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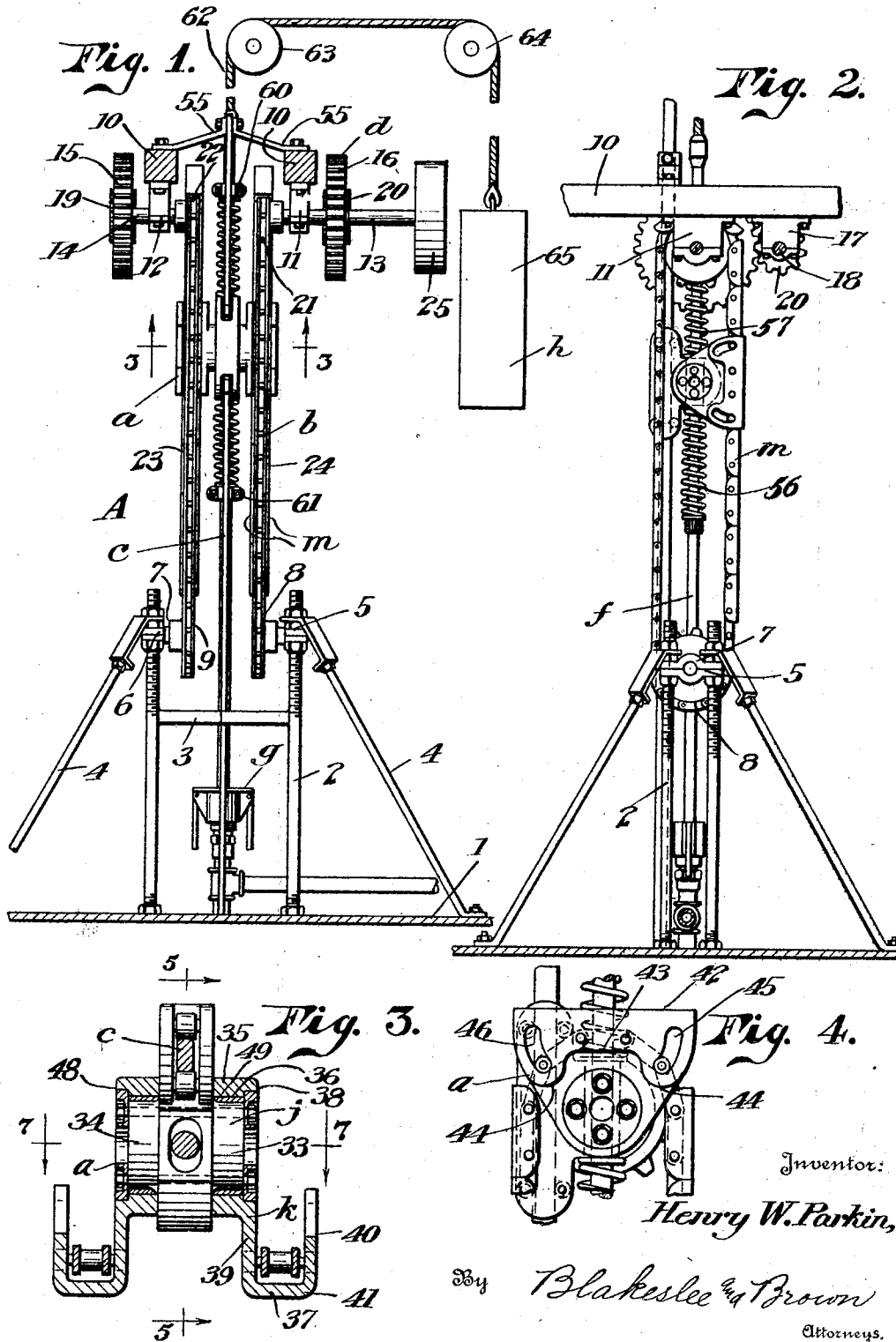
H. W. PARKIN

1,787,164

PUMPING JACK

Filed July 5, 1928

2 Sheets-Sheet 1



Inventor:

Henry W. Parkin,

By *Blakeslee & Brown*
Attorneys.

