R. J. CARTMELL.

PUMP JACK.

APPLICATION FILED AUG. 14, 1915.

1,169,923.

Patented Feb. 1, 1916.

3 SHEETS—SHEET 1.

Fig. 3.

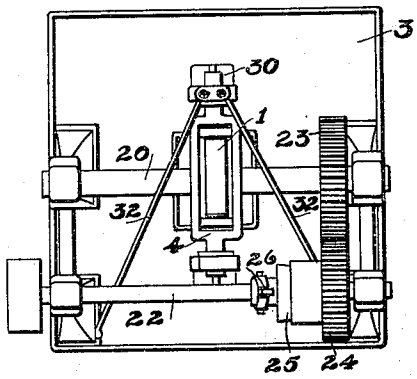


Fig. 1.

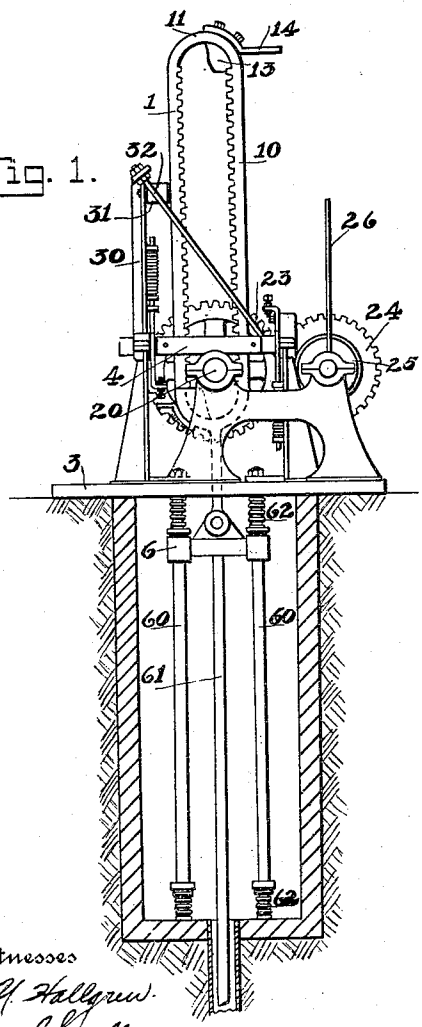


Fig. 2.

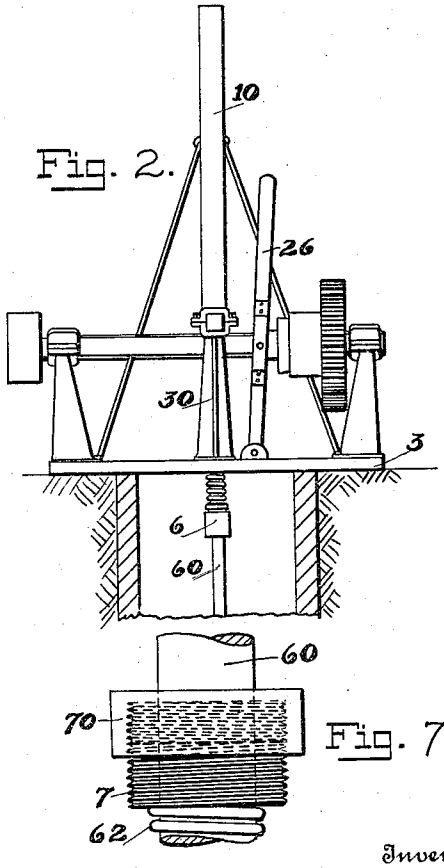


Fig. 7.

Witnesses

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3 SHEETS—SHEET 2.

