Nov. 6, 1951 L. T. BERNARD 2,573,948

PUMP JACK

Filed Dec. 12, 1946 2 SHEETS—SHEET 1

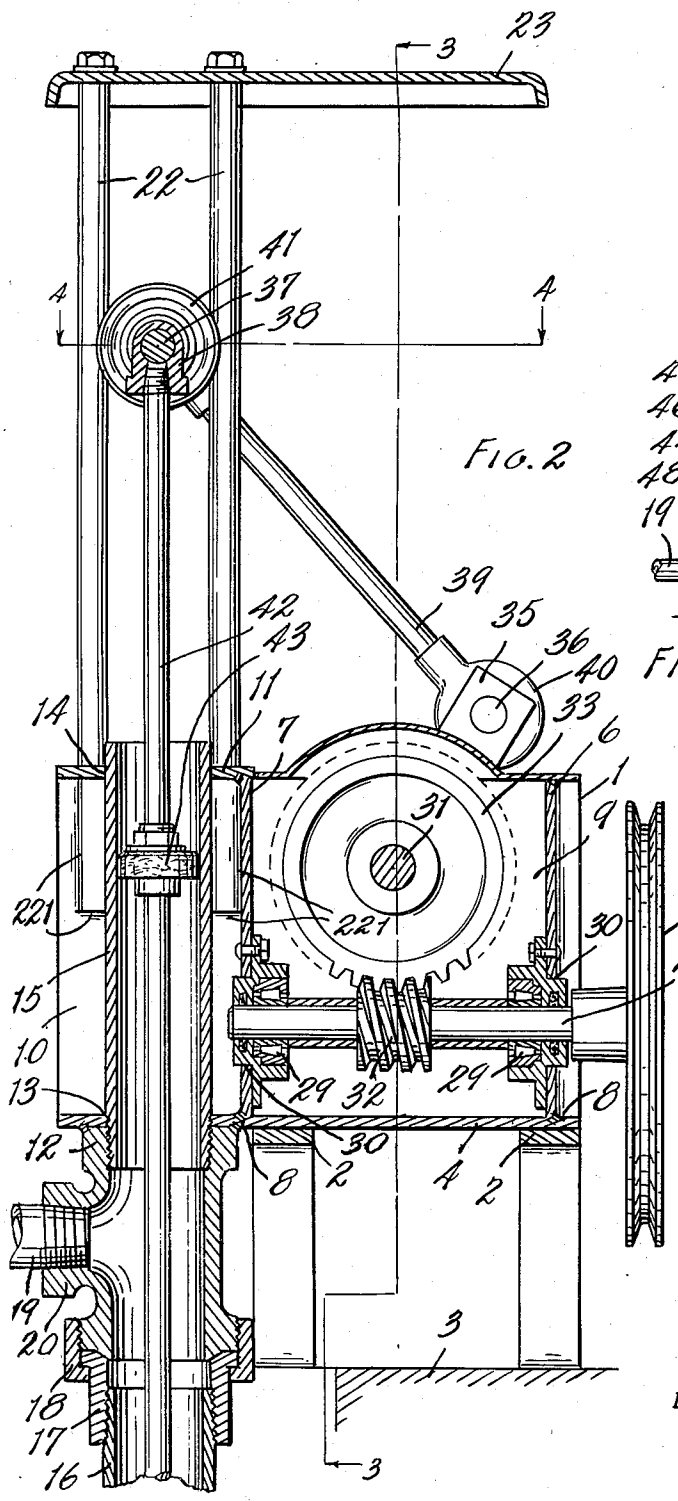


FIG. 2

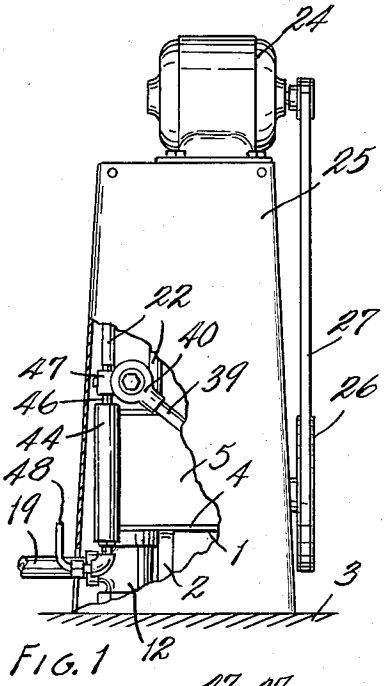


FIG. 1

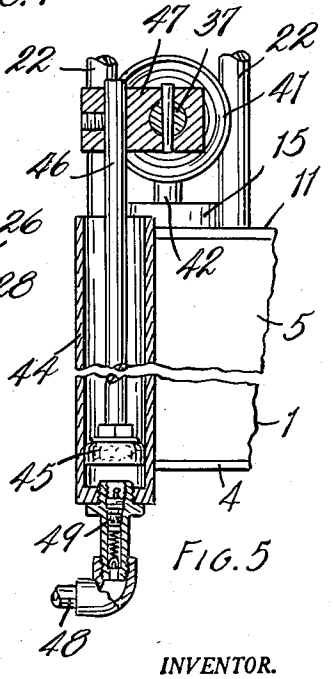


FIG. 5

INVENTOR.

BY Lorn T. Bernard

Attorney.

