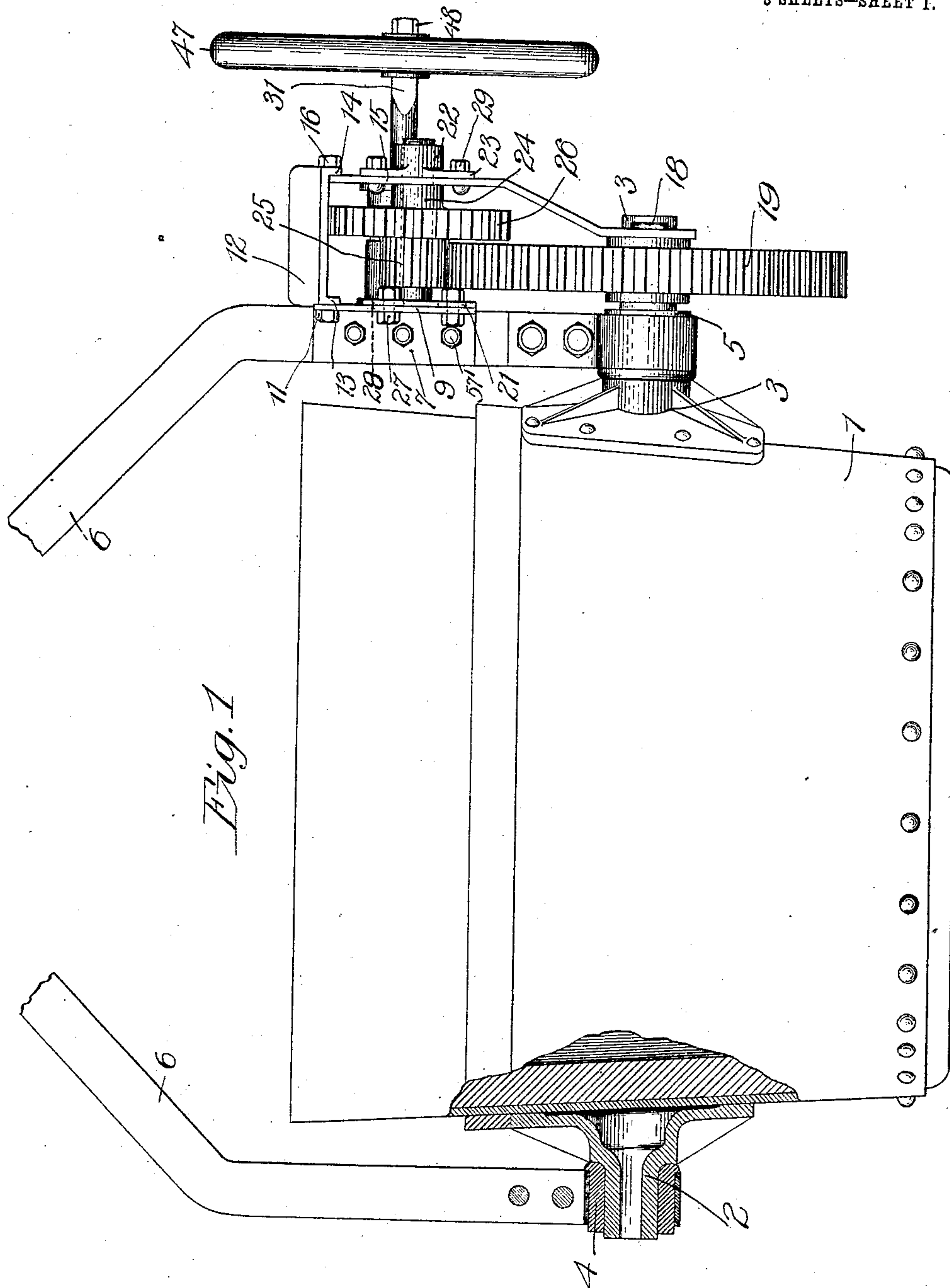


910,483.

C. W. AVELING.  
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APPLICATION FILED JUNE 12, 1908.

Patented Jan. 26, 1909.  
3 SHEETS—SHEET 1.