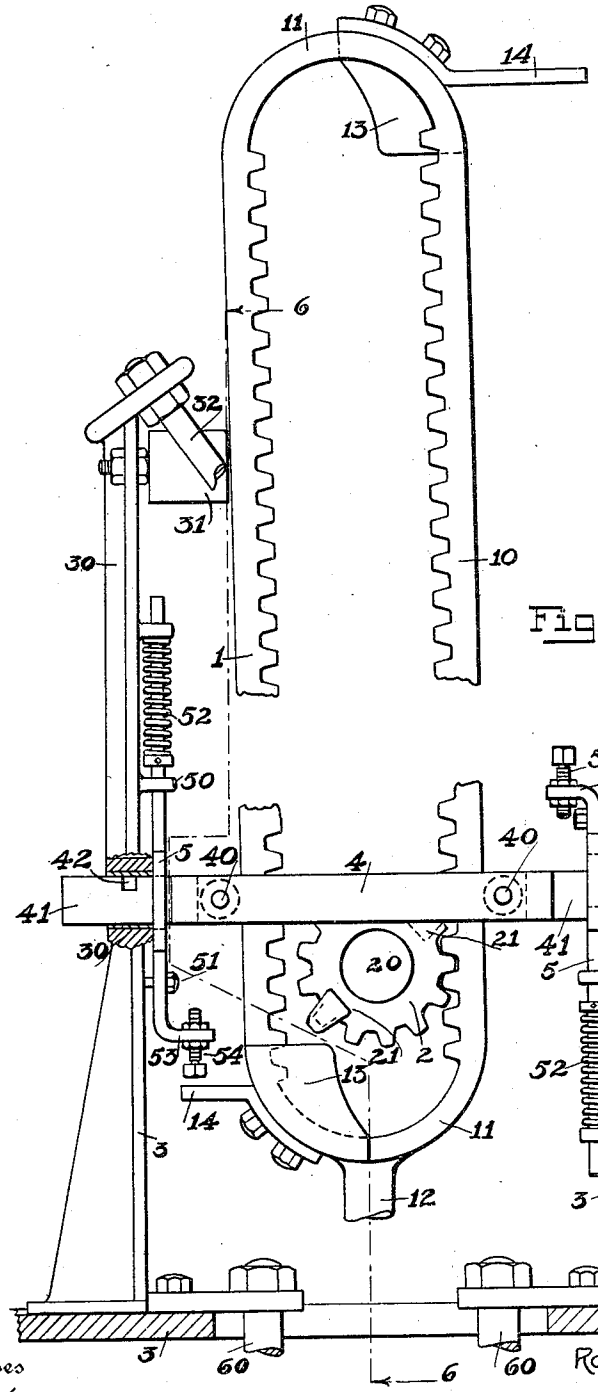


Fig. 4.

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3 SHEETS—SHEET 3.

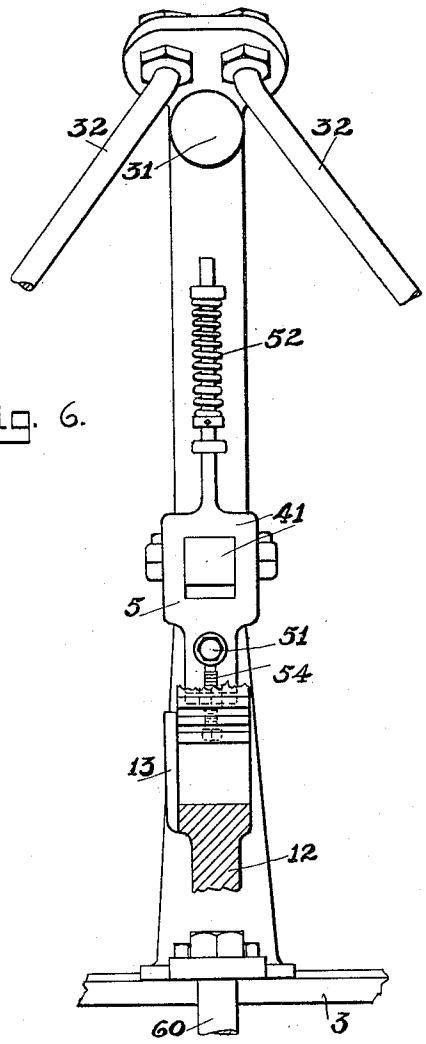


Fig. 6.

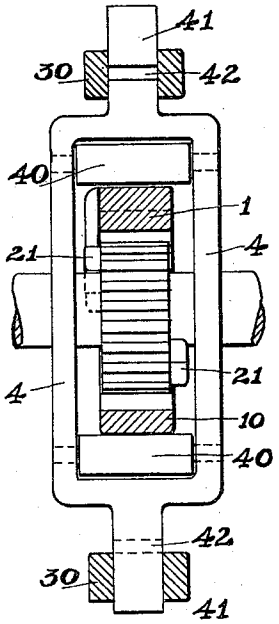


Fig. 5.

