

July 31, 1945.

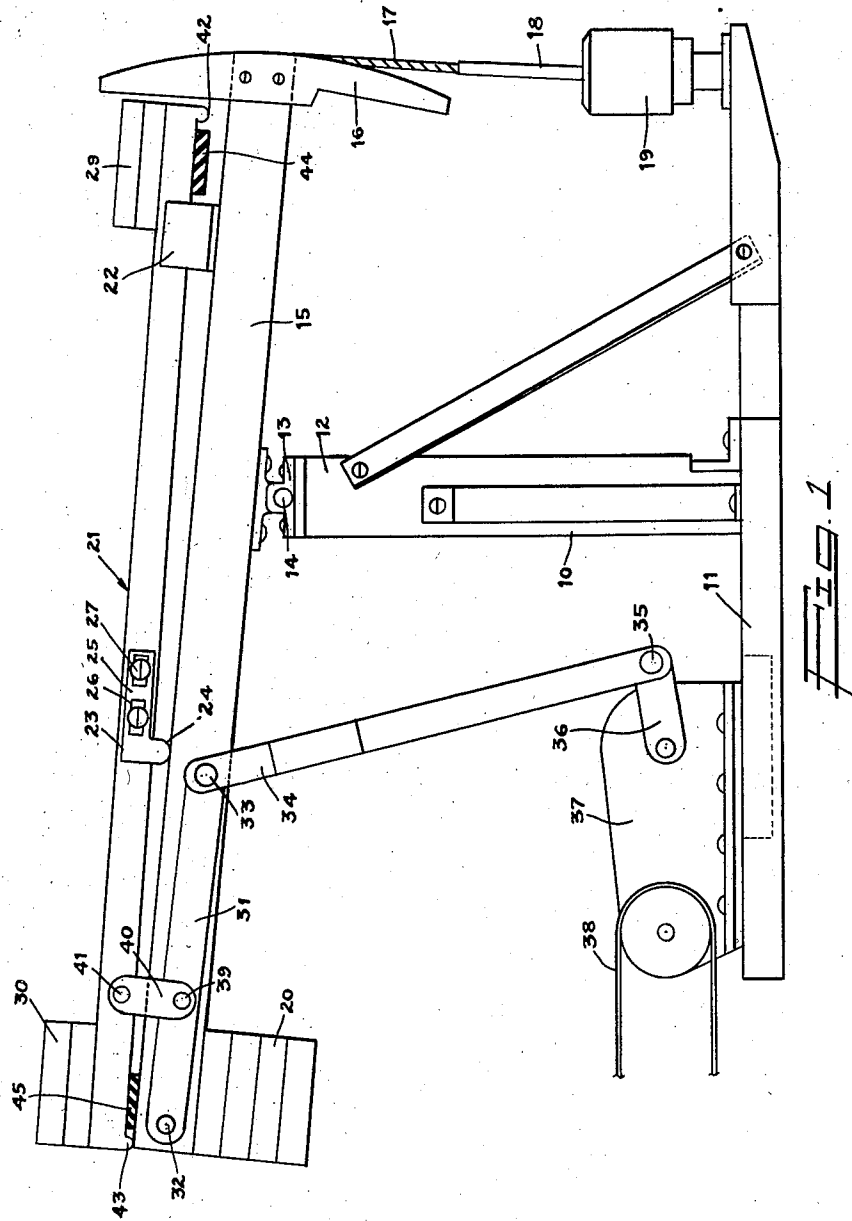
W. E. CUMMINS

2,380,686

PUMP JACK

Filed June 12, 1944

2 Sheets-Sheet 1



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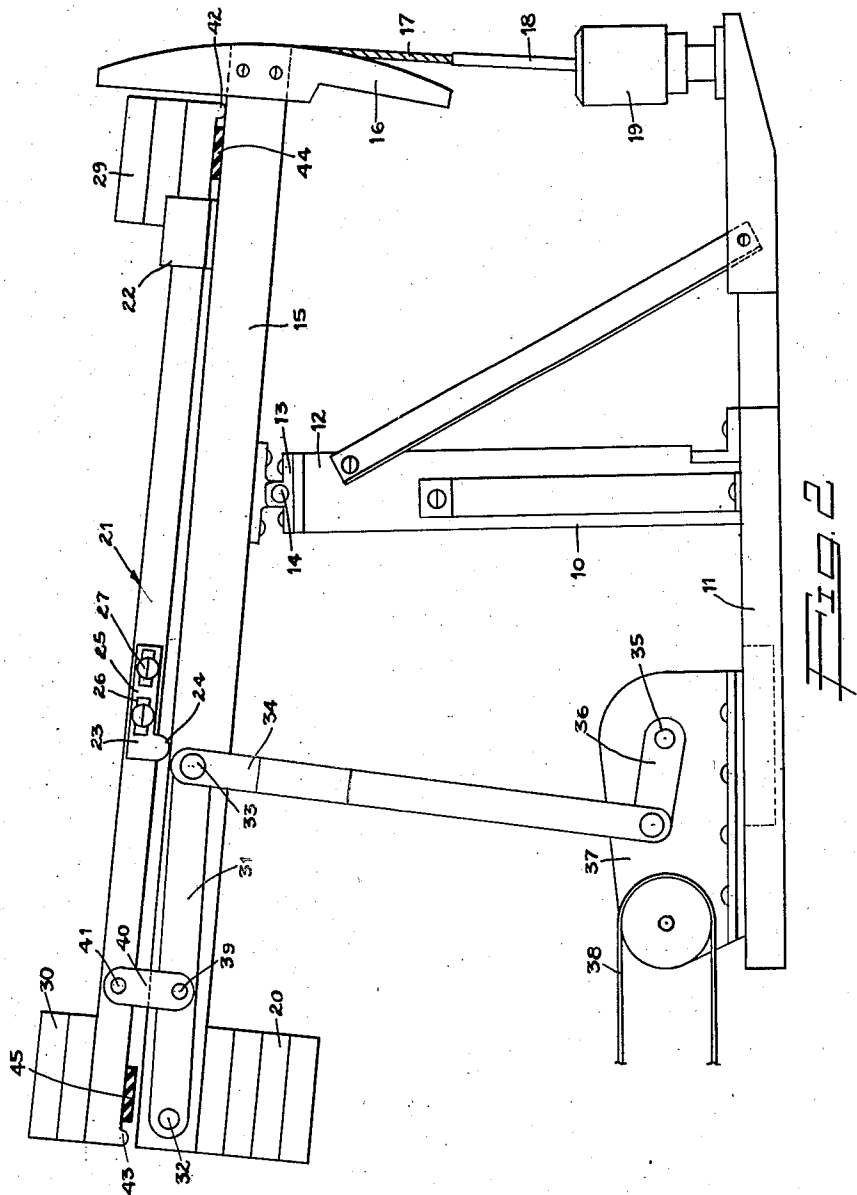
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UNITED STATES PATENT OFFICE

2,380,686

PUMP JACK

Walter E. Cummins, Los Angeles, Calif.

Application June 12, 1944, Serial No. 539,958

5 Claims. (Cl. 74-41)

This invention relates to a pump jack.

The general object of the invention is to provide a pump jack including novel balancing means.

A further object of the invention is to provide a pump jack which is adapted to reciprocate a sucker rod and wherein the pump jack includes novel means for balancing the weight to be lifted whereby a more uniform lift is secured than is present in the conventional construction.

A more specific object of the invention is to provide a pump jack having a weighted arm pivoted thereon and arranged to move in a limited manner relative to the walking beam.

A further object of the invention is to provide a pump jack including a walking beam and a weighted arm mounted on the walking beam together with novel link means for operating the parts.

Other objects and the advantages of the invention will be apparent from the following description taken in connection with the accompanying drawings, wherein:

Fig. 1 is a side elevation of a pump jack embodying the features of my invention and showing the parts in the position they assume when fluid is being lifted in the well, and

Fig. 2 is a view similar to Fig. 1 showing the parts in the position assumed when the sucker rod is moving downwardly in the well.

