Nov. 14, 1939. E. S. HUNTSMAN 2,180,240

PUMP PLUNGER

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Fig. 1.

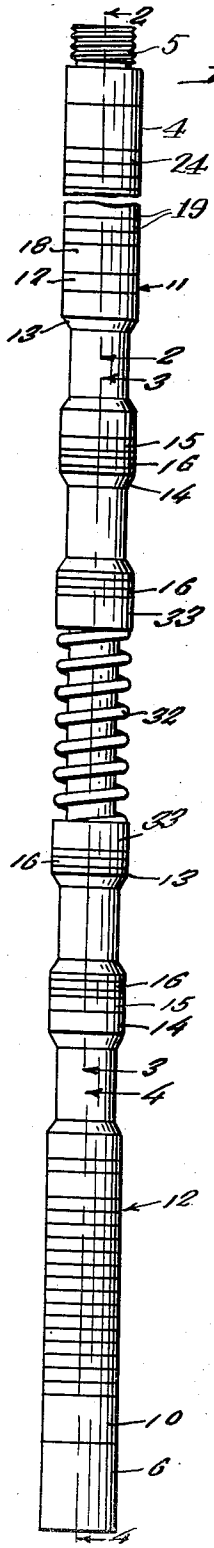


Fig. 5.

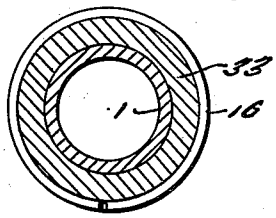


Fig. 6.

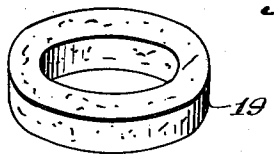


Fig. 7.

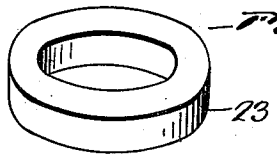
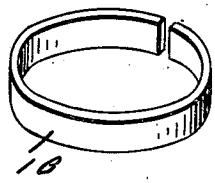


Fig. 8.



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Fig. 2.

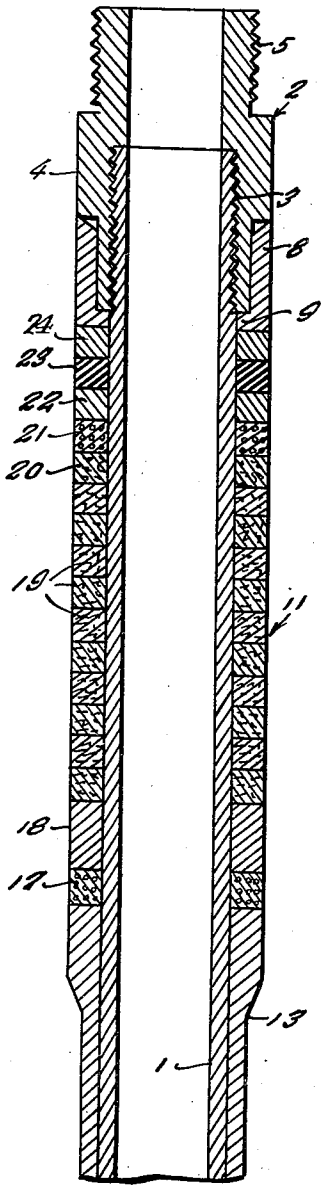


Fig. 3.