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2 Sheets-Sheet 2

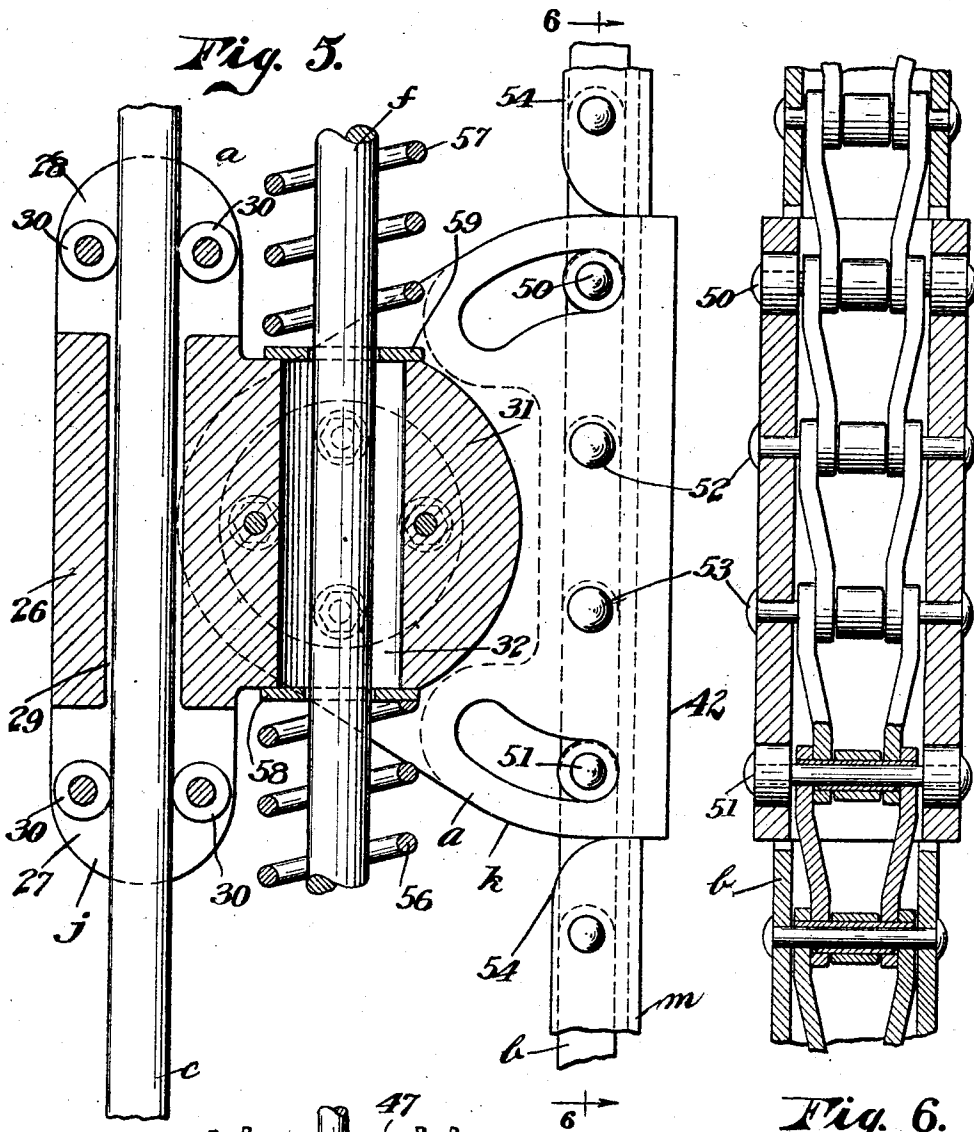


Fig. 5.

Fig. 6.

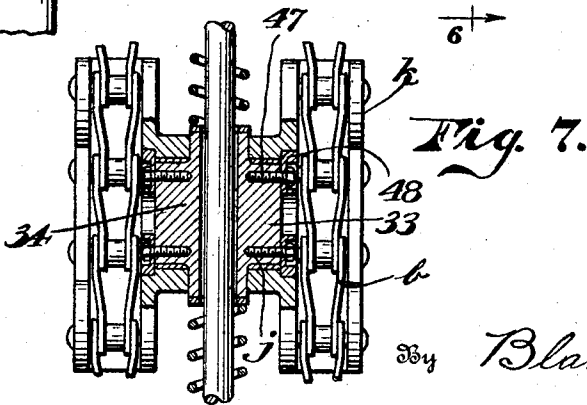


Fig. 7.