Witnesses:

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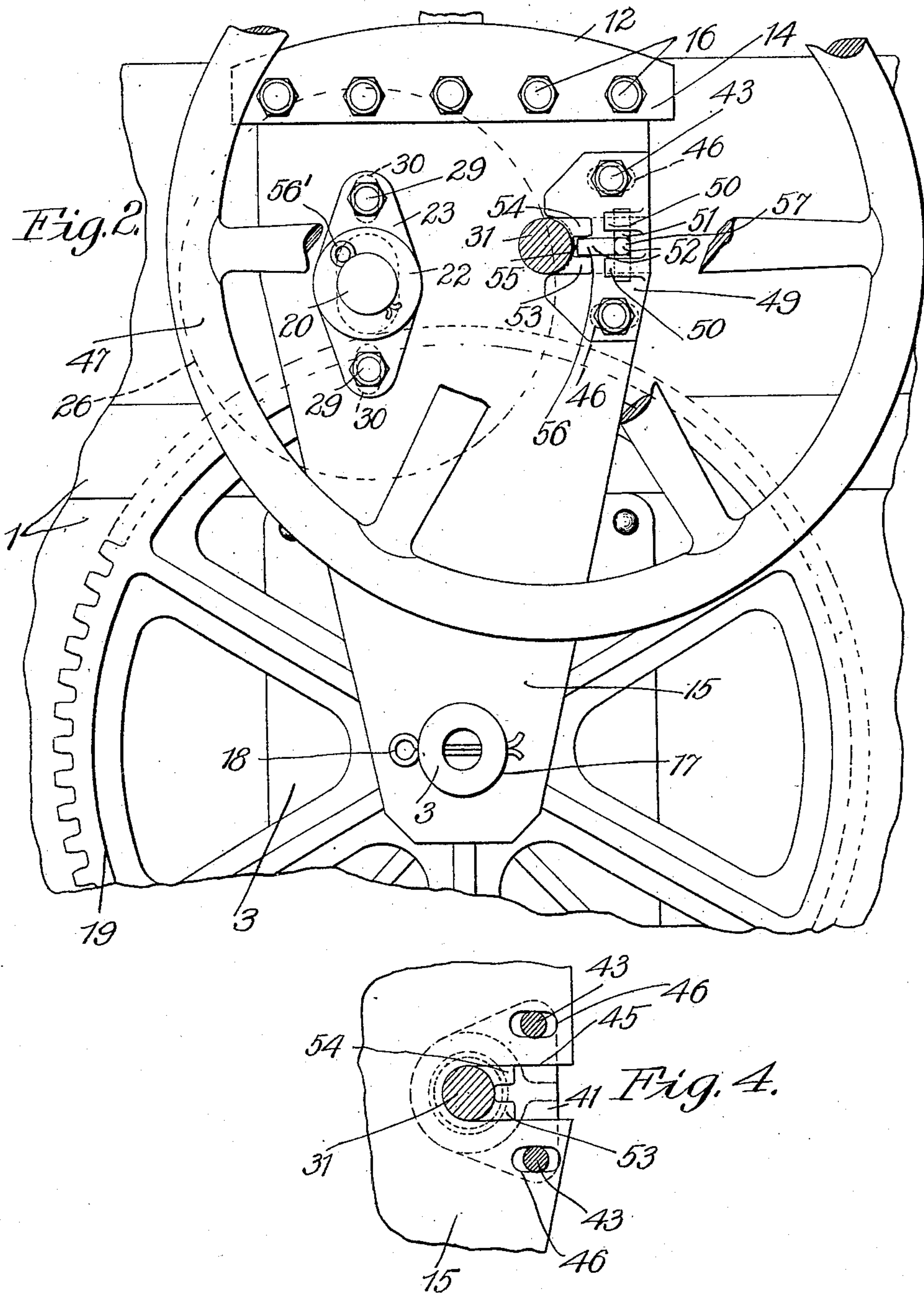
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