Nov. 7, 1933. F. M. GILSTRAP ET AL 1,934,186

PUMP

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Fig. 1.

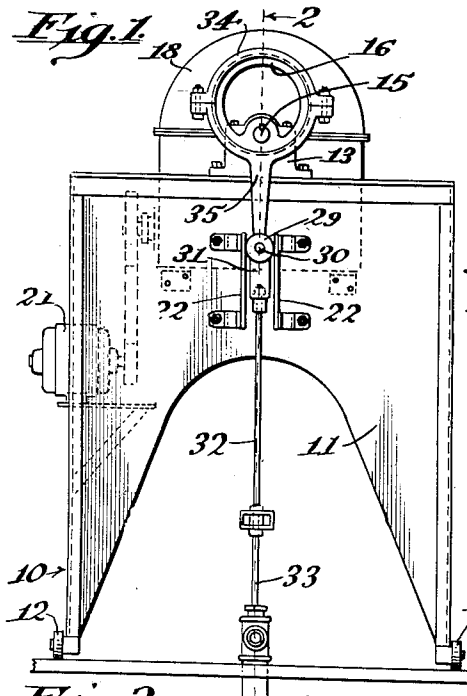


Fig. 2.

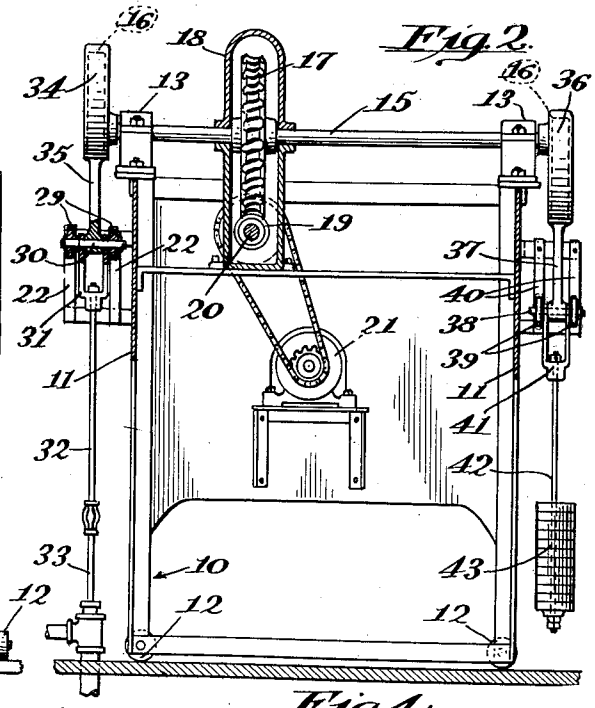


Fig. 3.

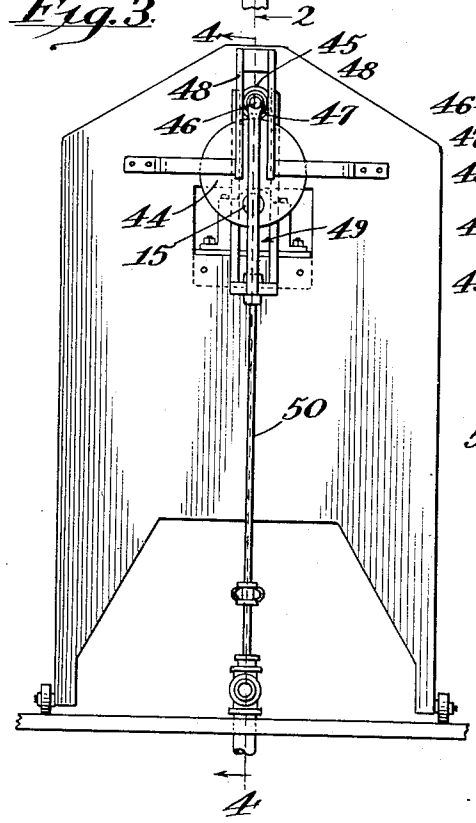
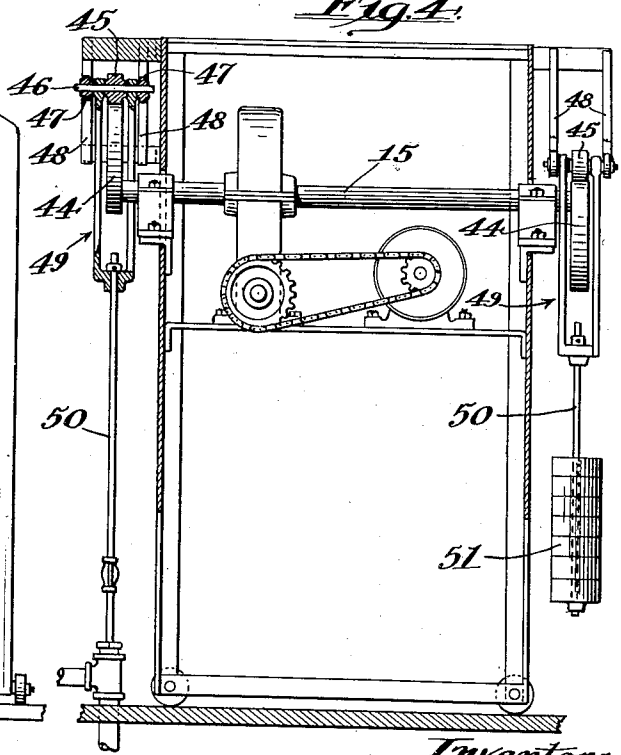


Fig. 4.