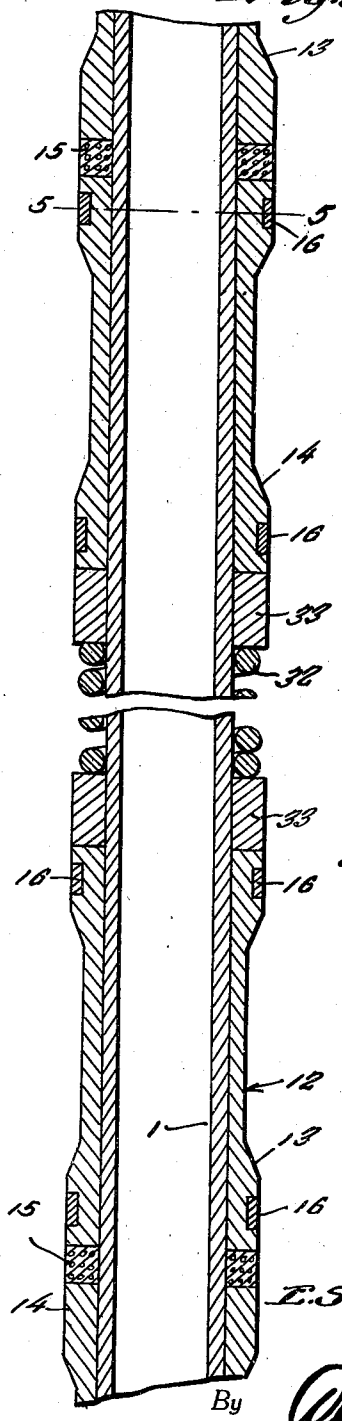
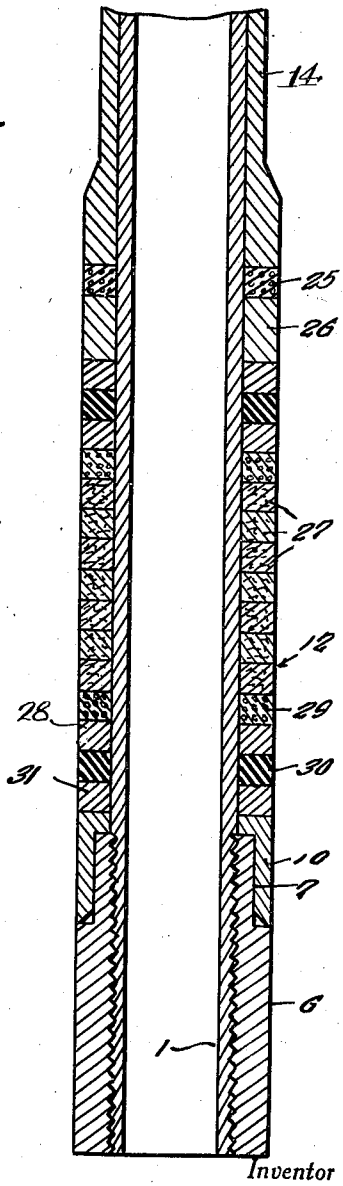


Fig. 4.



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UNITED STATES PATENT OFFICE

2,180,240

PUMP PLUNGER

Edwin S. Huntsman, Fillmore, Calif.

Application August 16, 1938, Serial No. 225,221

3 Claims. (Cl. 309—23)

My invention relates to improvements in pump plungers for use more particularly in oil wells, although, as will presently appear, it may be used in other wells if desired.

The principal object of the invention is to provide a plunger adapted to increase production by virtue of the fact that it is positively sealed and equipped to work in oil so that it is properly lubricated.

Other and subordinate objects are also comprehended by my invention, all of which, together with the precise nature of my improvement, will be readily understood when the succeeding description and claims are read with reference to the drawings accompanying and forming part of this specification.

In said drawings:

Figure 1 is a view in side elevation of a pump plunger constructed in accordance with my invention.

Figure 2 is a fragmentary view in vertical section taken on the line 2—2 of Figure 1 looking in the direction indicated by the arrows and drawn to an enlarged scale.

Figure 3 is a similar view taken on line 3—3 of Figure 1 drawn to an enlarged scale and looking in the direction indicated by the arrows, parts being broken away.

Figure 4 is still another similar view taken on line 4—4 of Figure 1 looking in the direction indicated by the arrows and drawn to an enlarged scale.

Figure 5 is a view in transverse section taken on line 5—5 of Figure 3.

Figure 6 is a view in perspective of one of the flax packing rings.

Figure 7 is a similar view of one of the rubber packing rings, and

Figure 8 is another similar view of one of the compression rings.

Referring to the drawings by numerals, the plunger of my invention comprises a standing tube 1 having at its upper end a metal cage bushing 2 internally threaded, as at 3, for attachment to said tube and provided with a central enlarged boss 4 and an externally threaded upper end 5 for attachment of the plunger to the usual operating connection (not shown). The lower end of said tube 1 has threaded thereon a metal bushing 6 of the type having a reduced upper end 7. Fitted on the lower end of the upper bushing 2 is an upper pump cup 8, of resilient material, having an internal lower end flange 9 fitting tightly around the tube 1. Similarly fitting over the reduced upper end 7 of the bushing 6 is a lower pump cup 10 similar to the upper pump cup 8 but inverted.

Intermediate the upper and lower pump cups 8 and 10, the tube 1 is equipped with a plurality of combination lubricating and sealing units, the number of units being increased or diminished according to the working conditions such as depth of wells, fluid gravity, and strokes per minute of the plunger.