Nov. 6, 1951 L. T. BERNARD 2,573,948

PUMP JACK

Filed Dec. 12, 1946 2 SHEETS—SHEET 2

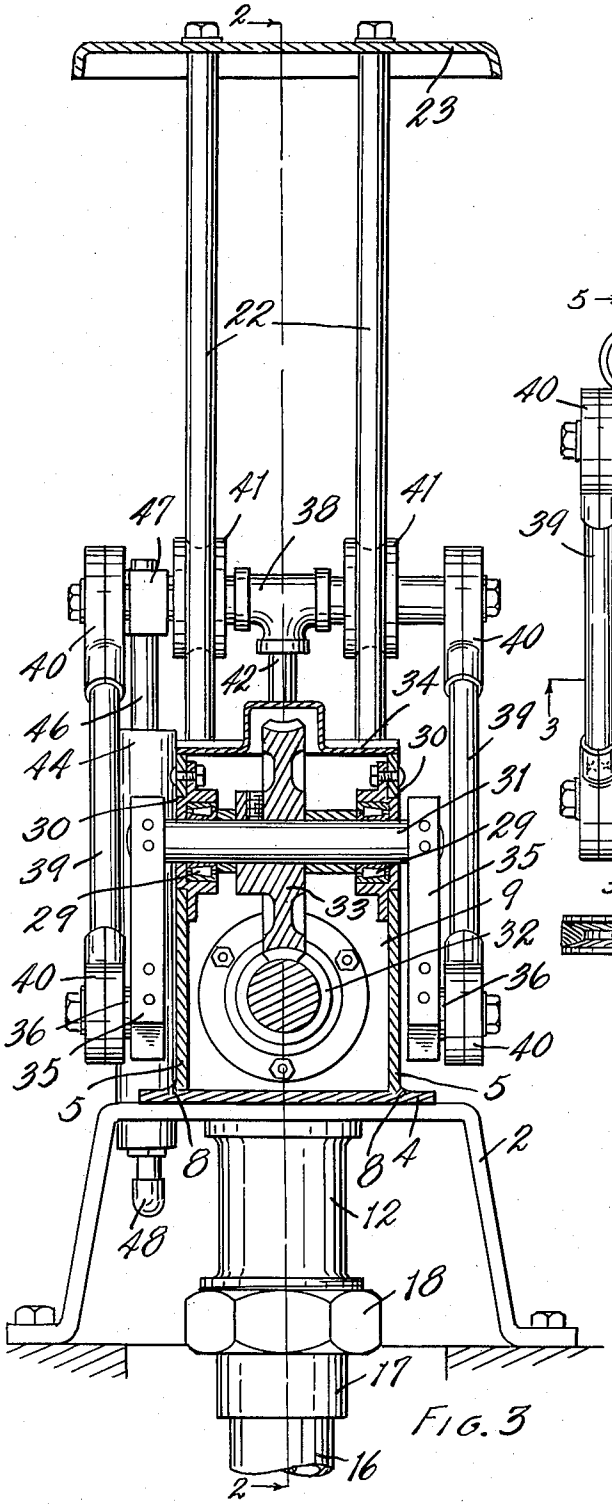


FIG. 3

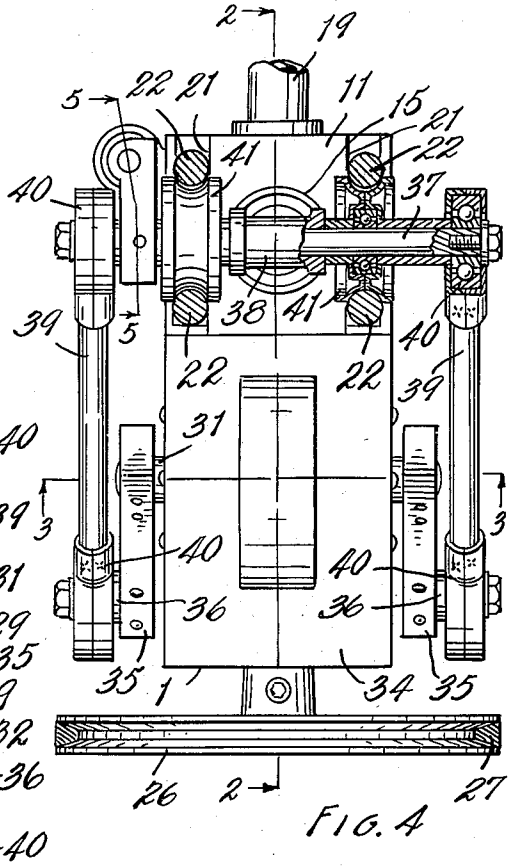


FIG. 4

INVENTOR.
Lorn T. Bernard
BY
Attorney

Patented Nov. 6, 1951

2,573,948

UNITED STATES PATENT OFFICE

2,573,948

PUMP JACK

Lorn T. Bernard, Grand Rapids, Mich.

Application December 12, 1946, Serial No. 715,734

8 Claims. (Cl. 103—205)

1

This invention relates to pump jacks.

The main objects of this invention are—

First, to provide a pump jack in which there is a minimum of friction and wear on the moving parts and at the same time one which is economical to produce.

Second, to provide a pump jack in which the bearing parts are efficiently lubricated and at the same time there is no dripping or splashing of lubricant on exposed parts.

Objects relating to details and economies of the invention will appear from the description to follow. The invention is defined and pointed out in the claims.

A preferred embodiment of the invention is illustrated in the accompanying drawings, in which:

Fig. 1 is a side elevation of a pump jack embodying the invention with the housing partially broken away.

Fig. 2 is an enlarged fragmentary view mainly in vertical section on a line corresponding to line 2—2 of Figs. 3 and 4.

Fig. 3 is a fragmentary view mainly in vertical section on a line corresponding to line 3—3 of Figs. 2 and 4.

Fig. 4 is an enlarged fragmentary view partially in horizontal section on a line corresponding to line 4—4 of Fig. 2.

Fig. 5 is an enlarged fragmentary view partially in section on line 5—5 of Fig. 4.

In the embodiment of the invention illustrated the support designated generally by the numeral 1 is provided with legs or pedestals 2, 2 adapted to be secured to the foundation or platform 3.