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PUMP

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Serial No. 563,569

7 Claims. (Cl. 74—14)

Our invention relates to a pump and has for its principal objects, the provision of a relatively simple, practical and inexpensive pump that is especially designed for use in pumping oil or water from deep wells and further, to provide a pump of the character referred to that is mounted on rolling supports in order that it may be readily shifted away from the well in order to permit pump rods and tubing to be readily withdrawn from the well.

Further objects of our invention are, to provide improved means for counterbalancing the weight of the pump rod during its reciprocatory movement, to provide a pump that is devoid of the usual cranks and consequently eliminating the whip and vibration that occurs where ordinary cranks are used in connection with a long string of polish rods, further, to provide a pump having a minimum number of gears and other machined parts and further, to provide a counterbalanced pump that will develop the smoothest possible pumping motion during all points of the pumping cycle.

With the foregoing and other objects in view, our invention consists in certain novel features of construction and arrangement of parts that will hereinafter be more fully described and claimed and illustrated in the accompanying drawing in which:

Fig. 1 is a front elevational view of a pump constructed in accordance with our invention.

Fig. 2 is a vertical cross section taken approximately on the line 2—2 of Fig. 1.

Fig. 3 is a front elevational view of a modified form of the pump.

Fig. 4 is a vertical cross section taken approximately on line 4—4 of Fig. 3.

Referring by numerals to the accompanying drawing, particularly to the construction illustrated in Figs. 1 and 2, 10 designates a substantially rectangular frame work that is preferably formed of angle bars or other structural shapes and applied to the sides of this frame work are sheets or panels 11, preferably of sheet metal.

Arranged at the lower corners of the frame work are small rollers or castors 12 which enables the frame and parts carried thereby to be readily moved over a comparatively smooth surface.

Suitably secured on top of the frame and at the front and rear thereof are bearings 13 for a shaft 15 and secured to the ends of said shaft are eccentrics 16 that are arranged directly opposite to each other or 180° apart.

Secured to the intermediate portion of shaft 15 is a worm wheel 17 that is enclosed by a suitable housing 18 and which worm wheel meshes with the worm 19 that is mounted on a shaft 20. This shaft 20 is journaled for rotation in suitable bearings and it occupies a position below and at right angles to the shaft 15.

Shaft 20 is suitably driven by means of pulleys and a belt or sprocket wheels and a chain from an electric motor 21 that is suitably supported within the frame work 11.

Suitably secured on the front wall of the pump below the front end of the shaft 15 and the eccentric that is carried by the front end of said shaft, are vertically disposed parallel guides or bearings 22 and arranged for vertical movement between said guides are rollers 29 that are mounted to rotate freely upon the ends of a short horizontally disposed shaft 30.

Depending from shaft 30 is a yoke or hanger 31 to which is connected the upper end of a rod 32 and the lower end of the latter is detachably secured in any suitable manner to the upper end of the pump or polish rod 33.

A yoke 34 encircles the eccentric on the forward end of shaft 15 and depending from said yoke is a short arm 35 having its lower end journaled on the intermediate portion of shaft 30.

Encircling the eccentric on the rear end of shaft 15 is a yoke 36 from which depends a short arm 37 and the lower end of said arm is journaled on a short transverse shaft 38 and the latter carrying rollers 39 that operate between vertical guides or bearings 40.

These guides or bearings are secured on the rear wall of the pump below the rear end of shaft 15.

Journaled on the shaft 38 is the upper end of a depending yoke or hanger 41 and detachably secured thereto is the upper end of a depending rod 42, upon the lower portion of which is removably mounted a plurality of counterbalancing weights 43.

In the operation of our improved pump, as described, the worm 19 on motor driven shaft 20 imparts rotary motion to worm wheel 17 that is carried by shaft 15 and, as said shaft is rotated, the eccentrics 16 on the ends thereof acting through yokes 34 and 36 impart vertical reciprocating movement to the shafts 30 and 38 that carry the rollers 29 and 39.

Inasmuch as the eccentrics 16 are oppositely arranged with respect to each other, the counterbalancing weights 43 that are suspended from shaft 38 move downwardly as the pump or polish rod 33 that is connected to shaft 30 moves upvardly and vice versa.

