

Dec. 22, 1931.

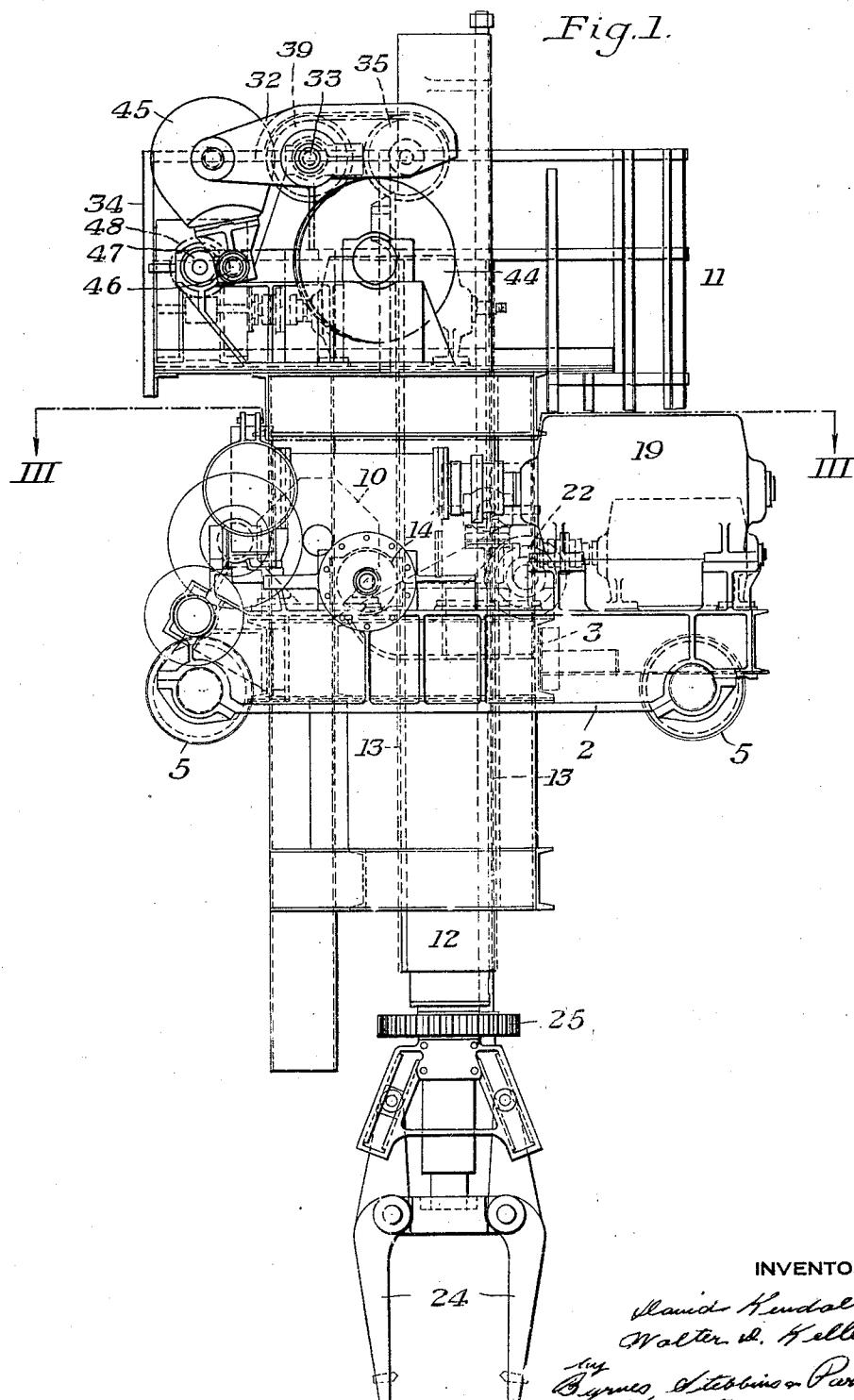
D. KENDALL ET AL

1,837,718

CRANE

Filed Aug. 31, 1928

3 Sheets-Sheet 1



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