May 13, 1930. E. B. WINTERS 1,758,730

PUMP UNIT

Filed Nov. 9, 1925

Fig. 1.

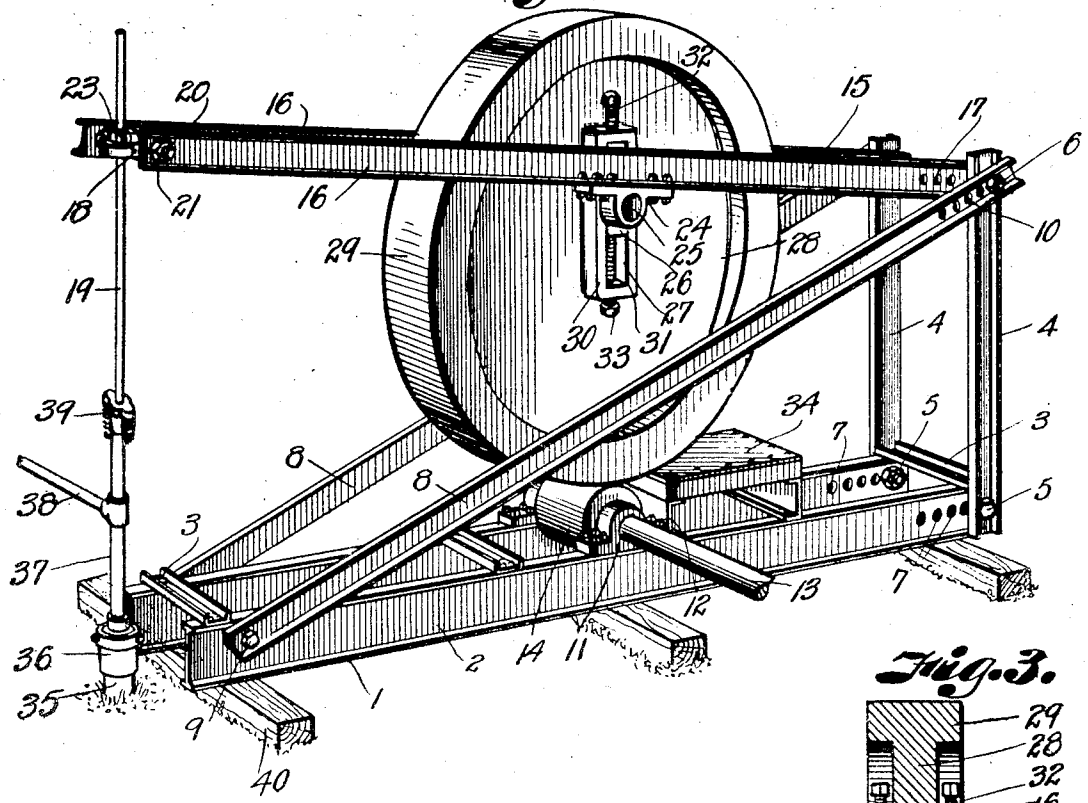


Fig. 3.

