Sept. 24, 1957 E. J. HANLEN 2,807,218

SUB-SURFACE TYPE OIL WELL PUMP

Filed Aug. 27, 1956

Fig. 1.

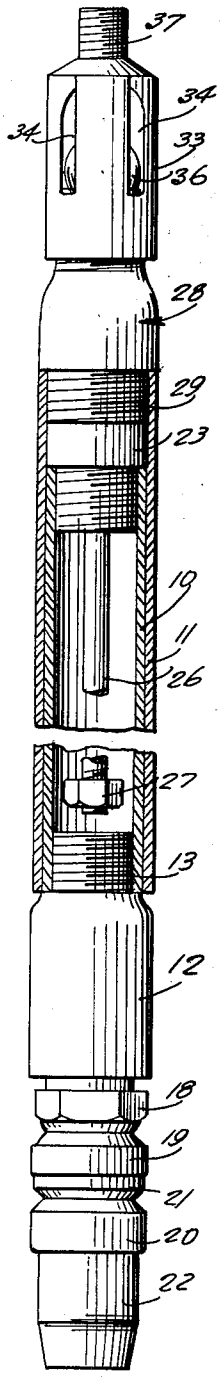


Fig. 2.

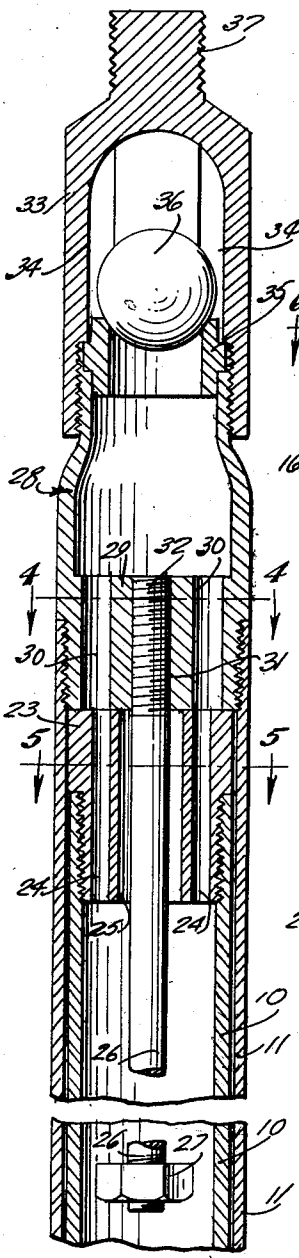


Fig. 3.

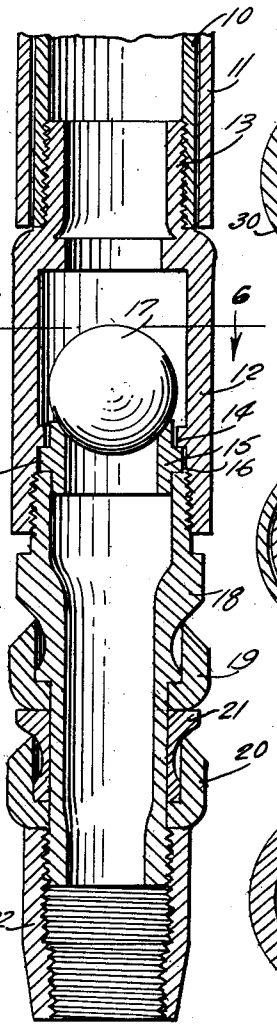


Fig. 4.

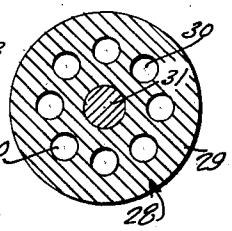


Fig. 5.

