March 8, 1932. J. S. HUNTER 1,848,530

LONG STROKE JACK

Filed Aug. 29, 1930 2 Sheets-Sheet 1

Fig. 1.

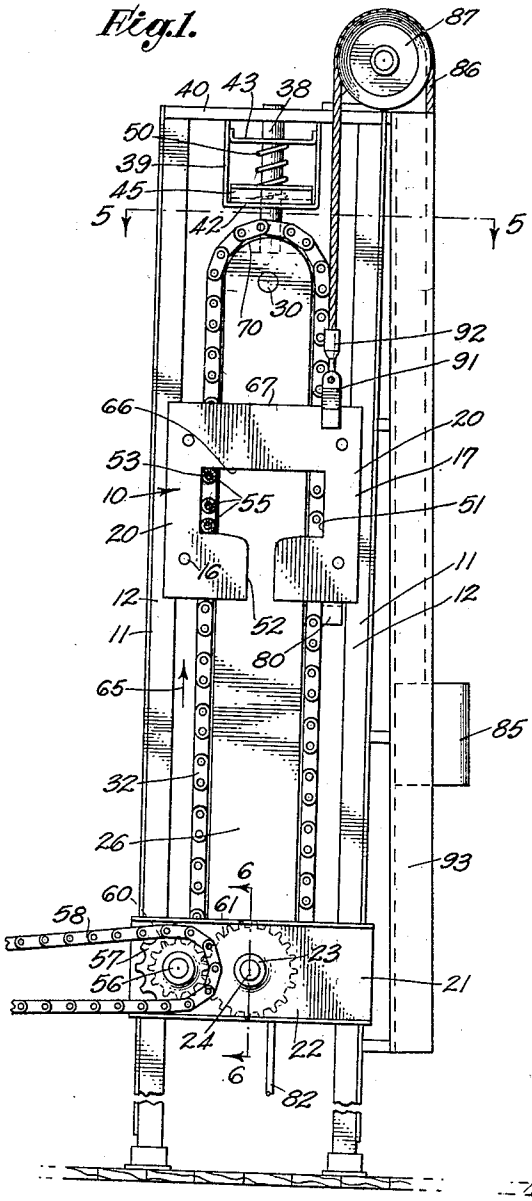


Fig. 2.

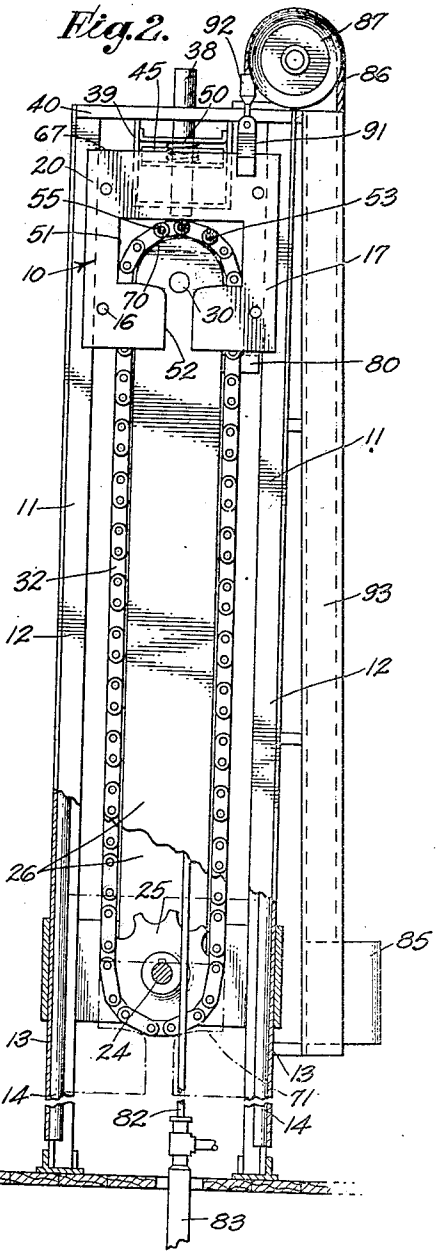
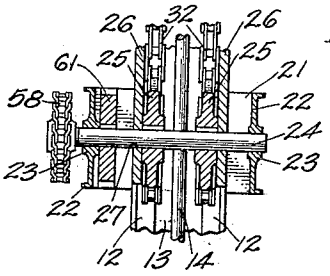


Fig. 6.



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Fig. 3.