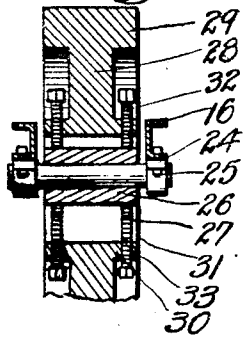
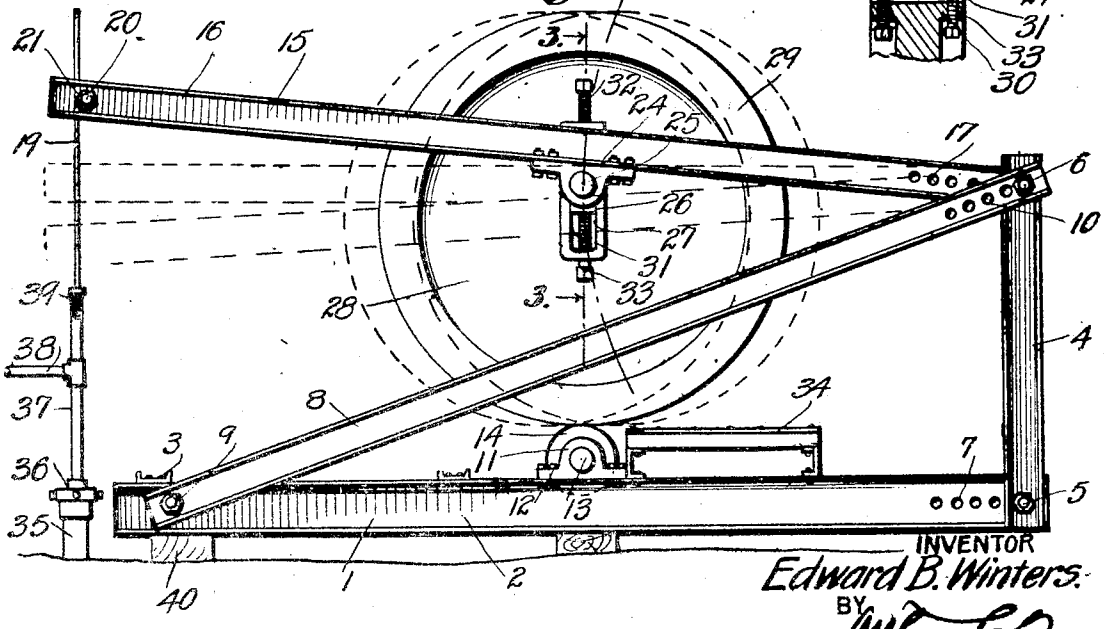


Fig. 2.



INVENTOR

Edward B. Winters.

BY

Milton C. Adams

ATTORNEY

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UNITED STATES PATENT OFFICE

EDWARD B. WINTERS, OF COFFEYVILLE, KANSAS

PUMP UNIT

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My invention relates to a pumping unit and more particularly to mechanism for transposing rotary to reciprocatory motion and reducing speed, whereby power from an engine may be employed in a pumping operation, the principal objects of the invention being to provide a unit of this character which is simple, economical and rugged in construction and operation, and wherein a pump stroke may be easily and quickly adjusted, the unit being adapted for any pumping operation, but especially intended for use in pumping oil from deep wells.

In accomplishing these and other objects of the invention I have provided improved details of structure, the preferred forms of which are illustrated in the accompanying drawings, wherein

Fig. 1 is a perspective view of a pumping unit embodying my improvements and illustrating its use in connection with an oil well.

Fig. 2 is a side elevation of the unit, particularly illustrating various eccentric positions of the power wheel for various pumping elevations of the pump rod.

Fig. 3 is a section on the line 3—3, Fig. 2.

Referring more in detail to the drawings:

1 designates a base, preferably comprising a pair of I beams 2, connected by cross bars 3 to form a rigid body. Rising from one end of the base 1 is a standard, preferably comprising a pair of channel bars 4, each connected with one of the base beams 2 by a bolt 5, and the two connected together at their upper ends by a long bolt 6.

The bolts 5 which connect the standard bars with the base beams may be selectively located in registering apertures 7 in the beams 2 in order to locate the standard at various distances from a center point, as hereinafter described, and the upper ends of the standard are braced from the forward ends of the beams by bars 8 connected with the forward ends of the beams by bolts 9 and having a set of apertures 10 at their upper ends for receiving the long bolt 6, the apertures 10 being spaced relative to the apertures 7 in the beams 2, so that the standard bars may be retained in vertical position irrespective of their distance from the aforesaid center point.

Mounted on the base 1 by bearings 11 attached to the respective beams 2 by bolts 12 is a shaft 13, driven from any suitable source of power (not shown) and fixed to the shaft is a rotary driving element 14, here shown to consist of a friction roller but which may consist of any suitable construction adaptable for transferring power from the shaft to a driven member of the character presently described.