The support 1 comprises a bottom wall 4, side walls 5, 5, and transverse walls 6 and 7, these walls being formed of rolled plates and welded together as conventionally indicated at 8 to provide a rigid supporting structure, the walls being arranged to provide a gear box 9 and a compartment 10 which is open at its outer end, the transverse wall 7 being inset from the rear end of the bottom and side walls. A top plate 11 for the compartment 10 is welded to the upper edges of the side walls and the transverse wall 7.

A T-coupling member 12 is welded to the bottom wall below the compartment 10, the bottom wall having an opening 13 and the top wall an opening 14 aligned therewith to receive the upper pump cylinder 15 which is arranged through the opening and threaded into the upper end of the T-coupling.

The well pipe 16 is connected to the lower end

2

of the T-coupling by means of the union comprising the members 17 and 18. The delivery pipe 19 is threaded into the branch 20 of the T-coupling.

The support is provided with sockets 21 for the pairs of guide rods 22. These guide rods are connected at their upper ends by the plate-like top member 23 which serves as a tie member for the guide rods and as a support for the motor 24 and also as a top for the housing 25 which embraces the moving parts except the driving pulley 26 and the belt 27. The guide rods are welded at 221.

The driving pulley 26 is mounted on the outer end of the drive shaft 28 which is supported by roller bearings designated generally by the numeral 29 mounted in openings 30 provided therefor in the transverse walls 6 and 7 of the support.

The driven shaft 31 is mounted transversely of the drive shaft in roller bearings 29 mounted in openings 30 provided therefor in the side walls of the housing. The driving worm gear 32 is mounted on the drive shaft while the driven coacting gear 33 is mounted on the driven shaft. These shafts and gears are within the gear box which is adapted to contain lubricant. The roller bearings are in communication with the gear box to receive lubrication therefrom.