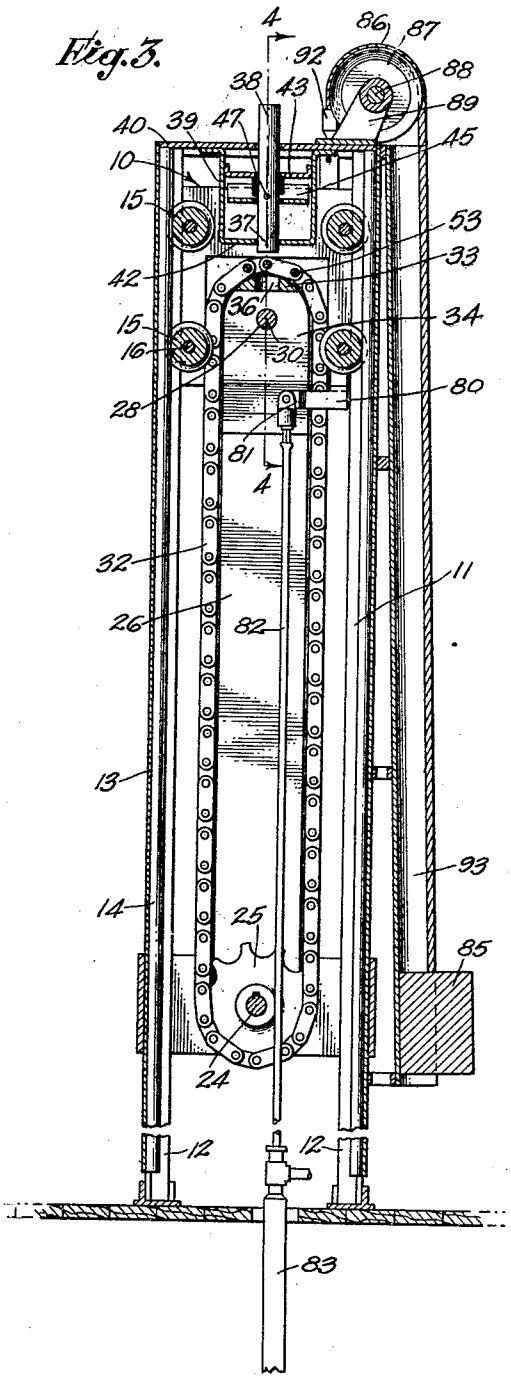


Fig. 4.

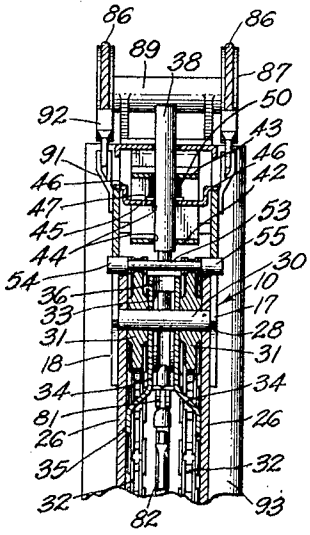
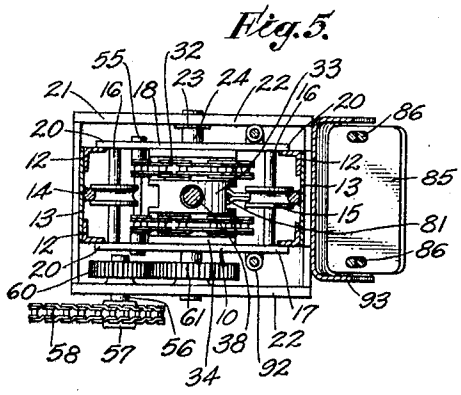


Fig. 5.



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UNITED STATES PATENT OFFICE

JOHN S. HUNTER, OF COALINGA, CALIFORNIA

LONG STROKE JACK

Application filed August 29, 1930. Serial No. 478,631.

My invention relates to pumping jacks for use in reciprocating the sucker rods of a pump, and relates particularly to a simple form of long stroke pump mechanism.

Owing to the fact that there is a definite stretch in a string of pump rods, a portion of the movement of the pump jack on each upward stroke is devoted to stretching the rods, and it is only after the pump rods have been stretched that movement of the pump plunger or pump piston is obtained. It is an object of my invention to provide a pump jack or reciprocating mechanism by which a pump plunger may be moved through a long stroke, and accordingly it is an object of the invention to provide a reciprocating mechanism whereby the efficiency of the pumping operation may be considerably increased by reason of such increase in the stroke of the pump.

It is an object of the invention to provide a pump jack having a continuous chain which travels through vertically elongated loops and has projections thereon adapted to engage and reciprocate a cross head which has means for attaching it to the upper end of a string of sucker rods or to the polish rod situated at the upper end of the string of sucker rods.