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UNITED STATES PATENT OFFICE.

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PUMP-JACK.

1,169,923. Specification of Letters Patent. Patented Feb. 1, 1916.

Application filed August 14, 1915. Serial No. 45,484.

To all whom it may concern:

Be it known that I, ROBERT J. CARTMELL, a citizen of the United States of America, and resident of the city of Soap Lake, county of Grant, and State of Washington, have invented certain new and useful Improvements in Pump-Jacks, of which the following is a specification.

My invention relates to an apparatus which is designed for transforming rotative movement into reciprocatory movement and comprises certain novel constructions and combinations of parts which will be hereinafter described and particularly pointed out in the claims.

The object of my invention is to produce an efficient and reliable device for this purpose and one which is particularly well adapted for use in operating pumps and like mechanisms.

In the accompanying drawings I have shown my device in the form of construction which is now most preferred by me.

Figure 1 is an elevation of the device showing it as applied for use in operating a deep well pump. Fig. 2 is an elevation of the same device taken from a different view point. Fig. 3 is a plan view of said mechanism. Fig. 4 is a side view of the device on a larger scale with parts broken away showing the detail of its operation to better advantage. Fig. 5 is a plan view with parts in section taken just above the guide yoke 4. Fig. 6 is a side elevation on the line 6—6 of Fig. 4, and Fig. 7 is a detail of the device used for adjusting the members by which the reciprocating guide yoke is stopped.

My device is of that type in which two rack bars are employed which are adapted to be alternately engaged with a revolving pinion, the rack bars being spaced apart such distance that when the pinion is in engagement with one rack bar it will be out of engagement with the other rack bar, the rack bar being shifted at the ends of its stroke to bring the pinion into engagement with the other rack bar. I have indicated the two rack bars by the figures 1 and 10, and the pinion by 2. The pinion is fixed upon a shaft 20, which is journaled in a fixed position.

The two rack bars are connected at each end by a bar or yoke 11 one of which has an extension 12 to which the pump rod or other like member may be secured. At one end of each rack bar, this being the end at which the pinion is shifted out of engagement with this rack bar in order to engage the opposite rack bar, projections 13 are provided which lie outside of the plane of the teeth and project inwardly beyond the points of the teeth. This projection, at one end of the yoke formed by the two rack bars and their connections, is at one side, while the like projection at the other end is at the opposite side.

The pinion 2 has two projecting fingers or teeth 21 located diametrically opposite from each other and also at opposite side faces of the pinion, these fingers or teeth being outside the planes of the teeth and so placed as to engage the lugs or projections 13 upon the rack bars to thereby shift the rack bars laterally.

The rack bars are held against the lateral movement by means of a yoke 4 which extends about them and is provided with rollers 40 which engage the outer or back surfaces of the rack bars. The sides of the yoke 4 are separated sufficiently to permit passage of the projections 21 on the pinion and lugs 13 on the rack bars. The ends 41 of this yoke are mounted in guide supports 30 carried by the frame 3. The ends 41 are made square in cross section or in some other suitable manner prevented from turning and the bearings therefor are made of like cross section. Each end 41 of the yoke is provided with a transverse notch 42, which is adapted to be engaged by a reciprocating lock plate or bar 5 to thereby hold the yoke against movement transversely of the rack bars.

The locking or catch plates 5 are mounted for reciprocation, as in guides 50, and by a bolt 51, which passes through a slot in the catch bar and into the frame. The catch bar may be held in locking position by a spring 52 as well as by gravity. As herein shown one of these catch bars, being the one which is at the right hand side in Fig. 4, is supported against the action of gravity by

spring 52, when in locking position. Each end of the catch bars 5 is provided with a lateral off-set 53 at one end, which is adapted to be engaged by a tappet member 14, carried by the rack bar. These tappet members are placed one at the upper and the other at the lower end of the rack bar. In order to secure accurate adjustment as to the point in the travel of the rack bar where this engagement is to take place, I have provided an adjustable bolt 54 secured in place by lock nuts which serves as the actual contact member. By this means the time of releasing the latch bar may be adjusted to accurately conform to the time of engagement of the shifting finger 21 of the pinion with the coöperating lug 13 of the rack bar.