The gear box is provided with a cover 34. The driven shaft projects at each side and has cranks 35 on the projecting ends, the cranks being provided with crank pins 36. The cranks are connected to shaft 37 of the cross head 38 by means of connecting rods or pitman 39. Lubricant packed roller bearings 40 are provided at each end of the connecting rods for periodic lubrication at these points. It has been found that a packed bearing will perform satisfactorily for a long period of time.

The crosshead is provided with peripherally grooved guide rollers 41 disposed between and coacting with the pairs of guide rods. A slight or small amount of clearance is provided between the rollers and the guide rods so that the rollers are in rotating engagement with only one guide rod of a pair on each stroke of the crosshead. The location of the cranks at one side of the guide rods results in some lateral thrust on the crosshead rollers which secures this result with a very slight amount of clearance. This arrangement minimizes wear on the rollers and guide rods.

The pump or plunger rod 42 is provided with a plunger 43 coacting with the upper cylinder

15; the lower plunger is not illustrated. The embodiment of the invention illustrated is of a pressure pump type and is commonly used in connection with a storage tank not illustrated. In such pressure storage tanks, it is desirable to maintain a suitable volume of air and to that end I provide an air pump cylinder 44 and coacting plunger 45 which is connected by the plunger rod 46 and the coupling block 47 to the crosshead shaft 37.

The pump cylinder 44 is provided with a delivery pipe 48 delivering to the top of the tank. A discharge valve designated generally by the numeral 49 is provided at the bottom of the air pump cylinder.

The structure illustrated embodying the invention may be very economically produced and with a relatively small amount of material—that is, considered from the weight angle and at the same time is very strong and rigid and durable. While the moving parts are efficiently lubricated there is no splashing or dripping of oil such as is quite commonly incident to pumping jacks or pump power heads embodying lubricant circulating systems or one in which the bearings are provided with oil cups which require frequent attention.

I have illustrated and described my invention in a highly practical embodiment thereof. I have not attempted to illustrate certain modifications and adaptations which I contemplate as it is believed that this disclosure will enable those skilled in the art to embody or adapt my invention as may be desired.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a pump jack, the combination of a support comprising a bottom and side and transverse walls arranged and welded together to provide a rigid support structure including a gear box adapted to contain lubricant, and a compartment at the inner end of the gear box, said compartment having a top integrally connected to the upper edges of the side and inner transverse walls, a T-coupling welded to the bottom below said compartment, the bottom and compartment top having openings therein aligned with said T-coupling, an upper cylinder arranged through said openings and threaded into said coupling, a well pipe connected to said coupling, a drive shaft provided with roller bearings carried by said transverse walls, a driven shaft provided with roller bearings carried by said side walls, said roller bearings being in communication with said gear box to receive lubricant therefrom, a worm on said drive shaft, a coacting worm gear on said driven shaft, both arranged within said gear box, the ends of said driven shaft projecting from said side walls and having cranks thereon provided with crank pins, two spaced pairs of crosshead guide rods carried by and projecting upwardly from said support above its said compartment, a top member mounted on the upper ends of said guide rods and constituting a tie member therefor and a motor support and housing top, a crosshead provided with a shaft disposed between the guide rods of each pair of guide rods and projecting beyond said pairs of guide rods, connecting rods for the pins of said cranks to the projecting ends of said crosshead shaft, peripherally grooved rollers on said crosshead shaft coacting with said guide rods, one roller being disposed between and coacting with the guide rods of one of said pairs and the other roller being disposed between and coacting with the guide rods of the other pair, said connecting rods and rollers being provided with lubricant packed ball bearings, there being a slight clearance between the crosshead rollers and said guide rods so that the rollers are in rotating engagement with only one guide rod of the pair on each stroke of the crosshead, a plunger rod connected to said crosshead between said rollers and provided with a plunger coacting with said upper cylinder and extending into said well pipe, said cylinder being disposed between the plane of one pair of guide rods coacting with one roller and the plane of the other pair of guide rods coacting with the other roller, a cover for said gear box, and a housing attached to said top member and extending downwardly therefrom.