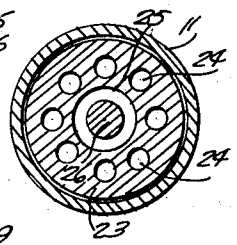
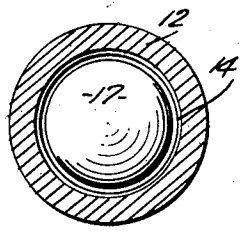


Fig. 6



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SUB-SURFACE TYPE OIL WELL PUMP

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Application August 27, 1956, Serial No. 606,421

1 Claim. (Cl. 103—158)

This invention relates to a fluid pump, and more particularly to a sub-surface oil well pump.

The object of the invention is to provide a pump which will permit operators to pump fluid such as oil from wells at increased efficiency and greater economy.

Another object of the invention is to provide a sub-surface fluid pump which includes a pair of tubes which are slidably connected together, there being a means provided for maintaining the parts of the pump in their proper assembled position as the pump is operated, and wherein the pump of the present invention does not use any cups or packing to create displacement or to create vacuum in the pumping motion.

A further object of the invention is to provide a sub-surface oil well pump which is extremely simple and inexpensive to manufacture.

Other objects and advantages will be apparent during the course of the following description.

In the accompanying drawings, forming a part of this application, and in which like numerals are used to designate like parts throughout the same:

Figure 1 is a side elevational view of the pump of the present invention, with parts broken away and in section.

Figure 2 is a fragmentary longitudinal sectional view taken through the pump and showing the upper portion thereof.

Figure 3 is a view similar to Figure 2, but showing the lower portion of the pump.

Figure 4 is a sectional view taken on the line 4—4 of Figure 2.

Figure 5 is a sectional view taken on the line 5—5 of Figure 2.

Figure 6 is a sectional view taken on the line 6—6 of Figure 3.

Referring in detail to the drawings, the numerals **10** and **11** designate inner and outer tubes which are slidably connected together. There is further provided a body member **12** which has an exteriorly threaded neck **13** on its upper end and the neck **13** is arranged in threaded engagement with the lower interiorly threaded portion of the tube **10**, Figure 3. The body member **12** is provided with an inwardly extending angular flange **14**, and a bushing **15** is positioned in the body member **12**, the bushing **15** being provided with an annular collar **16** which engages the lower surface of the flange **14**. A ball **17** is mounted for movement into and out of closing or bridging relation with respect to the upper end of the bushing **15**.

There is further provided a support member which is indicated generally by the numeral **18**, and the support member **18** has its upper end arranged in threaded engagement with the lower portion of the body member **12**. Circumposed on the support member **18** is a pair of yieldable sleeves **19** and **20** which can be made of any suitable material such as leather or plastic, and a spacer member **21** is interposed between the pair of sleeves **19** and **20**. A guide member **22** is arranged in threaded engagement with the lower end of the support member **18**,

and the bottom of the guide member **22** is open so that oil or other fluid being pumped, can pass therethrough.

A plug **23** is provided with a lower threaded portion which threadedly engages the upper end of the inner tube **10**, Figure 2. The plug **23** is provided with a plurality of equally spaced apart apertures **24**, Figure 5, for a purpose to be later described. The plug **23** is further provided with a central bore **25**, and a rod **26** is slidably positioned in the bore **25**. A nut **27** is arranged in threaded engagement with the lower end of the rod **26**.

The numeral **28** designates a headpiece which has its lower end arranged in threaded engagement with the top of the outer tube **11**. The headpiece **28** includes a lower portion **29** which is provided with a plurality of spaced apart apertures **30**, and the headpiece **28** is further provided with a central threaded bore **31**. The upper end of the rod **26** is threaded exteriorly as at **32**, and the upper threaded portion **32** of the rod **26** is arranged in threaded engagement with the bore **31** of the headpiece **28**.

Arranged in threaded engagement with the upper end of the headpiece **28** is a cage **33**, and the cage **33** is provided with a plurality of spaced apart cutouts **34**. A bushing **35** is positioned within the cage **33**, and a ball **36** is mounted for movement into and out of bridging or closing relation with respect to the upper end of the bushing **35**. Extending upwardly from the top of the cage **33** is an exteriorly threaded shank or stem **37**, Figures 1 and 2.

