No. 687,067. Patented Nov. 19, 1901.

C. F. RIGBY.

OIL PUMP.

(Application filed Apr. 8, 1901.)

(No Model.)

Fig. 3.

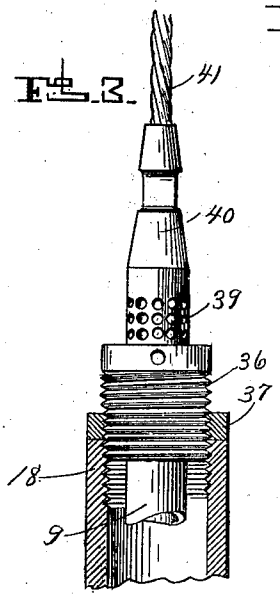


Fig. 1.

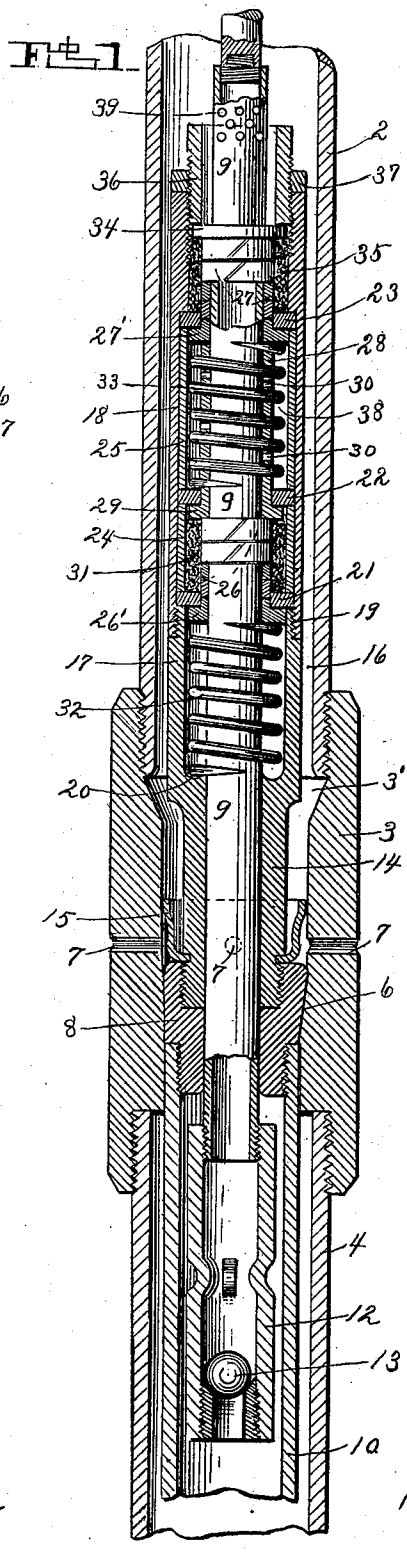
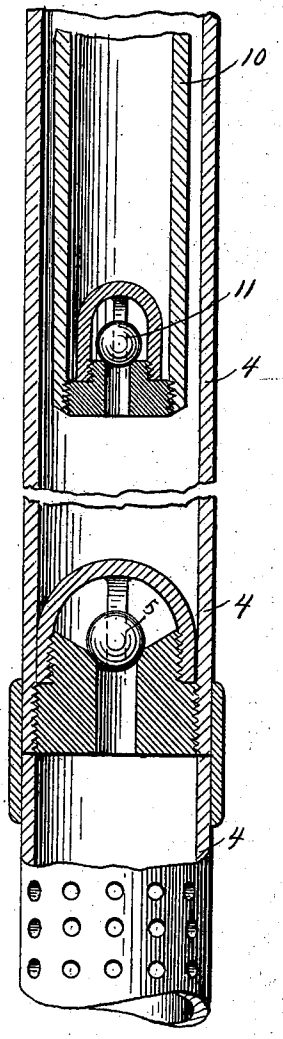


Fig. 2.



WITNESSES

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CLARK F. RIGBY, OF NEW MARTINSVILLE, WEST VIRGINIA.

OIL-PUMP.

SPECIFICATION forming part of Letters Patent No. 687,067, dated November 19, 1901.

Application filed April 8, 1901. Serial No. 54,787. (No model.)