2. In a pump jack, the combination of a support comprising a bottom and side and transverse walls arranged and welded together to provide a rigid support structure including a gear box adapted to contain lubricant, and a compartment at the inner end of the gear box, said compartment having a top integrally connected to the upper edges of the side and inner transverse walls, a T-coupling welded to the bottom below said compartment, the bottom and compartment top having openings therein aligned with said T-coupling, an upper cylinder arranged through said openings and threaded into said coupling, a well pipe connected to said coupling, a drive shaft provided with roller bearings carried by said transverse walls, a driven shaft provided with roller bearings carried by said side walls, said roller bearings being in communication with said gear box to receive lubricant therefrom, a worm on said drive shaft, a coacting worm gear on said driven shaft, both arranged within said gear box, the ends of said driven shaft projecting from said side walls and having cranks thereon provided with crank pins, two spaced pairs of crosshead guide rods carried by and projecting upwardly from said support above its said compartment, a crosshead provided with a shaft disposed between the guide rods of each pair of guide rods and projecting beyond said pairs of guide rods, connecting rods for the pins of said cranks to the projecting ends of said crosshead shaft, peripherally grooved rollers on said crosshead shaft coacting with said guide rods, one roller being disposed between and coacting with the guide rods of one of said pairs and the other roller being disposed between and coacting with the guide rods of the other pair, said connecting rods and rollers being provided with lubricant packed ball bearings, there being a slight clearance between the crosshead rollers and said guide rods so that the rollers are in rotating engagement with only one guide rod of the pair on each stroke of the crosshead, and a plunger rod connected to said crosshead between said rollers and provided with a plunger coacting with said upper cylinder and extending into said well pipe, said cylinder being disposed between the plane of one pair of guide rods coacting with one roller and the plane of the other pair of guide rods coacting with the other roller.

3. In a pump jack, the combination of a support comprising a bottom and side and transverse walls arranged to provide a gear box, a coupling secured to the support at one end of the gear box, an upper cylinder carried by said coupling, a well pipe connected to said coupling,

a drive shaft provided with roller bearings carried by opposed walls of said walls, a driven shaft provided with bearings carried by opposed walls of said walls, said bearings being in communication with said gear box to receive lubricant therefrom, coacting gears on said shafts arranged within said gear box, the ends of said driven shaft projecting from the gear box and having cranks thereon, two spaced pairs of crosshead guide rods carried by and projecting upwardly from said support, a top member mounted on the upper ends of said guide rods and constituting a tie member therefor and a motor support and housing top, a crosshead provided with a shaft disposed between the guide rods of each pair of guide rods and projecting beyond said pairs of guide rods, connecting rods for the said cranks to said crosshead shaft, peripherally grooved rollers on said crosshead shaft coacting with said guide rods, one roller being disposed between and coacting with the guide rods of one of said pairs and the other roller being disposed between and coacting with the guide rods of the other pair, said connecting rods and rollers being provided with lubricant packed bearings, there being a clearance between the crosshead rollers and said guide rods so that the rollers are in rotating engagement with only one guide rod of the pair on each stroke of the crosshead, a plunger rod connected to said crosshead between said rollers and provided with a plunger coacting with said upper cylinder and extending into said well pipe, said cylinder being disposed between the plane of one pair of guide rods coacting with one roller and the plane of the other pair of guide rods coacting with the other roller, a cover for said gear box, and a housing attached to said top member and extending downwardly therefrom.

4. In a pump jack, the combination of a support comprising a bottom and side and transverse walls arranged to provide a gear box, a coupling secured to the support at one end of the gear box, an upper cylinder carried by said coupling, a well pipe connected to said coupling, a drive shaft provided with roller bearings carried by opposed walls of said walls, a driven shaft provided with bearings carried by opposed walls of said walls, said bearings being in communication with said gear box to receive lubricant therefrom, coacting gears on said shafts arranged within said gear box, the ends of said driven shaft projecting from the gear box and having cranks thereon, two spaced pairs of crosshead guide rods carried by and projecting upwardly from said support, a crosshead provided with a shaft disposed between the guide rods of each pair of guide rods and projecting beyond said pairs of guide rods, connecting rods for the said cranks to said crosshead shaft, peripherally grooved rollers on said crosshead shaft coacting with said guide rods, one roller being disposed between and coacting with the guide rods of one of said pairs and the other roller being disposed between and coacting with the guide rods of the other pair, said connecting rods and rollers being provided with lubricant packed bearings, there being a clearance between the crosshead rollers and said guide rods so that the rollers are in rotating engagement with only one guide rod of the pair on each stroke of the crosshead, and a plunger rod connected to said crosshead between said rollers and provided with a plunger coacting with said upper cylinder and extending into said well pipe, said cylinder being disposed between the plane of one pair of guide rods coacting with one roller and the plane of the other pair of guide rods coacting with the other roller.