Further advantages and the specific novel and valuable details of my invention will be clearly pointed out in the following part of the specification.

Referring to the drawings, which are for illustrative purposes only,

Fig. 1 is an elevational view of a simple preferred embodiment of my invention.

Fig. 2 is a view similar to Fig. 1 showing the cross head thereof in raised position and having the lower portion thereof partly sectioned on a vertical plane.

Fig. 3 is a vertical cross section through the pumping jack, with the parts thereof in raised position.

Fig. 4 is a fragmentary section on a plane represented by the line 4—4 of Fig. 3.

Fig. 5 is a horizontal cross section on a plane represented by the line 5—5 of Fig. 1.

Fig. 6 is a fragmentary cross section on a plane represented by the line 6—6 of Fig. 1.

As shown in the drawings, my invention includes a cross head 10 adapted to move in vertical guides 11, each of which, as shown in Fig. 5, consists of a pair of vertical angle members 12 and a side plate 13 which supports a vertical bar or track member 14 so positioned that it will be engaged by grooved wheels 15 carried on shafts 16 extending between front and back plates 17 and 18 of the cross head 10. In the simple construction shown the cross head 10 consists of the front and back plates 17 and 18 secured together and held in spaced relationship by the shaft members 16, the plates 17 and 18 being of such width that the edges 20 thereof overlap the angles 12 of the guides 11. Near the lower ends of the guide means consisting of the guide members 11 is mounted a rectangular frame 21 having side plates 22 carrying bearings 23 in which a primary shaft 24 is journalled. On this primary shaft 24 are secured a pair of primary wheel members which preferably have the form of sprockets 25, and outside of the sprockets 25 the shaft receives the lower ends of supporting means or plates 26, these plates 26 having openings 27 therein through which the shaft 24 extends, as shown in Fig. 6. The upper and lower ends of the plates 26 are semi-circular in form, and near the upper ends thereof openings 28 are provided into which the ends of a secondary shaft 30 extend, as best shown in Fig. 4. On the shaft 30 secondary wheel members 31 are mounted in spaced relationship, and over the upper and lower cooperating pairs of wheel members 31 and 25 continuous traveling members or chains 32 are extended so as to form vertically elongated loops.

The upper end of the supporting means is provided with a central block 33 having a pair of downwardly extending side plates or legs 34 which are bent outwardly and are secured at 35 to the inner faces of the plates 26. In the upper portion of the block 33 is a vertical opening 36 adapted to receive the lower end 37 of a vertically extending holding pin 38 which is carried in a bracket 39 which projects downwardly from a cross member 40, this bracket 39 including a lower

plate 42 and an upper plate 43, each of which includes an opening 44 through which the pin 38 extends. Mounted on the pin 38 is a lifter plate 45 having ends 46 which project outwardly over the upper edges of the side plates 17 and 18 of the cross head 10 so as to be lifted from the position in which it is shown in Fig. 1 to the position in which it is shown in Figs. 2, 3, and 4 when the cross head 10 is lifted into raised position. The lifting means or plate 45 engages a pin 47 which extends through the holding pin 38 and lifts the pin 38 against the action of a compression spring 50 which extends between the upper plate 43 and the pin 47, moving the pin 38 from engagement with the opening 36 when the cross head reaches the upper end of its travel.

Each of the side plates 17 and 18 is provided with a rectangular opening 51 and a downwardly projecting slot 52 aligned with the primary shaft 24. Extending across the chains 32 are three shafts 53 which replace three pintles in each of the chains 32 and have rollers 54 and 55 mounted on the projecting ends thereof and extending into the openings 51 so as to provide a means carried by the continuous traveling members 32 for engaging and reciprocating the cross head 10.