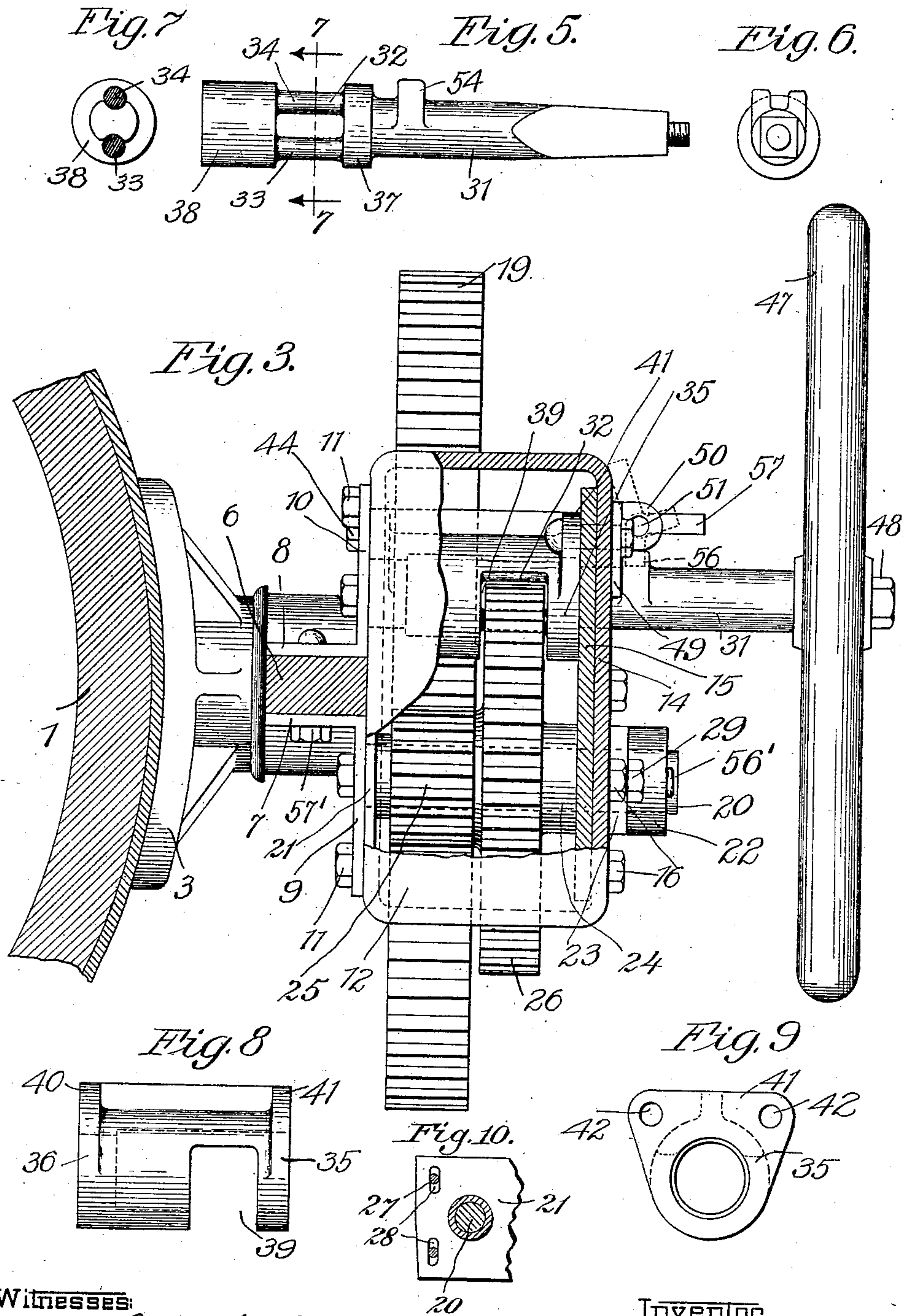
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# UNITED STATES PATENT OFFICE.