Pivotally mounted on the standard, preferably by means of the long bolt 6, is a beam 15, preferably consisting of a pair of channel bars 16, each having a set of apertures 17 at its rear end through which the long bolt may be selectively projected, and having a connecting link 18 at its forward end for connecting the beam with a pump rod 19. The link 18 preferably comprises a central, plate-like section, having an aperture (not shown) through which the pump or polish rod may be projected, and end shanks 20 that extend through the pump beams and are held thereto by nuts 21. The polish rod 19 carries a clamp 23 which rests upon the top of the link plate, so that when the beam lifts, it lifts the polish rod and when the movement is reversed, the pump beam is lowered by weight of the polish rod. Suspended from the under sides of the pump beam members near the center of the beam are bearings 24, and rotatable in said bearings is a shaft 25. Fixed on the shaft 25 is a block 26 which is slidably mounted in a guide 27 in the web 28 of a driven wheel 29, the guide comprising flanges 30 built up along the sides and ends of a radial slot 31 in the web of the wheel, one end of the slot being located at the center of the wheel and the other end terminating at a point between the center and the rim, so that, irrespective of the position of the shaft 25 in the slot, it will be eccentric to the wheel.

The bearings 24 are so placed on the pump beam relative to the bearings 11 on the base 1 as to locate the shafts 25 and 13 in substantially vertical alignment, whereby the wheel

29 is supported on the driving member 14 and in rolling contact therewith.

The block 26 is adapted for adjustment in the guide 30 by set screws 32 and 33 which extend through the guide flanges to abutment against the block 26 to locate and hold the block at an adjusted position in the guide and thereby determine eccentric power and resultant length of pump stroke, as will presently be more fully described.

Also mounted on the base 1, back of the power wheel 14 and at a level with the top of the wheel is a platform 34 upon which the floating driven wheel may be supported under conditions presently described.

35 designates an oil well casing, 36 the casing head, 37 the tubing having the offtake branch, 38, 39 a stuffing box at the top of the tubing through which the polish rod 19 extends, and 40 ground sills upon which the base 1 may be supported when the pump unit is in operation; such parts being all of any ordinary construction and merely included in the description for better explanation of the operation of my improvements.

Assuming the parts to be constructed and assembled as described, the unit is located in such position that the polish rod of the well can be connected with the pump beam of the unit. Power is then applied to the shaft 13, rotating the driving member 14 which in turn rotates the eccentric wheel, whether the driving member 14 be of friction roller, gear wheel, or other like type. As the eccentric wheel rotates, the shaft 25 constrained by bolt 6 and beam 15 oscillates about bolt 6 as an axis, thereby raising and lowering the pump beam; the wheel itself rotating on its oscillating axis, raising and lowering of the pump raising and lowering the polish rod so that an ordinary pumping effect is produced.

The stroke of the pump may be varied in either of two ways. First, by adjustment of the standard 4 toward or from the driving shaft 13 by adjustment of the bolts in the registering apertures in the base beams and corresponding adjustment of the long bolt 6 in the apertures 10 and 17 of the brace beams 8 and pump beams 16 respectively, it being apparent that if the standard is relatively close to the drive shaft, the lever arm of the beam 16 will be relatively longer than the fulcrum arm and a long stroke is produced whereas extension of the standard from the power shaft will tend to lessen the ratio of the arms and reduce the length of the stroke.

The second method of varying the stroke is by adjustment of the shaft 25 in the radial slot in the power wheel, it being apparent that as the shaft 25 is brought nearer the center of the wheel, eccentric radius is reduced and the stroke is shortened, and that as the shaft is moved from the center, the length of the radius is increased and the stroke lengthened. In any event the wheel 29, although having a floating connection with the pump beam, will revolve in an unchanging circular plane because of its support on the rotary member 14.