The manner of reciprocating the rack bars in opposite directions by means of the pinion through the shifting of the pinion from engagement with one to engagement with the other will be understood without further explanation. The action of the means by which this reciprocation is secured is as follows: When the rack bars reach the end of the stroke the shifting finger or tooth 21 engages the side face of the lug 13 to force the pinion out of engagement with the rack with which it has previously been engaged and into engagement with the opposite rack. The relative position of the tappet 14 and the members 54 of the catch bar has been adjusted to contact just prior to the shifting action caused by the tooth 21 with the lug 13, the catch bar 5 has been forced out of its notch 42 in the ends of the yoke 4, thus leaving the yoke 4 free to be shifted. As soon as the yoke 4 has been shifted into its opposite position the other catch bar 5 is forced into its notch 42 by the action of the spring 52 and the yoke is held in this adjusted position until the rack bars reach the other extremity of their stroke, at which time the finger 21 upon the other side of the pinion engages its lug 13 to shift the rack bars. This shifting is also preceded by the release of the catch bar 5 which has been in engagement with the yoke through engagement of the tappet arms 14 with the bolt 54.

I have shown the lower end of the bar 12, which constitutes an extension from the rack bars, as being connected with a cross head 6, which slides upon guide rods 60 and to which is connected the pump rods 61. To relieve any shock which may occur at the point where the movement of the cross head 6 is reversed I have provided springs 62 which surround the rods 60. I have also shown an upward extension 30 of the frame which is provided with a bumper 31 so placed as to be engaged by the upper end of the rack bar yoke when it is reversed. This will check the lateral movement of the rack bars at the time of reversal and prevent undue strain caused thereby, as well as absorb the strain which might be produced by the checking of this movement. To assist in caring for these strains brace rods 32 are provided which extend diagonally downward to the base of the frame.

As a means for adjusting the time of contact of the cross heads 6 with the buffer springs 62 I have used a device which is shown separately in Fig. 7. This consists of a nipple 7 which is exteriorly threaded and screws into a cap 70. These are placed about the rods 60 and bear against the ends of the springs. By adjustment of these two parts the space between the ends of the spring and the cross head may be adjusted so as to bring the springs into action at an earlier or later time as may be desirable.

I have shown the shaft 20 as being connected with a parallel shaft 22 by gears 23 and 24. I have also shown a friction clutch 25 controlled by a shipper lever 26 by which the gear 24 may be secured to the shaft 22 or released therefrom at will.

While I have herein shown my device as employed in connection with a pump it is to be understood that it may be employed for any other analogous purpose where rotary movement is to be converted into reciprocating movement.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent of the United States of America, is:—

1. In a device of the character described, in combination, a pinion mounted for rotation in a fixed position, two connected rack bars adapted to be alternately engaged with said pinion by lateral movement, said rack bars and the pinion having projections located outside the planes of the teeth and adapted to engage to shift the rack bars at the ends of the stroke, a guide yoke engaging the back faces of the rack bars, guide supports for said yoke permitting movement to accommodate the lateral shift of the rack bars, locking means for said yoke released by the rack bars at the ends of their stroke.

2. In a device of the character described, in combination, a pinion mounted for rotation in a fixed position, two connected rack bars adapted to be alternately engaged with said pinion by lateral movement, said rack bars and the pinion having projections located outside the planes of the teeth and adapted to engage to shift the rack bars at the ends of the stroke, a guide yoke for the rack bars mounted for reciprocation transversely with the rack bars, and provided with recesses, latches adapted to be engaged with said recesses, and means carried by the rack bars for releasing said latches.

3. In a device of the character described, in combination, a pinion mounted for rotation in a fixed position, two connected rack bars adapted to be alternately engaged with

said pinion by lateral movement, said rack bars and the pinion having projections located outside the planes of the teeth and adapted to engage to shift the rack bars at the ends of the stroke, a guide for said rack bars, means for locking said guide against movement during the reciprocating movement of the rack bars, and means for releasing said locking means at the beginning of the shifting movement.

Signed at Seattle, Washington this 31st day of July 1915.

ROBERT J. CARTMELL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."