CHRISTIAAN W. AVELING, OF MORGAN PARK, ILLINOIS, ASSIGNOR TO CALUMET ENGINEERING WORKS, OF HARVEY, ILLINOIS, A CORPORATION OF ILLINOIS.

## LADLE MACHINERY.

No. 910,483.

Specification of Letters Patent.

Patented Jan. 26, 1909.

Application filed June 12, 1908. Serial No. 438,058.

*To all whom it may concern:*

Be it known that I, CHRISTIAAN W. AVELING, residing at Morgan Park, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Ladle Machinery, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to ladle machinery, particularly to the machinery for controlling the tipping of the ladle and the pouring therefrom, the object of my invention being to produce stronger, more efficient and more simple machinery of this kind.

In the class of ladles to which my invention is particularly applicable, the bail is pivoted to trunnions secured to the bucket, and it is very important that the controlling machinery should be rigidly secured so that the various gears of the machinery can be kept in proper relation.

The main object of my invention, therefore, is to so construct and to so arrange the parts that they may be secured in rigid position to the bail and with reference to the trunnion so that the gearing relations will always be properly maintained.

My improved arrangement involves various important features which will appear in the following description with reference to the drawings, in which—

Figure 1 is a side elevation view of a ladle showing the controlling mechanism; Fig. 2 is an enlarged side view of the controlling mechanism; Fig. 3 is a top view of the mechanism shown in Fig. 2; Fig. 4 is a detail view showing the method of supporting the finger pinion shaft; Fig. 5 shows the finger pinion shaft; Fig. 6 is an end view of said shaft; Fig. 7 is a sectional view taken on line 7—7 of Fig. 5; Fig. 8 is a view showing the unitary bearing frame for the finger pinion shaft, Fig. 9 is an end view of said frame, and Fig. 10 is a view of part of a shaft supporting plate.

Extending from the bucket or ladle 1 are the trunnion members 2 and 3 which are pivotally engaged by the hubs 4 and 5 at the ends of the bail 6. Secured to one limb of the bail, adjacent the ladle, are two angle frames 7 and 8. The longer members 9 and 10 of the angle frames have their front faces coincident with the outer face of the bail limb so that a vertical wall is formed from

which the various casing parts and gear shafts may be supported.

Secured at its rear edge to the top edge of the angle frames, as by means of bolts 11, is the gear cover 12, the bolts 11 passing through the angle frames and through the rear flange 13 of the gear cover. This cover also has the front flange 14, to which is secured the front plate 15, as by means of bolts 16. This front plate extends downwardly and at its lower end has the opening 17 for receiving the outer end of the trunnion 3, a cotter pin 18 being shown extending through the trunnion end to hold the plate in place. The angle frames, gear cover and front plate, being thus securely bolted together and being thus securely held against the bail and the trunnion, form a very rigid support and housing for the various gears, and this construction and arrangement form one feature of my arrangement.

Secured to the trunnion 3, between the bail hub 5 and the outer plate 15, is the main gear 19 which extends upwardly into the housing. A shaft 20 extends through the housing above the gear 19 and parallel to the trunnion. This shaft at its rear end bears in the plate 21 best shown in Fig. 10 and at its front has bearing in the hub 22 extending from the plate 23. Mounted on said shaft is the hub or sleeve 24 which carries the pinion 25 and intermediate gear 26. These gears and the hub may be integral, the pinion 25 meshing with the main gear 19. In order that adjustment may be made between the pinion 25 and gear 19, the plates 21 and 23 are adapted for vertical adjustment. The plate 21 is secured to the front member 9 of the angle frame 7, as by means of bolts 27, these bolts passing through elongated openings 28 so that this plate with the rear bearing for the shaft 20 can be raised or lowered and secured in any position. The plate 23 is secured to the front housing plate 15 as by means of bolts 29 which pass through elongated openings 30 in the plate 15 so that the outer bearing 22 for the shaft 20 may be raised or lowered. These slots may be elongated vertically or at any other angle so that the best adjustment can be made of the pinion 25 with reference to the main gear 19. To the rear of the shaft 20 is the shaft 31. This shaft is journaled in a unitary bearing frame which affords a bearing at each side of the finger pinion 32, which engages with the



intermediate gear 26, this intermediate gear 26 having comparatively long teeth and the finger pinion comprising two pins 33 and 34.

Figs. 5, 6 and 7 show the construction of the shaft 31, and Figs. 8 and 9 show the construction of the unitary bearing frame. This bearing frame has the front and rear bearing parts 35 and 36, in which journal respectively the parts 37 and 38 of the pinion shaft. Between these bearing parts is the groove 39, into which extends the intermediate gear 26 in meshing relation with the pinion teeth 33 and 34. At the ends of the bearing frame are the flanges 40 and 41 having bolt holes 42. This bearing frame is secured between the front housing plate 16 and the front member 10 of the angle frame 8 by means of bolts 43 passing through the front flange 41 and the front housing plate 15, and the bolts 44 passing through the rear flange 40 and the member 10 of the angle frame 8. Cut into the housing plate 15 from the right edge thereof is the horizontal slot 45, through which extends the outer end of pinion shaft 31. Thus by withdrawing the bolts 43 and 44, the bearing frame with the pinion shaft can be withdrawn.

In order that adjustment may be made between the pinion 32 and the intermediate gear, the bolts 43 pass through horizontal slots 46 in the front plate 15 and the bolts 44 pass through similar slots in the angle frame member 10. With this arrangement, the unitary bearing frame, with the pinion shaft, can be moved toward and away from the intermediate gear so that the proper gearing relations can be adjusted for. On the outer end of the pinion shaft is mounted the hand-wheel 47, held in place by the end nut 48. By turning this hand wheel, the pinion 32 rotates the intermediate gear 26, and the pinion 25 rotates the main gear 19, and thereby the trunnion shaft 3 thus tipping the ladle 1 in one direction or the other. In order to hold the ladle in a certain position, I provide stop mechanism comprising a plate 49 which fits against the outside of the housing plate 15, adjacent the pinion shaft, and which plate has bolt holes for receiving the bolts 43. Extending from this plate are two bearing lugs 50, in which is pivoted or trunnioned a shaft 51, carrying the angular stop lever 52.