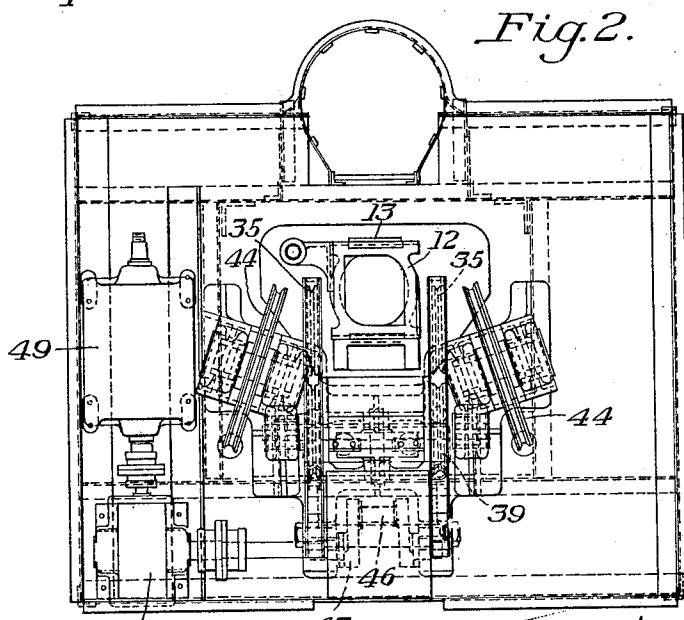
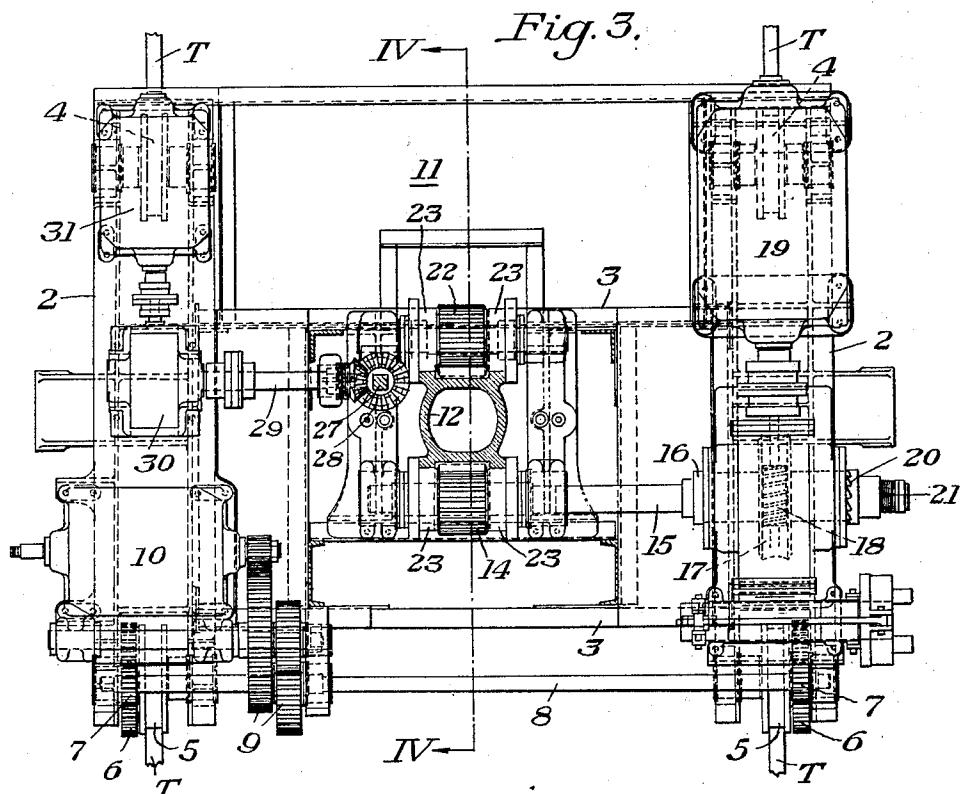
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CRANE