In Figs. 1 and 5 I show a jack shaft 56 having a drive sprocket 57 thereon adapted to be engaged by a drive chain 58, and having a pinion 60 thereon adapted to engage a gear 61 mounted on the primary shaft 24. By rotation imparted through the chain 58, the pinion 60, and the gear 61, the shaft 24 and the wheel members 25 are caused to rotate so as to move the chain in a direction indicated by the arrow 65 of Fig. 1. During upward movement of the engagement members 55 they rest in the leftward ends of the openings 51 in the plates 17 and 18, and the upper engagement members 55 engage the upper walls 66 of the openings 51 and lift the cross head toward the top of the guide means represented by the members 11. As the cross head approaches its uppermost position, the upper edges 67 of the plates 17 and 18 engage the outwardly projecting ends 46 of the lifting plate 45 so that when the cross head reaches its uppermost position the holding pin 38 will be raised, as shown in Figs. 2, 3, and 4, sufficiently to clear the shafts 53 as they travel over the tops of the sprockets 31. The rollers 54 ride across the upper semi-cylindrical ends 70 of the plates 26, and the rollers 55 pass through the position in which they are shown in Fig. 2 and then into vertically aligned position in the rightward ends of the openings 51, whereupon further movement of the chain causes these engagement members or rollers 55 to carry the cross head downwardly. The vertical slots 52 in the lower ends of the plates 17 and 18 are provided for the purpose of clearing the primary shaft 24 as the cross head moves into its lowermost position, as indicated by the dotted lines 71 of Fig. 2. When the cross head 10 moves downwardly from its uppermost position shown in Figs. 2, 3, and 4, the lifting plate 45 is allowed to descend so as to permit the lower end 37 of the holding pin 38 to reengage the opening 36 in the block 33 in the upper end of the supporting means or plates 26 which hold the sprockets 31 in their proper positions of operation. The holding pin 38 then serves to hold the upper sprockets 31 in aligned position during the time the cross head 10 is below its uppermost position. During the movement of the shafts 53 from the leftward to the rightward sides of the openings 51, the upper ends of the members 26 are held in centralized position by the cross head which at this time surrounds them. Although the rollers 55 are the only parts carried by the chains 32 which actually engage the cross head 10, the shafts 53 may be properly included as part of the engagement means carried by the chains 32 for moving the cross head 10. The traveling members or chains 32 are caused to assume elongated loops by a supporting means consisting of the plates 26, permanently secured only at their lower ends and having their upper ends centralized by a latch means consisting of the pin 38, which latch means is adapted to be moved from engagement so as to permit the shafts 53 to pass over the upper face of the block 33, when the rollers or engagers 55 move the cross head 10 into raised position. As shown in Fig. 3, the cross head 10 is provided with an inwardly extending bracket or arm 80 adapted to be secured by means of a clevis 81 to the upper end of a polish rod 82 situated at the upper end of a string of drill rod which operates within a pump tubing 83. The reciprocation of the cross head 10 is in this manner transmitted to the sucker rods of the pump. Such reciprocation may be of any desired length, for the length of the loops formed by the chains 32 may be made as desired or controlled by existing conditions of the well to be pumped.

It may be desirable to provide a counterweight 85 which may be connected to the cross head 10 by means of a pair of cables or ropes 86 adapted to extend over pulleys 87 mounted on a horizontal shaft 88 carried by brackets 89 at the upper end of one of the guide means 11, clips 91 and rope sockets 92 being used to secure the cables 86 to the side plates 17 and 18 of the cross head 10. I have shown a channel 93 mounted in substantially vertical position for the purpose of guiding the counterweight 85 during its reciprocation.

Although I have herein shown and described a simple and practical embodiment of my invention, it is recognized that certain parts or elements thereof are representative

of other parts, elements, or mechanisms which may be employed in substantially the same manner to accomplish substantially the same results; therefore, it is to be understood that the invention should not be limited to the details disclosed herein but should be accorded the full scope of the following claims.

I claim as my invention:

1. A pump jack of the character described, including: a traveling member; supporting means for holding said traveling member in the form of a loop; means for supporting the primary end of said supporting means; a latch for holding the secondary end of said supporting means in aligned position; a cross head; guide means for guiding said cross head along said loop formed by said traveling member; means for disengaging said latch when said cross head approaches the secondary end of its travel; an engager carried by said traveling member for engaging and moving said cross head; and means for producing movement of said traveling member through the path defined by the loop through which said traveling member extends.

2. A pump jack of the character described, including: a traveling member; supporting means for holding said traveling member in the form of a loop; means for supporting the primary end of said supporting means; a holding pin; means for yieldably maintaining said holding pin in engagement with the secondary end of said supporting means, for holding said secondary end of said supporting means in alignment; a lifter adapted to move said holding pin from engagement with said secondary end of said supporting means when said cross head approaches the secondary end of its travel; an engager carried by said traveling member for engaging and moving said cross head; and means for producing movement of said traveling member through the path defined by the loop through which said traveling member extends.

3. A pump jack of the character described, including: a traveling member; supporting means for holding said traveling member in the form of a loop; a shaft extending through and supporting the primary end of said supporting means; shaft supports engaged by said shaft; a latch for holding the secondary end of said supporting means in aligned position; a cross head; guide means for guiding said cross head along said loop formed by said traveling member; means for disengaging said latch when said cross head approaches the secondary end of its travel; an engager carried by said traveling member for engaging and moving said cross head; and a wheel member on said shaft for causing said traveling member to move through its loop path.