To all whom it may concern:

Be it known that I, CLARK F. RIGBY, a citizen of the United States, residing at New Martinsville, in the county of Wetzel and State of West Virginia, have invented certain new and useful Improvements in Oil-Pumps, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to deep-well oil-pumps; and the primary object thereof is to provide a simple and effective pump adapted to be operated by a wire or other cable in place of the sucker-rods now usually employed for connecting the pump and walking-beam.

A further object is to provide a pump which includes a stuffing-box, plunger, and other necessary adjuncts, which may be lowered to position in the well-tube by means of the operating-cable, or removed therefrom by means of the pump-actuating cable, at the pleasure of the operator.

A further object is to so construct the pump mechanism and well-tube that by partially withdrawing the former the column of oil in the tube will be discharged laterally through the base thereof for the purpose of washing the wall of the well.

A further object is to provide improved means for packing and for lubricating the plunger.

The invention consists in the novel features of construction and combination and arrangement of parts, hereinafter fully described and claimed, and illustrated by the accompanying drawings, wherein—

Figure 1 is a vertical sectional view of a pump and well-tube constructed in accordance with my improvements. Fig. 2 is a similar view of the lower portion of the same. Fig. 3 is a similar view of the upper portion of the pump.

Referring to the drawings, 2 represents the well-tube, and uniting with the lower end thereof is the elongated chamber 3. Depending from the lower end of this chamber is tube 4, provided with foot-valve 5. Chamber 3 forms a bottom continuation of the well-tube, and formed therein is the downwardly-tapering seat 6, here shown immediately below the laterally-extending outlet-openings 7. Formed complementary with seat 6 is the tapered supporting-head 8 of the stuffing-box through which plunger 9 reciprocates. Depending from head 8 is anchor-tube 10, containing standing valve 11, and secured to the extremity of plunger 9 beneath head 8 is the enlarged valve-cage 12, provided with ball-valve 13. The stuffing-box is formed with a stem portion 14 where it unites with head 8, confining on the upper end of the latter the leather cup 15, which is expanded by the column of oil in space 16 between tube 2 and the stuffing-box and caused to tightly fit chamber 3 above apertures 7 and prevent the oil from discharging therethrough.

The operating-cable is attached to the plunger in manner presently to be explained, and when it is desired to wash or flood the walls of the well the plunger is drawn upward, engaging valve-cage 12 with the lower end of head 8, and by further upward movement the head and the stuffing-box may be raised sufficiently to permit the oil in tube 2 to pass the cup and flow out through apertures 7, from which it discharges onto the faces or walls of the well for the purpose of cleansing them. For removing the entire pump from the well the said upward movement is simply continued, all portions of the pump being of such diameter as to pass upward freely through tube 2, including free passage of anchor-tube 10 through seat 6. When the pump is raised, as above described, for flooding the well through apertures 7, tube 4 and valve 5 prevent the oil from discharging through the lower end of the well-tube. If it is not desired to utilize the flooding feature, said tube 4 and its valve may be omitted.

The upper and enlarged portion of the stuffing-box consists of lower section 17 and upper section 18, threaded together at 19. The contracted lower end of box-section 17 forms an abutment 20, and above the same and arranged successively at separated points are the abutments 21, 22, and 23. Abutment 21 is confined on the upper end of box-section 17, abutment 22 is spaced therefrom by sleeve 24, and abutment 23 is spaced from abutment 22 by sleeve 25. Embracing plunger 9 are two series 26 and 27 of split metallic packing-rings, which are spaced apart by elongated sleeve 28, flanged at its lower end

at 29 and provided with side perforations 30. Confined between flange 29 and abutment 21 is soft packing 31, which surrounds split rings 26, while confined between the lowermost and flanged ring 26′ and base-abutment 20 is spiral spring 32. Confined between abutment 22 and lowermost and flanged ring 27′ of ring series 27 is spiral spring 33, and inclosed between abutment 23 and wide wing 34, bearing on the upper end of ring series 27, is soft packing 35, which surrounds the last-named rings. Threaded into the upper end of box-section 18 is bushing 36, which bears on wide ring 34 and by means of which both the metallic and soft packings are adjusted as the conditions of working may require. Gland or bushing 36 is held fixed after being adjusted by lock-nut 37. Longitudinal movement of the column of metallic packing is resisted intermediate its ends by spring 33 and at its lower end by spring 32, so that the several rings are held tightly together or in close relation. Abutments 21 and 23 prevent the soft packing 31 and 35 from moving downward. Hence said packings are compressed by the inward or downward movement of the metallic packing, and this compression contracts rings 26 and 27 on plunger 9, and by this means the packing may be made either loose or tight, as may be required.