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3 Sheets-Sheet 2



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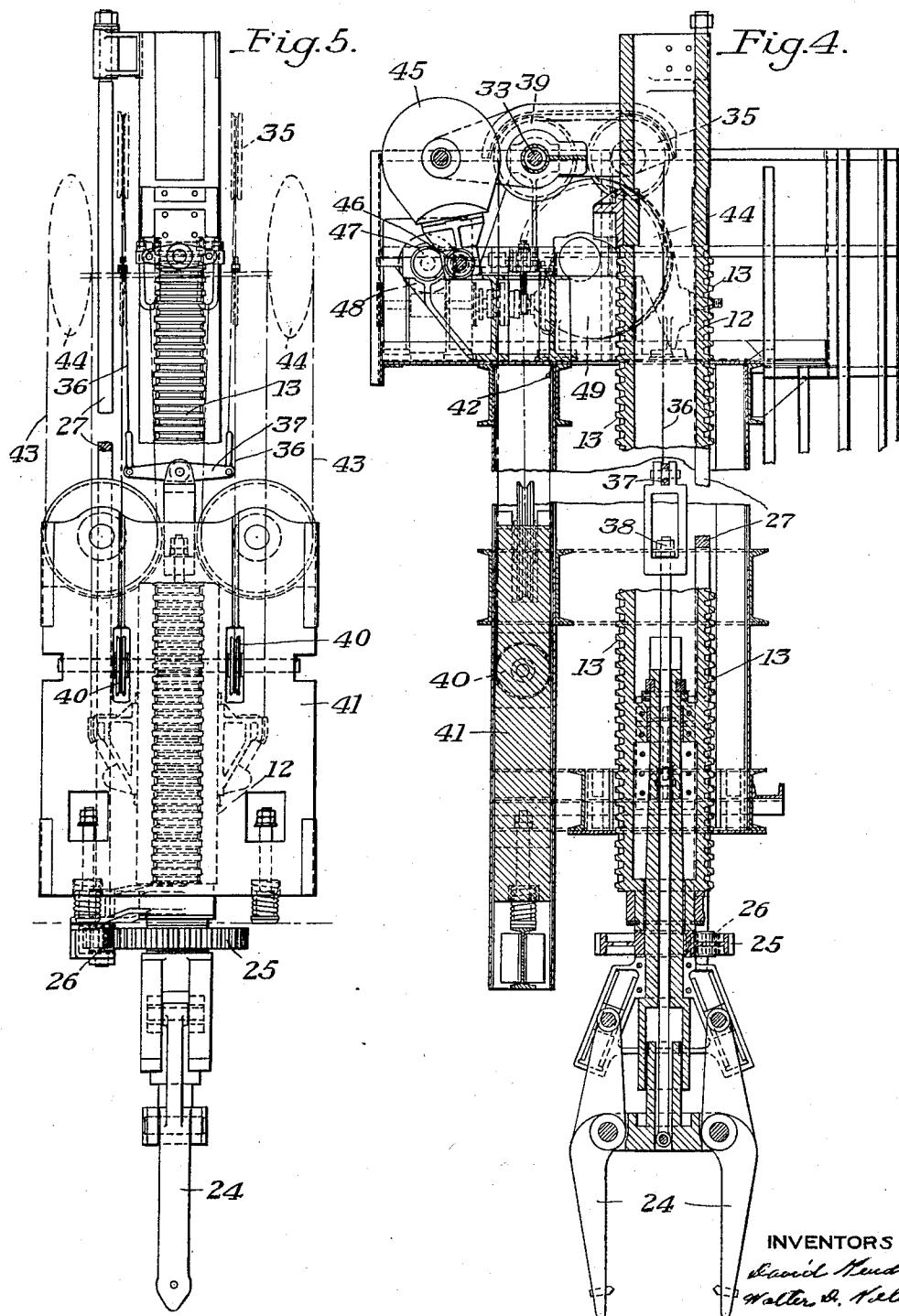
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CRANE

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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CRANE

Application filed August 31, 1928. Serial No. 303,192.

This invention relates to cranes of the stiff leg type, such as soaking pit cranes.

Cranes of this type comprise a trolley which carries a stiff leg having tongs at the lower end thereof. Cranes of this general character are well known and have been in use for many years. We provide a number of improved features contributing to reduction in cost of construction and operation and long life.

Our improved crane is provided with worm gear drives for the several operating mechanisms. Worm drives are of special value in a crane of this type and permit of a very simple driving connection. The motors are preferably mounted with their axes extending longitudinally of the trolley trucks as this insures proper alignment of the parts regardless of the "give" of the trolley under load.

The stiff leg is provided with rack teeth so that it may be raised or lowered through a gear or pinion engaging such rack teeth, and we provide a second set of rack teeth disposed opposite those first mentioned, this second set being connected with a gear which acts as an idler. This prevents slippage of the stiff leg on the idler. After the first set of teeth has worn the stiff leg may be reversed and the second set used for driving.

We mount the operating cage between the wheels of the trolley and so arrange it that it does not project any substantial distance beyond the wheels in the direction of travel of the trolley. In a crane of this type it is important to reduce to a minimum the distance which the stiff leg is spaced from the end of the crane-way when the trolley has reached the limit of its travel along the tracks. By placing the cage as above described it is possible to bring the stiff leg into very close proximity with either end of the crane-way.

In the accompanying drawings illustrating the present preferred embodiment of the invention,

Figure 1 is a side elevation partly broken away of a stiff leg soaking pit crane embodying our improvements,

Figure 2 is a top plan view,

Figure 3 is a section taken on the line III-III of Figure 1,

Figure 4 is a vertical section taken on the line IV-IV of Figure 3, and

Figure 5 is a view largely diagrammatic taken at right angles to the view of Figure 4 and showing the stiff leg.