Referring to the drawings by reference characters, I have shown my invention as embodied in a pump jack which is indicated generally at 10. As shown the pump jack includes a base 11, having a Samson post 12 mounted thereon. The Samson post includes a bearing 13 for a shaft 14 which latter pivotally supports a walking beam 15.

The walking beam is provided at one end with a head 16 which includes a flexible member 17 suitably connected to a pump rod 18 by means of which suitable pumping mechanism 19 is operated. The walking beam 15 includes a weight 20 arranged remote from the head 16.

Disposed upon the walking beam 15 I show an arm which is indicated generally at 21. This arm is guided for rocking action at the head end thereof by working in a channel member 22 and at the other end is guided by link means (to be presently described). Intermediate its ends the arm 21 is provided with a fulcrum member 23. This fulcrum member includes a fulcrum 24 which engages the upper surface of the walking beam 15 and includes an arm 25, having slots 26 therein which receive securing means 27 such as screws. By loosening the screws 27 and shifting

the member 23 the position of the fulcrum 24 may be shifted along the walking beam 15.

The arm 21 is provided, adjacent the head 16, with a weight 29 and at the end remote from the head 16 is provided with a weight 30.

To operate the device I provide a link 31 which is pivoted at 32 on the end of the walking beam and is remote from the head 16. The link 31 at its other end is connected at 33 to a second link 34. The link 34 at its lower end is connected at 35 to a crank 36 which is adapted to be operated by suitable gear means 37, driven as by a belt 38.