From the foregoing, it is apparent that there has been provided a fluid pump which is especially suitable for use in sub-surface oil wells or the like. In use the shank or stem **37** can be connected to the lower end of a pump rod and then the pump of the present invention can be inserted into a sub-surface well such as an oil well. Then, as the pump rod is reciprocated or moved up and down, this will result in up and down movement of the cage **33**. As the cage **33** moves up and down, it causes up and down movement of the headpiece **28** which in turn results in up and down movement of the outer tube **11**. It is to be noted that the inner tube **10** is stationary while the outer tube **11** slides up anad down. This movement results in oil or other fluid being drawn in through the lower open end of the guide member **22** and this fluid such as the oil passes up through the support member **18** and up through the bushing **15** whereby it raises the ball **17** and then the oil or other fluid passes up through the body member **12** and through the inner tube **10**. The fluid then passes up through the apertures **24** and through the registering apertures **30** and then through the bushing **35** which causes the ball **36** to be lifted. The fluid can then pass out through the cutouts **34** in the cage **33**. The pair of balls **36** and **17** serve as check valves which permit the oil to pass upwardly through the pump, but these balls prevent the oil from passing downwardly.

As previously described, the ball **36** is seated in the cage **33** which is provided with the cutouts **34**. Ports or apertures are provided in the headpiece **28** and plug **23**. The retaining nut **27** prevents the tubes **10** and **11** from pulling apart. The seating cups **19** and **20** are preferably made of leather or other suitable material.

The present invention thus constitutes a plunger type pump which employs or uses the two tubes **10** and **11**. The tubes are matched together with not too close a tolerance. In actual practice, it has been found that a tolerance of $\frac{1}{32}$ of an inch between the diameters of the inner and outer tubes works much better than one with a real close fit. It is believed that the efficiency of the pump is higher with a maximum tolerance between the tubes on account of the weight of the oil above the pump within the tubing which aids in the pumping stroke. In other words, it is believed that the weight of the fluid acts as a force in lifting the rods and the outer tube over

the inner tube. The apertures **24** and **30** permit the oil to travel from the lower tube up through the pump. The rod **26** and nut **27** prevent the pump from coming apart while running or from coming apart in the hole.

When using the present pump, a well can be pumped economically and efficiently and no cups or packing are utilized to create displacement or to create vacuum in the pumping motion.

I claim:

In a sub-surface pump, an inner tube, an outer tube slidably connected to said inner tube and being of greater diameter than said inner tube, said inner tube having its interior threaded adjacent the lower end thereof, a body member having an exteriorly threaded neck threadedly engaging the lower threaded portion of said inner tube, an annular flange extending inwardly from said body member, a bushing seated in said body member and having an annular collar arranged contiguous to the bottom of said flange, a ball engaging the upper end of said bushing, a support member having an upper portion threadedly engaging the lower end of said body member, a pair of spaced apart yieldable sleeves circumposed on said support member, a spacer member interposed between said pair of sleeves, a guide member arranged in threaded engagement with the lower end of

said support member, a plug mounted on the upper end of said inner tube and arranged in threaded engagement therewith, there being a plurality of spaced apart apertures in said plug, said plug having a central bore arranged therein, a rod slidably arranged in said bore, a nut on the lower end of said rod, a headpiece including a lower threaded section threadedly engaging the upper end of said outer tube, said headpiece including a lower portion provided with a plurality of apertures and a central threaded bore for threadedly receiving the upper end of said rod, a cage arranged in threaded engagement with the upper end of said headpiece and said cage being provided with a plurality of spaced apart cutouts, a bushing seated in said cage, a ball arranged in engagement with said bushing, and a threaded shank extending upwardly from said cage.

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