover plate 38 for the gear housing. The shaft 33 extends through the cover 38 and has secured to its outer end a hand wheel 39 for rotation of the shaft. (See Figures 1, 2 and 5.)

Each of the bearings 34 and 36 are retained by bearing caps 40—41 that are secured to the bosses 35 and 37 by cap screws 42.

The bearing 26 is likewise retained by a bearing cap 43 secured to the housing 28 by cap screws 42. The top of the housing 28 above the shaft 33 is closed by a cover plate 44, secured by cap screws 45.

Now, when the hand wheel 39 is rotated,

the bevel gears 29 and 32 will impart rotation to the worm 30 and the latter will cause the gear 23 to rotate but a much less amount due to the reduction gearing.

This partial revolution of the gear 23 will likewise cause the shaft 11ª to revolve and tip the ladle 1 about the trunnions 5, 5.

An opposite movement of the housing 20 is prevented by the bolted connection with the trunnion bushing 12ª and the bail 15 that is maintained in practically a vertical position by the weight of the ladle suspended from the crane hook (not shown).

When the operator removes his hands from the wheel 39, the ladle will not tip or return to a normal position due to the worm gearing and thus providing an automatic locking feature that is indispensable in the safe handling of molten metals.

My gear housing is adapted to be filled with oil or other lubricant and I have provided a drain plug 44ª to permit draining the gear housing 20 when desired. Any movement of the bail or expansion or distortion of the ladle will not affect the alinement of the gearing which is entirely self-contained and free of any connection with the bail.

It is thus seen that I have provided a ladle tipping mechanism that reduces one of the great hazards in foundry practice—the spilling of molten metal; it provides a mechanism that promotes easy operation; it is self locking; and has a reliable operation that is unaffected by expansion of the bowl, bail or other parts.

Having described my invention, I claim:

1. In a device of the type described, the combination with a ladle, a bail therefor, a trunnion bushing carried by said bail, a gear housing secured to said bushing, free of any contact with the bail itself, and gear mechanism in said housing operatively connected through the trunnion bushing to the ladle for turning the same.

2. In a device of the type described, the combination with a ladle, a bail therefor, a trunnion bushing carried by said bail, a gear housing secured to said bushing, free of any contact with said bail, a shaft secured at its inner end to the ladle and projecting through the bushing into the gear housing, and gearing in the latter operatively connected to the shaft to turn the ladle.

3. In a device of the type described, the combination with a ladle, a trunnion fixedly secured to each side of said ladle, a boss on each trunnion, a shaft in each trunnion boss, an inverted V-shaped bail, a bushing carried by the lower end of each leg of the bail, to receive a respective trunnion shaft, a gear case wholly supported by one of said bushings, without contact with the bail itself so as not to be distorted thereby, and gearing in said case, operatively connected to the trunnion shaft that passes through the bushing to which the case is anchored, to turn the ladle.

In testimony whereof I have hereunto set my hand this 30th day of January, 1931.

EUGENE A. FREY.