It is further apparent that the driving connection between the wheels 14 and 29 will be positive, irrespective of the nature of the connection, due to pressure of the wheel 29 against the wheel 14. If the well is deep and the rod heavy, more power is required to lift the rod, but this additional weight will exert a corresponding pressure of the wheel 29 on its driving member to produce the driving relation, whether the connection is frictional or geared.

In the operation of an oil well it is necessary to frequently pull the rods so that the well may be cleaned. As the rods are pulled from a point above that at which the pump beam is located, it is necessary to disconnect the beam from the rod and remove the beam from the path of the rod. To accomplish this it is only necessary for me to disconnect the pump beam from the polish rod, disconnect the front ends of the brace beams 8 from the base beams 2 and rock the frame back on its pivotal mounting, this rocking movement carrying the wheel 29 back onto platform 34, upon which the wheel is supported during the rod-pulling and lowering operation. When the pumping is to be resumed, the parts are returned to their original positions and the pump beam again connected with the polish rod.

What I claim and desire to secure by Letters-Patent is:—

1. In a pumping unit, a driving element, a reciprocatory beam, a wheel supported on the driving element, a block adapted for radial adjustment on the wheel, and a shaft member on the block and journalled on the beam.

2. In a pumping unit, a driving roller, a pivoted beam, a driven wheel rotatably supported on the roller, and a journal member radially adjustable on the driven wheel and journalled on the beam.

3. In a pumping unit, a driving roller, a pivoted beam, a driven wheel rotatably supported on the roller and having a radial slot, a block adjustably mounted in the slot, and a shaft carried by the block and journalled on the beam.

4. In a pumping unit, a driving roller, a pivoted beam, a driven wheel rotatably supported by the roller and having a radial slot and flanges at the margin of the slot, a block adjustable in the slot, a shaft element on the block journalled on the beam, and set screws carried by said flanges and engaging the block to retain the block in adjusted position.

5. In a pumping unit, a frame comprising a base and a standard tiltable on the base, a driving roller on the base, a beam pivoted on the standard, a driven roller having an ec-

centric shaft element journalled in the beam, and a platform on the base for supporting the driven wheel when the standard is tilted.

6. In a pumping unit, a base, a standard on the base, a beam pivotally mounted on the standard, a driven wheel having an eccentric shaft element journalled on the beam and a driving roller on the base supporting the driven wheel, the standard being adjustable relative to the beam to vary the stroke of the beam.

7. In a pumping unit, a base and a standard, a roller journaled on the base, a beam pivoted on the standard and provided with means for connection with a polish rod, a roller journaled on the beam and having support on and driving relation with the roller on the base, one of the rollers having an eccentric axis, means for rotating the roller on the base, the standard being adjustable relative to the base, and means to vary angular movement of the beam.

8. In a pumping unit, a base and a standard, a roller journaled on the base, a beam pivoted on the standard and provided with means for connection with a polish rod, a roller journaled on the beam and having support on and driving relation with the roller on the base, one of the rollers having an eccentric axis, and means for rotating the roller on the base, the eccentrically mounted roller being adjustable on its journal to vary the eccentricity of said roller.

9. A pumping unit comprising a supporting frame, a pumping beam pivotally connected with the frame, a driving shaft rotatably mounted in the frame, a concentric driving member fixed to the shaft and a circular driven member eccentrically rotatable on the beam and having rolling support on the driving member.

10. A pumping unit comprising a supporting frame, a pumping beam pivotally mounted on the frame, a concentric driving roller rotatable on the frame and a circular driven wheel mounted on the beam for eccentric rotation and having rolling support on the roller.

11. In a pumping unit, a frame including a base, a beam pivotally mounted on the frame, and adapted for movement into and from functional position, a driving roller on the base, a driven roller having an eccentric shaft element journaled in the beam and a support on the base for supporting the driven wheel when the beam is moved out of functional position.

In testimony whereof I affix my signature.

EDWARD B. WINTERS.