Inventor:
Henry W. Parkin,

Blakeslee and Brown

Attorneys

UNITED STATES PATENT OFFICE

HENRY W. PARKIN, OF LOS ANGELES, CALIFORNIA, ASSIGNOR OF ONE-HALF TO HARLEY J. GUNDERSON, OF LOS ANGELES, CALIFORNIA

PUMPING JACK

Application filed July 5, 1928. Serial No. 290,297.

This invention relates to pumping means, and particularly to a device adapted to give a polish rod greater reciprocating movement than is possible by the ordinary walking beam.

Another object is the provision of a device adapted to give a long stroke to a polish rod and in which there are periods of dwell at both ends of the stroke.

Another object is the provision of means adapted to increase production of a well.

Other objects include a device which is adapted to work efficiently under adverse conditions, is fool proof, without parts liable to breakage, and generally superior.

With the above and other objects in view, the invention consists in the novel and useful provision, formation, construction, association, and relative arrangement of parts, members and features, all as shown in a certain embodiment in the accompanying drawings, described generally, and more particularly pointed out in the claims.

In the drawings:

Figure 1 is an elevation of the invention shown in association with a polish rod.

Figure 2 is a side elevation of the device shown in Figure 1,

Figure 3 is a cross sectional view on the line 3—3 of Figure 1,

Figure 4 is a detail of certain features of the invention,

Figure 5 is a cross sectional view on the line 5—5 of Figure 3,

Figure 6 is a cross sectional view on the line 6—6 of Figure 5, and,

Figure 7 is a cross sectional view on the line 7—7 of Figure 3.

Referring now with particularity to the drawings, the improved device is designated as an entirety by A, and the same includes means *a* adapted to secure an object to be moved such as a polish rod where the device is used in well practice, means *b* for causing travel of the means *a*, means *c* for guiding movement of the means *a*, and means designated generally as *d* for causing movement of the means *a* and *b*, all of which elements may be used in practicing one embodiment of the invention.

As has been before stated in the objects, it is essential to proper operation of pumping equipment that the fluid pumped, if it be oil, should be given a chance to seep through the oil sands and into the pump tubing. Where the polish rod is actuated or reciprocated rapidly, this is not always possible. If, however, a long slow stroke is given the polish rod with a dwell at both ends of the stroke, inertia of the fluid is effectively compensated and the dwell permits the creation of a higher vacuum in the sands and opens up seepage, with the result that a high production well may be brought forth. In the drawings, I have shown a polish rod *f* which is passed through the usual stuffing box *g* and leads to the pump tubing within the well hole. Ordinarily, this polish rod is reciprocated by a walking beam. In the present embodiment of the invention, the polish rod is secured to means *a*, which means will reciprocate said rod. However, the entire weight of the pump string is not carried by the means *a* but is carried by a suitable counterbalance arrangement designated as *h* and to be hereinafter described.

The ordinary derrick platform is shown at 1 and secured to said platform are pairs of uprights 2, having transverse braces 3 therebetween, with the said uprights maintained in position against movement by braces 4. Carried by the supports 2 and between adjacent pairs thereof as, for instance, shown in Figures 1 and 2 at 5 and 6, are journal blocks 7. These journal blocks in turn house the shafts of sprockets 8 and 9. An overhead support 10 is provided directly above the supports 2 and said support includes two members, both adapted to carry journal blocks 11 and 12. Housed by said journal blocks are shafts 13 and 14. The shaft 14 carries a gear 15 and the shaft 13 a gear 16. Likewise carried by the supports 10 are further journal blocks 17 between which is passed a shaft 18 and said shaft carries pinion gears 19 and 20 adapted to mesh with the gears 15 and 16. The shafts 13 and 14 carry sprockets 21 and 22 and continuous chains 23 and 24 are passed between the sprockets 9 and 22, respectively, and the sprockets 8

and 21, respectively. The shaft 13 likewise carries a pulley 25 whereby the said shaft may be rotated by a belt associated with suitable mechanism, not shown. The continuous chains are spaced apart and the polish rod f is adapted to be spaced intermediate said pair of chains, as shown in Figure 1.