In the present instance an upper and lower combination unit 11 and 12, respectively, only have been shown as illustrative of the principle and structure involved. Each unit 11, 12 comprises a pair of upper and lower spool-like metal sleeves 13 and 14 slidably fitted onto the tube 1 and spaced apart, in each unit, by a hydraulic packing ring 15 of suitable packing material.

The enlarged end of the lower sleeve 14 of the upper pair and that of the upper sleeve 13 of the lower pair have countersunk therein split metal compression rings 16 forming oil sealing members, as will presently more clearly appear.

The upper sleeve 13 of the upper unit 11 is spaced from the upper pump cup 8 by the following devices: On top of the upper sleeve 13 of said unit is a hydraulic packing ring 17, similar to rings 15, and a metal follower ring 18 both fitting around the tube 1 and the last-mentioned ring being surmounted by a series of similar packing rings 19 of flax above which, in the order named, is another follower 20, a hydraulic packing ring 21, a metal follower 22, a rubber sealing ring 23 and a cup follower ring 24.

The lower sleeve 14 of the lower unit 12 is similarly spaced from the lower pump cup 10 by a hydraulic packing ring 25 immediately below said sleeve, a metal follower ring 26 below ring 25, a series of flax packing rings 27 below ring 26, a metal follower ring 28 below said series, and hydraulic and rubber packing rings 29 and 30 alternating with metal follower rings 31 between said follower ring 28 and said pump cup 10. A coiled spring 32 sleeved onto the tube 1 between the adjacent sleeves 14 and 13 of said units 11 and 12 with metal followers at each end thereof urges the component parts of the described units into compact relation as will be clear.

The described plunger is designed for use in the usual well tubing, (not shown) into which the various packing rings, sealing rings, and followers have a working fit. As will be clear the sleeves 13 and 14 of the described units, together with the inner wall of the well tubing provide cavities designed to receive lubricating oil introduced therein in any suitable manner,

as for instance, when the plunger is lowered into the tubing. By virtue of this arrangement, the plunger is adequately lubricated, the various followers and packing rings likewise, and the oil accommodating cavities sealed at each end thereof by the metal compression rings 16 and the hydraulic packing rings 15. The flax packing rings 19 and 27 serve the purpose of holding the compression out of the oil accommodating cavities and together with the other packing rings form a positive seal preventing the oil from escaping. The metal compression rings work in oil and galling is prevented by positive lubrication to all working parts. The spring 32 keeps all packings tight.

The foregoing will, it is believed, suffice to impart a clear understanding of the invention without further explanation.

Manifestly the invention, as described, is susceptible of modification without departing from the inventive concept and right is herein reserved to such modifications as fall within the scope of the subjoined claims.

What I claim is:

1. A pump plunger for use in well tubing comprising a tube, a pair of bushings threaded onto opposite ends of said tube, respectively, and a plurality of combination units on said tube intermediate said bushings each including spool-like sleeves adapted to form together with the inner wall of the well tubing lubricant containing chambers, a pair of pump cups surrounding said tube at the inner ends of said bushings, respectively, a series of sealing and packing rings intermediate each pump cup and said units, and spring means dividing said units and said series of rings and urging the units and series upon opposite sides thereof into compact relation.

2. A pump plunger for use in well tubing comprising a tube, a pair of bushings threaded onto opposite ends of said tube, respectively, and a plurality of combination units on said tube intermediate said bushings each including spool-like sleeves adapted to form together with the inner wall of the well tubing lubricant containing chambers, a pair of pump cups surrounding said tube at the inner ends of said bushings, respectively, a series of sealing and packing rings intermediate each pump cup and said units, and spring means dividing said units and said series of rings and urging the units and series upon opposite sides thereof into compact relation, each sleeve being provided with resilient metal compression rings in the ends thereof.

3. A pump plunger for use in well tubing comprising a tube, a pair of bushings threaded onto opposite ends of said tube, respectively, and a plurality of combination units on said tube intermediate said bushings each including spool-like sleeves adapted to form together with the inner wall of the well tubing lubricant containing chambers, a pair of pump cups surrounding said tube at the inner ends of said bushings, respectively, a series of sealing and packing rings intermediate each pump cup and said units, spring means dividing said units and said series of rings and urging the units and series upon opposite sides thereof into compact relation, each sleeve being provided with resilient metal compression rings in the ends thereof, and hydraulic packing rings on said tube intermediate said sleeves.

EDWIN S. HUNTSMAN.