Extending from the pinion shaft, at the outside of the gear casing, are two lugs 53 and 54 forming a locking groove 55 for receiving the locking end 56 of the stop lever, the end 57 of this lever forming a handle. While the hand-wheel is being turned, the stop lever is in position indicated by dotted lines in Fig. 3. When the mechanism is to be locked after turning of the hand-wheel, the stop lever is rotated by means of its handle to carry the stop end 56 into the groove 55 so that the pinion shaft is locked to the gear housing and the ladle held in position.

The unitary bearing for the pinion shaft forms another important feature of my invention, a rigid bearing being always afforded the pinion shaft. When the pinion is adjusted with reference to the intermediate gear, both bearing parts of the bearing frame are simultaneously moved and the adjustment is never disturbed. In prior ladle structures, two bearings are employed and the bearing adjustment is very readily disturbed. The pinion shaft, being also very rigidly held in the unitary bearing, is not so apt to work unequally, and thus the unitary bearing further assists in maintaining proper gearing relations and maintaining free running conditions of the pinion shaft.

The construction which I have described is very readily taken apart for inspection or repairs and can readily be assembled. If the bearing frame is to be removed, bolts 43 and 44 can be withdrawn and the frame, pinion shaft and supported parts can be removed together. The shaft for the intermediate gear and pinion can be locked to the hub 22 by means of a cotter pin 56<sup>1</sup>. When it is desired to remove the intermediate gear mechanism, the cotter pin 56<sup>1</sup> is removed and the shaft 20 withdrawn, whereupon the intermediate gear mechanism can be removed from the housing. By removing the bolts 57<sup>1</sup> which secure the angle member to the bail and by withdrawing the cotter pin 18, the entire controlling mechanism can be removed from the ladle. The entire controlling mechanism can also be assembled and then applied to the ladle by the insertion of the bolts 57<sup>1</sup> and cotter pin 18. This arrangement makes it easy to replace worn or injured parts without putting the ladle out of commission for any length of time and without disturbing the adjustments. By the rigid connection of the mechanism to both sides of the bail and by means of the rigid connection of the housing with the trunnion, the proper gearing relation of the various gears with reference to the trunnion is always maintained, and free and easy operation at all times assured, there being no chance for uneven wear or binding.

Details of construction and arrangement are, of course, possible which would still come within the scope of my invention, and I therefore do not limit myself to the precise arrangement shown.

I desire to secure the following claims by Letters Patent:

1. In ladle mechanism, the combination of a ladle bucket, trunnions extending from said buckets, a bail pivoted to the trunnions, a main gear secured to one of said trunnions, a gear housing supporting frame secured to the bail, a train of gears within the frame connected with the main gear, an actuating member for the gear train, and means securing said housing to said trunnion independ-



ently of the bail whereby said housing is caused to be more rigid.

2. In ladle mechanism, the combination of a ladle bucket, trunnions for the bucket, a bail pivoted to said trunnions, a main gear secured to one of said trunnions, a supporting housing over said main gear having an inner wall rigidly secured to the bail and an outer wall secured directly to said trunnion outside the main gear, a train of gears mounted within the housing, and an actuating member at the outside of the housing connected with said train.

3. In ladle mechanism, the combination of a ladle bucket, trunnions extending from said bucket, a bail pivoted to said trunnions, a main gear secured to one of said trunnions, a supporting housing over said main gear having a rear wall and a front wall, extensions from the rear wall forming a slot for receiving the bail, means for securing said extensions and thereby said housing to the bail, the front wall of the housing extending downwardly and being secured to the end of the main gear trunnion, intermediate gearing mechanism pivoted within the housing, and an actuating member at the outside of the housing connected with said intermediate gearing.

4. In ladle mechanism, the combination of a ladle bucket, trunnions extending from said bucket, a bail pivoted to said trunnions, a main gear keyed to one of said trunnions, a supporting housing over the main gear having a rear wall and a front wall, extensions from the rear wall forming a slot for receiving one limb of the bail, means for securing the extensions and thereby the housing to the bail, said front wall extending downwardly and having an opening for receiving the main gear trunnion, means for locking said front wall to said trunnion, intermediate gearing mechanism within the housing, and actuating means connected with said intermediate gearing.