Space 38 between sleeve 28 and the inner wall of the stuffing-box is filled with a suitable lubricant, such as soap, graphite, or a suitable oil, which reaches the surface of the plunger through sleeve-aperture 30, whereby the plunger is maintained in a thoroughly-lubricated condition and caused to reciprocate through the metallic packing-rings with comparatively little resistance and this without impairing the efficiency of said packing.

Plunger 9 is apertured at its upper end at 39 to permit the oil being pumped to discharge therefrom, and coupled in usual manner to the upper end of the plunger by means of rope-socket 40 is the operating-cable 41.

With the weight of the column of oil in the tube bearing on cup 15 and with the plunger packed and lubricated as described the stuffing-box remains seated in tube-chamber 3 and there is no tendency on the part thereof to lift with the plunger. Also under these conditions the plunger works with sufficient ease to drop of its own weight for the downstroke, thus dispensing with the rigid sucker-rod connection with the walking-beam heretofore necessary and making it entirely practicable to operate the pump with a cable. In pumping a well several thousand feet deep the advantages of a cable over the cumbersome succession of sucker-rods will be apparent to those skilled in the art. The pump entire may be pulled out of the well at any time for the purpose of repair, for adjustment, or for replenishing the lubricant, and when being lowered in the well the pump takes its proper position, as in Fig. 1, without the slightest hitch.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A tube for deep wells having lateral outlet-openings, in combination with pumping mechanism removably positioned in the tube, the pumping mechanism consisting of a normally-fixed element which includes a stuffing-box, and a reciprocating element comprising a plunger which is operative in the stuffing-box, the fixed element of the pumping mechanism normally closing the tube and the lateral outlet-openings therein, substantially as shown and described.

2. A tube for deep wells having lateral outlet-openings, in combination with pumping mechanism removably positioned in the tube, the pumping mechanism consisting of a normally-fixed element which includes a stuffing-box, and a reciprocating element comprising a plunger which is operative in the stuffing-box, the diameter of the tube being reduced below said lateral outlet-openings, the fixed element of the pumping mechanism normally closing said openings and depending into and closing the contracted portion of the tube, and means for raising the pumping mechanism and thereby opening the said outlet-openings to the uncontracted portion of the tube without opening the lower contracted portion of the latter, substantially as shown and described.

3. In an oil-pump, the combination of a well-tube formed with a seat and above the seat provided with lateral outlet-openings, the diameter of the tube adjacent said openings being contracted, a stuffing-box adapted to rest in the seat, an outwardly-flaring leather cup carried by the stuffing-box and bearing outward against the wall of the tube at said contracted portion, thereby preventing the oil in the tube from discharging through the said tube-apertures, means for lifting the stuffing-box so as to raise said cup out of the tube contraction, and a plunger operative in the stuffing-box, substantially as shown and described.

4. In an oil-pump, the combination of a well-tube formed with a seat and provided with lateral outlet-openings, a stuffing-box adapted to rest in the seat, means operating to prevent the discharge of oil in the tube through said openings when the stuffing-box is seated, said means operating to permit said discharge when the box is raised from its seat, and a plunger operative in the stuffing-box, substantially as shown and described.

5. In an oil-pump, the combination of a well-tube, a chamber forming a continuation of the well-tube and constructed with a contracted bore terminating in a seat, said contracted portion being formed with lateral outlet-openings, a stuffing-box formed complementary with the seat, a leather cup carried by the box and closing the space between the stuffing-box and chamber-wall above said openings, means for lifting the stuffing-box,

and a plunger operative in the box, substantially as shown and described.

6. In an oil-pump, the combination of a stuffing-box, a plunger, elongated metallic packing embracing the plunger, a spring at the base of the packing and another spring intermediate the ends thereof for resisting downward movement of the metallic packing, soft packing surrounding the metallic packing, a fixed bottom-support for the soft packing, and means at the upper end of the stuffing-box for depressing the metallic packing and for compressing the soft packing, substantially as shown and described.

In testimony whereof I affix my signature in presence of two witnesses.

CLARK F. RIGBY.

Witnesses:
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ALEX. S. MABON.