In general, the crane shown in the drawings embodies many of the features of the crane shown in the patent to Milo Shutt, 1,487,032, dated March 18th, 1924. It comprises a trolley made of spaced trucks 2 connected by structural members 3, and each provided with track wheels 4 and 5 adapted to run on spaced tracks T on the crane bridge. The wheels 4 are idler wheels and the wheels 5 are driving wheels. Each wheel 5 is provided with a gear 6 meshing with a pinion 7 on a shaft 8. The shaft 8 is driven through gearing 9 from a trolley motor 10.

The operating cage 11, as best shown in Figure 3, lies between the trucks 2 and does not extend any substantial distance beyond the track wheels 4. This materially reduces the amount of space at either end of the runway which cannot be reached by the stiff leg.

The stiff leg comprises a hollow casting 12 having rack teeth 13 formed on diametrically opposite sides. The stiff leg is symmetrical about a horizontal center line, as viewed in Figure 3, so that it may be taken out, turned through 180° and replaced. The stiff leg is raised and lowered by a pinion 14 on a shaft 15. The shaft 15 carries a loose sleeve 16 on which a worm gear 17 is mounted. The worm gear meshes with a worm wheel 18 on the shaft of a motor 19. As best seen from Figure 3, the axis of the motor 19 extends longitudinally of the truck 2 upon which it is mounted. One end of the sleeve 16 is toothed and engages a correspondingly toothed sleeve 20 in the shaft 15. The shaft makes a spline connection with the sleeve 20 and the teeth of the sleeve 20 are forced into engagement with the teeth of the sleeve 16 by a compression spring 21. The mechanism thus above described constitutes a slip connection so that if the operator fails to shut off the motor 19 when the stiff leg is lowered into engagement with the ingot to be lifted, continued rotation of the motor will not cause the trolley to climb up the stiff leg.

but the teeth of the sleeve 16 will simply slide over the teeth of the sleeve 20, the sleeve 20 being forced outwardly against the spring 21.

Opposite the pinion 14 there is provided an idler pinion 22 engaging the second set of rack teeth 13. Smooth faced flanged wheels 23 are placed adjacent the pinions 14 and are keyed to the same shafts. With this arrangement the guide wheels are forced to turn upon movement of the stiff leg so that no slipping can take place between the two. This eliminates any wearing of flat spots and consequent looseness in the stiff leg.

The tongs 24 at the bottom of the stiff leg carry a gear 25 meshing with a pinion 26 on a square shaft 27 extending longitudinally of the stiff leg. The shaft slides through a bevel gear 28 carried by the trolley and connected through a corresponding bevel gear to a shaft 29. The shaft 29 is connected through worm gearing indicated at 30 to a tongs rotating motor 31. The tongs rotating motor is also mounted on one of the trucks 2 and its axis extends longitudinally thereof.

The tongs opening and closing mechanism is best shown in Figures 1 and 4. It comprises lever arms 32 pivoted at 33 to the tower structure 34 of the trolley. The levers 32 carry sheave wheels 35 and tongs operating cables 36 (see Figure 4) pass over these sheaves and are connected to an equalizer bar 37 on the tongs closing rod 38. The cables 36 extend from the sheaves 35 around sheaves 39 rotatable on the pivot shaft 33, thence downwardly around sheave wheels 40 on a counter weight 41, and thence upwardly to be dead-ended at 42. The counter weight is connected through cables 43 running over sheave wheels 44 to the stiff leg.

The levers 32 are connected through a heavy counter balancing link 45 to a crank pin 46 on a crank 47. The crank 47 is connected through worm gearing 48 to the tongs opening and closing motor 49.

We have illustrated and described the present preferred form of our invention, but it is not limited to this form alone, as it may be embodied within the scope of the following claims:

We claim:

1. A crane comprising a stiff leg having a rack formed thereon, a motor, a pinion engaging the rack, gearing connecting the motor and the pinion, said gearing including a worm gear, and a slip mechanism interposed in the gearing, said slip mechanism comprising cooperating rotatable members having interengaging teeth, the teeth having axially extending faces and inclined faces, and means yieldingly urging the rotatable members together, said slip mechanism providing a positive driving connection in one direction and a slipping connection in the other

direction operable upon attempted undue lowering of the stiff leg.

2. A crane comprising a vertically movable stiff leg, a rack thereon, a reversible motor, gearing connecting the motor with the rack whereby the stiff leg may be driven upwardly or downwardly, and a slip mechanism interposed in the gearing, said slip mechanism comprising cooperating rotatable members having inter-engaging teeth, the teeth having axially extending faces and inclined faces, and means yieldingly urging the rotatable members together, said slip mechanism providing a positive driving connection in one direction and a slipping connection in the other direction operable upon attempted undue lowering of the stiff leg.

In testimony whereof we have hereunto set our hands.

DAVID KENDALL.

WALTER D. KELLER.

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