5. In a pump jack, the combination of a support comprising a bottom and side and transverse walls arranged to provide a gear box, a drive shaft provided with bearings carried by opposed walls, a driven shaft provided with bearings carried by opposed walls of said gear box, coacting gears on said shafts arranged within said gear box, the ends of said driven shaft projecting from the gear box and having cranks thereon, two spaced pairs of crosshead guide rods carried by and projecting upwardly from said support, a top member mounted on the upper ends of said guide rods and constituting a tie member therefor and a motor support and housing top, a motor mounted on said top member, driving connections between said motor and said drive shaft, a crosshead provided with a shaft disposed between the guide rods of each pair of guide rods and projecting beyond said pairs of guide rods, connecting rods for the said cranks to said crosshead shaft, peripherally grooved rollers on said crosshead shaft coacting with said guide rods, one roller being disposed between and coacting with the guide rods of one of said pairs and the other roller being disposed between and coacting with the guide rods of the other pair, a plunger rod connected to said crosshead between said rollers, a cover for said gear box, and a housing attached to said top member and extending downwardly therefrom.

6. In a pump jack, the combination of a support comprising a bottom and side and transverse walls arranged to provide a gear box, a drive shaft provided with bearings carried by opposed walls, a driven shaft provided with bearings carried by opposed walls of said gear box, coacting gears on said shafts arranged within said gear box, the ends of said driven shaft projecting from the gear box and having cranks thereon, two spaced pairs of crosshead guide rods carried by and projecting upwardly from said support, a crosshead provided with a shaft disposed between the guide rods of each pair of guide rods and projecting beyond said pairs of guide rods, connecting rods for the said cranks to said crosshead shaft, said gear box and said two spaced pairs of guide rods being disposed between said connecting rods, peripherally grooved rollers on said crosshead shaft coacting with said guide rods, one roller being disposed between and coacting with the guide rods of one of said pairs and the other roller being disposed between and coacting with the guide rods of the other pair, and a plunger rod connected to said crosshead between said rollers.

7. In a pump jack, the combination of a support provided with a gear box adapted to contain lubricant, a drive shaft, a driven shaft, said shafts being provided with bearings carried by walls of the gear box, said bearings being in communication with said gear box to receive lubricant therefrom, coacting gears on said shafts arranged within said gear box, the ends of said driven shaft projecting from the gear box and having cranks thereon, two spaced pairs of crosshead guide rods carried by and projecting upwardly from said support, a top member mounted on the upper ends of said guide rods and constituting a tie member therefor and a motor support and housing top, a motor mounted on said top member, driving connections between said motor and said drive shaft, a crosshead provided with a shaft disposed between the guide rods of each pair of guide rods and projecting

beyond said pairs of guide rods, connecting rods for the said cranks to said crosshead shaft, peripherally grooved rollers on said crosshead shaft coacting with said guide rods, one roller being disposed between and coacting with the guide rods of one of said pairs and the other roller being disposed between and coacting with the guide rods of the other pair, said connecting rods and rollers being provided with lubricant packed bearings, a plunger rod connected to said crosshead between said rollers, a cover for said gear box, and a housing attached to said top member and extending downwardly therefrom.

8. In a pump jack, the combination of a support provided with a gear box adapted to contain lubricant, a drive shaft, a driven shaft, said shafts being provided with bearings carried by walls of said gear box, said bearings being in communication with said gear box to receive lubricant therefrom, coacting gears on said shafts arranged within said gear box, the ends of said driven shaft projecting from the gear box and having cranks thereon, two spaced pairs of crosshead guide rods carried by and projecting upwardly from said support, a crosshead provided with a shaft disposed between the guide rods of each pair of guide rods and projecting beyond said pairs of guide rods, connecting rods for the said cranks to said crosshead shaft, said gear box and said two spaced pairs of guide rods being disposed between said connecting rods, peripherally grooved rollers on said crosshead shaft coacting with said guide rods, one roller being disposed between and coacting with the guide rods of one of said pairs and the other roller being disposed between and coacting with the guide rods of the other pair, said connecting rods and rollers being provided with lubricant packed bearings, and a plunger rod connected to said crosshead between said rollers.

LORN T. BERNARD.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,708,577	Hunter	Apr. 9, 1929
1,749,892	Scholes	Mar. 11, 1930
1,816,190	Meyers	July 28, 1931
2,038,125	Patterson	Apr. 21, 1936
2,045,552	Mann	June 23, 1936
2,078,480	Burks	Apr. 27, 1937
2,214,570	Bangasser	Sept. 10, 1940

FOREIGN PATENTS

Number	Country	Date
662,852	France	Aug. 13, 1929