5. In ladle mechanism, the combination of a ladle bucket, a bail pivoted to said bucket, a main gear connected with said bucket, rotation of said main gear causing tilting of the bucket, a supporting housing over the main gear having a front and a rear wall, means for securing the rear wall to the bail, a unitary bearing frame mounted between the front and rear walls of the housing and offering a front and a rear bearing section, a gear shaft extending through said bearing frame, a gear on said shaft disposed between the bearing sections of the frame, an actuating member at the end of said shaft, and means connecting said gear with the main gear.

6. In ladle mechanism, the combination of a ladle bucket, a bail pivoted to said bucket, a main gear connected with the bucket so that rotation thereof will cause tilting of the bucket, a supporting housing over the main

gear having front and rear parallel walls, means for securing the rear wall to said bail, a front bearing and a rear bearing disposed between the walls of the housing, a shaft in said bearings, a pinion on said shaft between the bearings, said bearings being cast to form a unitary frame, means for connecting said pinion with the main gear, and actuating means at the end of said shaft.

7. In ladle mechanism, the combination of a ladle bucket, a bail pivoted to said bucket, a main gear connected with the bucket, a supporting housing having a front and rear wall, said rear wall being adapted to be secured to said bail, a bearing frame having front and rear flanges, by means of which it may be secured to and between the front and rear walls of the housing, a shaft extending through said bearing frame, a slot in said bearing frame intermediate its ends, a pinion in said slot and mounted on said shaft, driving means at the end of said shaft, and means for connecting said pinion with the main gear.

8. In ladle mechanism, the combination of a ladle bucket, a bail pivoted to said bucket, a main gear connected with said bucket, supporting housing adjacent the main gear and having a front and rear wall, means for securing the rear wall to the bail, a bearing frame removably secured between and to the front and rear walls of the housing, a shaft having bearing in said bearing frame, a slot in said frame intermediate its ends, a pinion on said shaft and disposed in said slot, said pinion having connection with the main gear whereby turning of the shaft will cause turning of the main gear, a slot in the front wall of the housing through which said shaft extends, said slot extending to the edge of the front wall whereby said bearing frame and shaft may be removed together from the housing, and driving means at the outer end of said shaft.

9. In ladle mechanism, the combination of a ladle bucket, a bail pivoted to said bucket, a main gear having connection with the bucket so that rotation thereof will cause rotation of the bucket, a supporting housing over the main gear having a front and rear wall, means for securing the rear wall and thereby said housing to said bail, intermediate gearing within the housing, bearing plates for adjustable engagement with the walls of the housing, a shaft in said bearing plates for supporting the intermediate gearing, a unitary bearing frame secured to and between the walls of the housing, a pinion shaft extending through said bearing frame, a slot in said bearing frame, a pinion on said pinion shaft disposed in said slot, said pinion being in gearing relation with the intermediate gearing, means for adjusting said bearing frame to adjust the gearing relations, and a driving member at the end of the pinion shaft.



10. In ladle mechanism, the combination of a bucket, trunnions extending from said bucket, a bail pivoted to said trunnions, a main gear connected to one of said trunnions, 5 angle frames secured at opposite sides of one bail limb above said main gear, the front members of said angle frames being in the same plane to form a rear supporting wall, a cover secured at its rear edge to the angle 10 members, a front supporting wall secured at its top to the front of the cover and extending downwardly, there being an opening in the lower end of the front wall for receiving the end of the main gear trunnion, means for se- 15 curing the front wall in place on said trunnion, intermediate gearing mechanism pivoted between the walls of the housing and connected with the main gear, and a driving member at the outside of the housing con- 20 nected with the intermediate gearing.

11. In ladle mechanism, the combination

of a ladle bucket, a bail pivoted to said bucket, a main gear having connection with the bucket so that rotation thereof will cause rotation of the bucket, a supporting 25 housing over the main gear and supported from the bail, said housing having front and rear walls, intermediate gears between said walls, shafts for said gears extending between said walls, bearing plates for said shafts ad- 30 justably secured to said walls so that the gears may be adjusted with respect to each other, and a driving member for actuating said gears.

In witness whereof, I have hereunto sub- 35 scribed my name this 10th day of June, A. D. 1908.

CHRISTIAAN W. AVELING.

Witnesses:

CHARLES J. SCHMIDT,  
LEONARD W. NOVANDER.