Intermediate its length the link 31 is pivotally connected at 39 to a link 40 which, in turn, is pivoted as at 41 to the arm 21.

As a result, when the crank 36 is operated, the link 34 will be reciprocated thus rocking the link 31 and alternately lifting and lowering the link 40 to raise and lower the pivot 41 and thus tend to rock the arm 21.

The weight 20 is preferably of such size that it substantially balances the weight of the sucker rod in the well while the weights 29 and 30 are such that when the fulcrum 24 is properly placed the movement of the arm 21 will be governed in such fashion, as will be later described, so as to provide a smooth pumping operation.

The arm 21 is provided with tip portions 42 and 43 and may be provided with bumpers 44 and 45, arranged adjacent to the tip portions.

Assuming that the parts are in the position shown in Fig. 1, it will be noted that the link 34 is moving downwardly, thus pulling downwardly on the link 31 and link 40 and also pulling down on the pin 41, and since the portion 42 contacts the walking beam 15 walking beam is being rocked so that the head 16 moves upwardly, thus lifting the sucker rod 18 and causing fluid to be raised in the well. As soon as the crank 36 passes beyond its lower center the link 34 is pushed upwardly, thus raising the link 31 and pushing the pin 41 upwardly, thus causing the arm 21 to rock about the fulcrum 24 and causing the portion 42 and bumper 44 to move downwardly and engage the walking beam adjacent to the head 16. This operation occurs when the head 16 has reached its upper limit of movement. The head then remains stationary momentarily until the portion 42 and bumper 44 contact the walking beam, whereupon the head 16 moves downwardly as the crank 36 moves upwardly and thus the sucker rod is lowered in the well.

When the crank 36 is at the top of its motion,

then momentarily movement of the head 16 and sucker rod 18 will cease while the link 34 is moving downwardly and rocking the arm 21 from the position of Fig. 2 to the position of Fig. 1. This movement of the arm without causing consequent movement of the sucker rod builds up energy during its movement so that when the portion 43 and bumper 45 engage the walking beam 15 their energy is sufficient to overcome the initial energy required to start movement of the fluid upwardly in the well. Since the weight 20 balances the weight of the sucker rod there is no power required to lift the sucker rod and thus there is no requirement for sudden application of power at the time the fluid column starts its lift. Consequently the motor, engine or other prime mover which drive the crank 36 is doing practically constant work throughout the entire pumping cycle and thus a motor of lighter horsepower may be employed with my improved pump jack.

From the foregoing description it will be apparent that I have invented a novel pump jack which is simple in construction and which can be operated by a prime mover actuating at practically constant horsepower output.

Having thus described my invention, I claim:

1. A counterbalance for a walking beam including an arm, means intermediate the length of the arm adapted to pivotally support said arm on a walking beam, each end portion of said arm including a part adapted to engage a walking beam as the arm rocks, a link pivotally engaging said arm, said link being disposed between the pivotal support for the arm and one end portion of the arm, and means adapted to pivotally connect said link to a crank member.

2. A counterbalance for a walking beam including an arm, a weight on each end of the arm, means intermediate the length of said arm adapted to pivotally support said arm on a walking beam, said arm including portions at each end adapted to engage a walking beam as the arm rocks, a link pivotally engaging said arm between

the fulcrum and one end portion of the arm, and means adapted to pivotally connect said link to a crank member.

3. A counterbalance for a walking beam including an arm, means adjustable along the arm and disposed intermediate the length of said arm adapted to pivotally support said arm on a walking beam, weight means secured to said arm adjacent to each end thereof, each end of said arm including a portion adapted to engage a walking beam as the arm rocks, a link pivotally engaging said arm between the fulcrum and one end portion of the arm, and means adapted to pivotally connect said link to a crank member.

4. A counterbalance for a walking beam including a link adapted to be pivotally mounted upon one end portion of a walking beam, an arm, means intermediate the length of the arm adapted to pivotally support said arm on a walking beam, said arm including end portions adapted to engage a walking beam as the arm rocks, another link pivotally engaging said arm remote from the fulcrum, means to pivotally connect said other link to said first link, and means to rock said first link.

5. A counterbalance for a walking beam including a link adapted to be disposed alongside a walking beam and adapted to be pivotally connected at one end to a walking beam, a second link having one end pivotally connected to the other end of said first link, an arm adapted to be disposed above a walking beam, a fulcrum member adjustably mounted upon said arm and disposed intermediate the length of said arm and adapted to engage a walking beam, weight means secured on said arm adjacent to each end thereof, means to guide said arm as it rocks about its fulcrum, cushion means disposed upon each end portion of said arm adapted to engage the walking beam, a third link pivotally engaging said arm, and means to pivotally connect said third link to said first link.

WALTER E. CUMMINS.