The means a is adapted to be carried by the chains, the said means constituting what may be termed a cross-head and comprising two members j and k . The member j includes a part 26 having bifurcated ends 27 and 28 with the said part provided with a bore 29. Between the bifurcations of the ends 27 and 28 are spaced roller members 30, the spacing between said roller members being in substantial longitudinal alignment with the bore 29. The member 26 is provided with a part 31 extending outwardly from a side thereof and which member 31 is provided with an enlarged bore 32 substantially paralleling the bore 29. Furthermore, the member 31 is provided with a pair of laterally extending cylindrical portions 33 and 34. The general idea of the member j is conveyed by referring to Figure 3, wherein it will be seen that said member is substantially a T-block provided with members laterally extending from faces thereof which are cylindrical in form. These members 33 and 34 act as gudgeons in that the member k is adapted to turn relatively thereto. The member k constituting the second portion of the means a includes two members identically formed and one thereof will be described. Said member includes a body portion 35 which is transversely bored at 36 and provided with a wing extension 37. In the showing of Figure 3, these wing extensions are substantially U-shaped in cross section in that the same includes two spaced apart substantially parallel members 39 and 40 with an inter-connecting piece 41 and which members extend outwardly from the body portion 35, with the parts 39 in the plane of the ends of said body. The parts 39, 40 and 41 are constructed as shown best in Figures 4 and 5 wherein it will be seen that the top edge of the part 40 is substantially straight, as shown at 42, with the parts also so curved or bent as to have a portion 43 substantially paralleling the part 42 and with gradually curved portions 44 extending from said portion 43 to the portion 42. The members 40 may be termed cheeks, and said cheeks are provided with curved slots 45 and 46. The curvature of these slots will depend upon the radius of the sprockets 8 and 21 as well as 9 and 22. The wall bounding the bore 36 is annularly shouldered at 38. Both members constituting the part k are adapted to be positioned upon the gudgeons 33 and 34, as shown in Figure 3, whereupon bolts 47 are screw-threaded within the gudgeons to hold the said members in assemblage. In this connection, the bolt heads are adapted to bear

against annular retaining plates 48 which are received in the shoulder part 38 and against the end surfaces of the gudgeons. Any number of bolts may be provided although in the present instance four thereof are used for both gudgeons. Anti-friction material 49 may be interposed between the periphery of the gudgeons and the surface bounding the bore 36. Both said chains are adapted to be secured to the cheeks of the part k . As shown in Figure 5, certain of the link pins 50 and 51 are extended as to length and pass through the arcuate slots in the said cheeks with suitable means for retaining the link pins in position. The pins of a link member intermediate the pins 50 and 51 are fixed to the cheeks, as shown at 52 and 53. Furthermore, the said chain is provided with a series of cooperating members m adapted to prevent the chain during movement thereof from bowing inwardly when the chain is supporting load. The said members provide side plates which are fastened to the links and adapted to have ends thereof overlap adjacent links, as shown in Figure 5, at 54. This overlapped portion will cooperate with the top of the chain so that the chain cannot bend inwardly but bend in an outward direction as when the chain passes around the sprockets. These members m are arranged in a certain zone of the said chains and are not adapted to cover the entire chain, although they might be so arranged. In order to maintain a straight line of movement of the member j , the guide rod c is utilized. This guide rod is substantially rectangular in cross section and is passed between the rollers 30 and through the bore 29. This guide rod is carried at its upper end by brackets 55 secured to the members 10, and the lower end of said guide rod is fastened in any approved manner to the derrick flooring 1.