The parts 29, 30, 31 and 32 operate in a true vertical plane and consequently there are no side strains impressed on the upper end of the polish rod at any time during its reciprocatory travel.

The parts 38, 39, 41 and 42 that carry the counterbalancing weights 43 likewise move in a straight vertical line and as the weights 43 practically counterbalance the weight of polish rod, the operation of the latter is accomplished with a maximum degree of smoothness throughout the entire pump cycle.

Inasmuch as the pump frame is mounted on rollers it may, after detaching rod 32 from the polish rod 33, be moved several feet away from the pump tube in order that workmen may conveniently withdraw the polish rod from the well.

In the modified form of pump illustrated in Figs. 3 and 4, the ends of shaft 15 carry cams 44 that engage beneath rollers 45 and the latter being mounted on the central portions of shafts 46 and each shaft carrying a pair of rollers 47 that operate between vertical guides 48.

Depending from each shaft 46 is a hanger of yoke 49, the rear or inner portion of which is slotted for the accommodation of the shaft 15 and the yoke on the front of the pump is detachably connected by a rod 50 to the pump or polish rod and suspended from the yoke on the rear side of the machine is a series of counterbalancing weights 51.

In this form of pump the cams 44, which are disposed 180° apart lift the rollers 45 as said cams move upwardly, thereby imparting vertical reciprocatory movement to the polish rod and the operation of the pump during the entire pumping cycle is rendered smooth and vibrationless by the provision and arrangement of the counterbalancing weights 51.

Thus it will be seen that we have provided a pumping unit that is relatively simple in construction, inexpensive of manufacture and very effective in performing the functions for which it is intended.

Our improved pump is especially designed to impart smooth vibrationless straight line reciprocatory movement to the polish rod of a pump and the construction of the pump is such that it may be easily and conveniently moved into and out of position for use and through the use of eccentrics or their equivalent, the desired results are attained without the use of gears, pinions and other machined parts with the exception of a single worm and worm wheel that are utilized between the driving motor and the eccentric carrying shaft.

It will be understood that minor changes in the size, form and construction of the various parts of our improved pump may be made and substituted for those herein shown and described without departing from the spirit of our invention, the scope of which is set forth in the appended claims.

We claim as our invention:

1. In a pump, a mobile frame, a shaft journaled in said frame, means carried by said frame for driving said shaft, eccentrics carried by said shaft, yokes carried by said eccentrics, means for connecting one of said yokes to a pump rod, a counterbalancing weight suspended from the other yoke and means mounted on the frame for causing the lower portions of said yokes to reciprocate in vertical planes.

2. In a pump, a mobile frame, a shaft journaled in bearings on said frame, means carried by said frame for driving said shaft, eccentrics carried by said shaft, yokes encircling said eccentrics, an arm depending from each yoke, vertical guides mounted on the frame for the lower ends of said arms, means for connecting the lower end of one of the depending arms to a pump rod and a counterbalancing weight depending from the other arm.

3. In a pump, a mobile frame, a shaft journaled in bearings on said frame, means carried by said frame for driving said shaft, eccentrics carried by said shaft, yokes encircling said eccentrics, an arm depending from each yoke, vertical guides mounted on said frame for the lower ends of said arms, antifriction bearings between said arms and guides, means for connecting the lower end of one of the depending arms to a pump rod and a counterbalancing weight depending from the other arm.

4. In a pump, a frame, a shaft journaled thereon, means carried by said frame for driving said shaft, eccentrics on said shaft, yokes encircling said eccentrics, arms depending from said yokes, antifriction members carried by the lower portions of said arms, vertically disposed guides mounted on said frame for said antifriction members, means for connecting the lower end of one of said arms with a pump rod and a counterbalancing weight depending from the other arm.

5. In a pump, a frame, vertical guides on opposite sides of said frame, antifriction members arranged for reciprocating movement between said guides, means for connecting one of said antifriction members to a pump rod, a counterbalancing weight depending from the other reciprocating member, a shaft journaled on said frame, means for driving said shaft and means carried by said shaft for converting the rotary movement thereof into reciprocating movement and transmitting same to said reciprocatory members.

6. In a pump, a mobile frame, a shaft journaled in the upper portion of said frame, means carried by the frame for driving said shaft, oppositely disposed eccentrics mounted on said shaft, yokes bearing upon and depending from said eccentrics, vertically disposed guides on said frame, antifriction bearings carried by said yokes and operating between said vertically disposed guides, means depending from one yoke for connecting the same to a pump rod and a counterbalancing weight suspended from the other yoke.

7. In a pump, a mobile frame, a shaft journaled in the upper portion of said frame, means carried by said frame for driving said shaft, eccentrics carried by said shaft, yokes associated with and depending from said eccentrics, means for connecting one of said yokes to a pump rod, vertically disposed guides mounted on the frame below the other yoke, antifriction bearings carried by the last mentioned yoke and arranged for operation between said guides and a counter-balancing weight suspended from said last mentioned yoke and antifriction bearings.

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