4. A pump jack of the character described, including: a traveling member; supporting means for holding said traveling member in the form of a loop; a shaft extending through and supporting the primary end of said supporting means; shaft supports engaged by said shaft; a holding pin; means for yieldably maintaining said holding pin in engagement with the secondary end of said supporting means, for holding said secondary end of said supporting means in alignment; a lifter adapted to move said holding pin from engagement with said secondary end of said supporting means when said cross head approaches the secondary end of its travel; an engager carried by said traveling member for engaging and moving said cross head; and a wheel member on said shaft for causing said traveling member to move through its loop path.

5. A pump jack of the character described, including: a traveling member; supporting means for holding said traveling member in the form of a loop; a shaft extending through and supporting the primary end of said supporting means; shaft supports engaged by said shaft; a latch for holding the secondary end of said supporting means in aligned position; a cross head; guide means for guiding said cross head along said loop formed by said traveling member; means for disengaging said latch when said cross head approaches the secondary end of its travel; an engager carried by said traveling member for engaging and moving said cross head; a wheel member on said shaft for causing said traveling member to move through its loop path; and a wheel member at the secondary end of said supporting means over which said traveling member is extended.

6. A pump jack of the character described, including: a traveling member; supporting means for holding said traveling member in the form of a loop; a shaft extending through and supporting the primary end of said supporting means; shaft supports engaged by said shaft; a holding pin; means for yieldably maintaining said holding pin in engagement with the secondary end of said supporting means, for holding said secondary end of said supporting means in alignment; a lifter adapted to move said holding pin from engagement with said secondary end of said supporting means when said cross head approaches the secondary end of its travel; an engager carried by said traveling member for engaging and moving said cross head; a wheel member on said shaft for causing said traveling member to move through its loop path; and a wheel member at the secondary end of said supporting means over which said traveling member is extended.

7. A pump jack of the character described, including: a continuous chain; supporting means for holding said chain in the form of a loop; means for supporting the primary end of said supporting means; a latch for holding the secondary end of said support-

ing means in aligned position; a cross head, guide means for guiding said cross head along said loop formed by said chain; means for disengaging said latch when said cross head approaches the secondary end of its travel; an engager carried by said chain for engaging and moving said cross head; and means for producing movement of said chain through the path defined by the loop through which said chain extends.

8. A pump jack of the character described, including: a continuous chain; supporting means for holding said chain in the form of a loop; a shaft extending through and supporting the primary end of said supporting means; shaft supports engaged by said shaft; a latch for holding the secondary end of said supporting means in aligned position; a cross head; guide means for guiding said cross head along said loop formed by said chain; means for disengaging said latch when said cross head approaches the secondary end of its travel; an engager carried by said chain for engaging and moving said cross head; and a wheel member on said shaft for causing said chain to move through its loop path.

9. A pump jack of the character described, including: a continuous chain; supporting means for holding said chain in the form of a loop; a shaft extending through and supporting the primary end of said supporting means; shaft supports engaged by said shaft; a holding pin; means for yieldably maintaining said holding pin in engagement with the secondary end of said supporting means, for holding said secondary end of said supporting means in alignment; a lifter adapted to move said holding pin from engagement with said secondary end of said supporting means when said cross head approaches the secondary end of its travel; an engager carried by said chain for engaging and moving said cross head; a wheel member on said shaft for causing said chain to move through its loop path; and a wheel member at the secondary end of said supporting means over which said chain is extended.

10. A pump jack of the character described, including: a traveling member forming a continuous loop; supporting means for holding said traveling member in vertically elongated position; permanent structure at the lower end of said supporting means for supporting said supporting means; a cross head; means for guiding said cross head along said supporting means, said cross head having means moving therewith for maintaining the upper end of said supporting means in working alignment; engagers carried on said traveling member and engaging said cross head so as to reciprocate it; and means for producing movement of said traveling member on said supporting means.

11. A pump jack of the character described, including: a traveling member forming a continuous loop; supporting means extending from the primary end of said loop to the secondary end thereof for holding said loop in operative position; a permanent structure supporting the primary end of said supporting means; guide means extending along said loop; a cross head guided by said guide means so as to move along said loop, said cross head supporting the secondary end of said supporting means in working alignment when said cross head is at the secondary end of said supporting means, there being means for supporting said secondary end of said supporting means in working alignment when said cross head is away from said secondary end; engagers connecting said traveling member with said cross head so as to move said cross head in said guide means; and means for producing movement of said traveling member on said supporting means.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 25th day of August, 1930.

JOHN S. HUNTER.