The support between the cross head and the polish rod f is resilient in nature, in that upper and lower coil springs 56 and 57 are provided. The springs are adapted to bear against washers 58 and 59, which washers are adjacent the opening 32 of the part 31 and the said polish rod carries clamps 60 and 61 which confine the opposite ends of said springs. Thus, the said polish rod as far as the cross head is concerned is suspended by the springs. The upper end of said polish rod is secured to a cable 62 passed over sheaves 63 and 64 with a counter-balancing weight 65 secured to said cable, whereby the weight of the pumping string is balanced. The members 62, 63, 64 and 65 constitute portions of the means h .

The operation, uses, and advantages of the invention just described are as follows:

The polish rod is secured to the means h so that the weight of the pumping mechanism is counter-balanced. The polish rod is likewise

passed through the member *j* of the cross head and has a resilient connection therewith through the medium of the springs 56 and 57. The member *j* of said cross head is guided as to movement by the means *c* and the member *k* of said cross head is attached to the pair of chains 23 and 24 constituting portions of the means *b* and which chains are adapted to be moved in synchronism. When the shaft 13 is driven by suitable means, the chains will commence their movement and this movement will be communicated to the cross head and in turn to the polish rod. The polish rod will either move up or down, depending on the position of the member *k* but assuming the parts in the position shown in Figure 2, and movement in an anti-clockwise direction, the cross head will move upwardly carrying with it the polish rod. The member *k* of the cross head will move in accordance with movement of the chains and will swing to the position substantially as shown in Figure 4, wherein it will be seen that the pins 50 and 51 have changed their relation relative to the arcuate slot in the cheeks. The part *k* can revolve relative to the part *j* so that the part *j* would be covered by the cheeks of the part *k* as the chains commence their downward movement. It is evident that the members *k* would in no manner interfere with the member *j* or the polish rod carried thereby, as said members *k* are separated. This construction is best shown in Figures 3 and 7. The members *k* revolve upon the gudgeons of the member *j*. This construction provides for converting rotary movement into longitudinal reciprocal movement of a device associated therewith. The length of stroke of the polish rod will depend entirely upon the length of the chains, and furthermore there will be a period of dwell of the polish rod at the limit of its excursion. This period of dwell can be regulated by varying the diameter of the sprockets. This dwell is important in pumping operation because it allows fluid being pumped to seep through the valves and aids in raising a higher vacuum than would be otherwise attainable if the reciprocal movement were sharp, as it now is where walking beams are employed for this purpose.

It is obvious that various changes and modifications and variations may be made in practicing the invention in departure from the particular showing of the drawing without departing from the true spirit thereof.

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

1. In a cross head, a central member formed with bifurcated ends and with a bore, means for guiding movement of an object through said bore arranged in said bifurcated ends, and a pair of cheek members rotatively secured to said central member.

2. In means of the character disclosed, a

pair of spaced continuous chains, and a cross head therebetween, comprising a central member and a pair of cheek members rotatively secured to the central member, said cheek members being secured to said chains.

3. In means of the character disclosed, a pair of spaced continuous chains, and a cross head therebetween, comprising a central member and a pair of cheek members rotatively secured to the central member, said cheek members being secured to said chains, a pump rod carried by said central member, and means for guiding movement of the central member.

4. In means of the character disclosed, a pair of spaced continuous chains and a cross head therebetween, comprising a central member and a pair of cheek members rotatively secured to the central member, said cheek members being secured to said chains, a pump rod carried by said central member, means for guiding movement of the central member, and further means for causing movement of the continuous chains.

5. In a device of the character disclosed, a pair of spaced continuous chains, and a cross head centrally arranged therebetween, comprising a central member, cheek members, for both sides of said central member, rotatively secured to said central member and secured to said chains, and means for guiding movement of the central member during movement of the chains.

6. In means of the character disclosed, a pair of spaced continuous chains and a cross head therebetween comprising a central member formed with an elongated bore and a pair of cheek members rotatively secured to the central member; said cheek members being secured to said chains; a pump rod passed through the elongated bore of said central member, means for resiliently securing said pump rod to said central member, and means for guiding movement of the central member during movement of the pump rod.

In testimony whereof, I have signed my name to this specification at Los Angeles, California, this 27th day of June, 1928.

HENRY W. PARKIN.

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