Dec. 29, 1942. H. R. PENDLETON 2,306,560

SAND EXTRACTOR FOR OIL WELL PUMPS

Filed Jan. 21, 1942 2 Sheets-Sheet 1

Fig. 1.

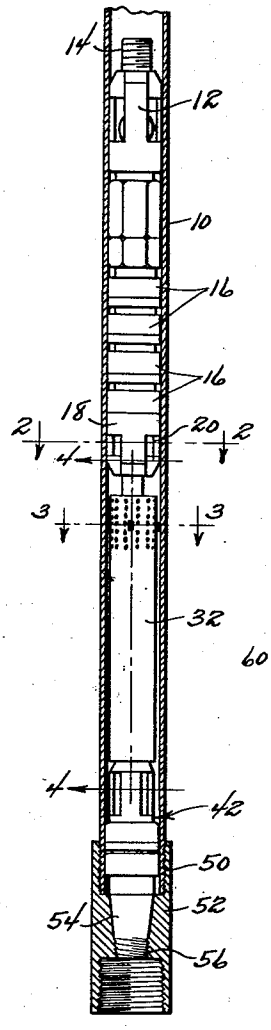


Fig. 2.

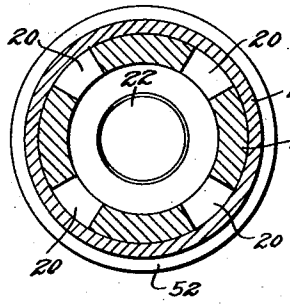


Fig. 3

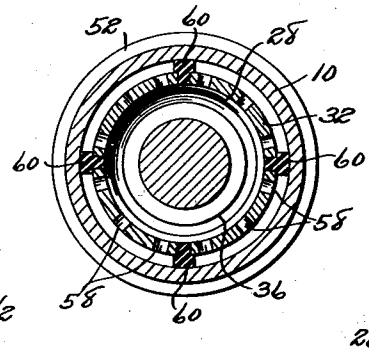
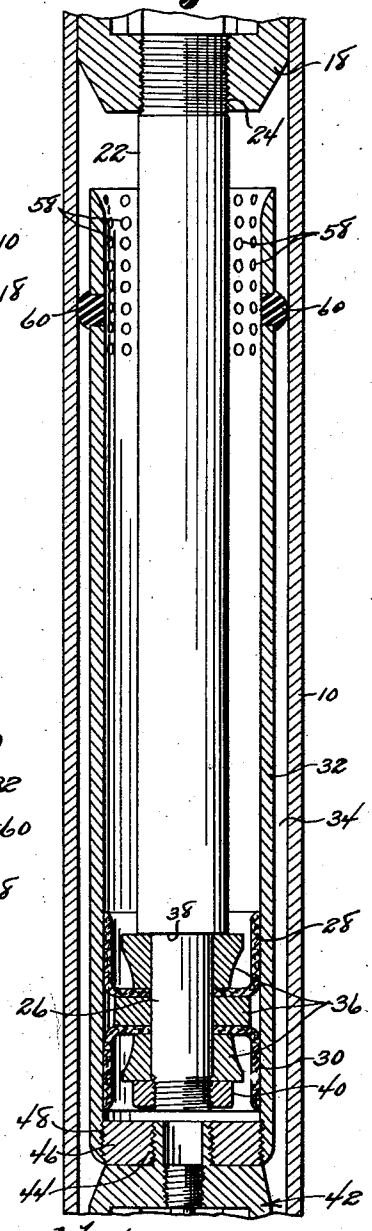


Fig. 4.



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Fig. 5

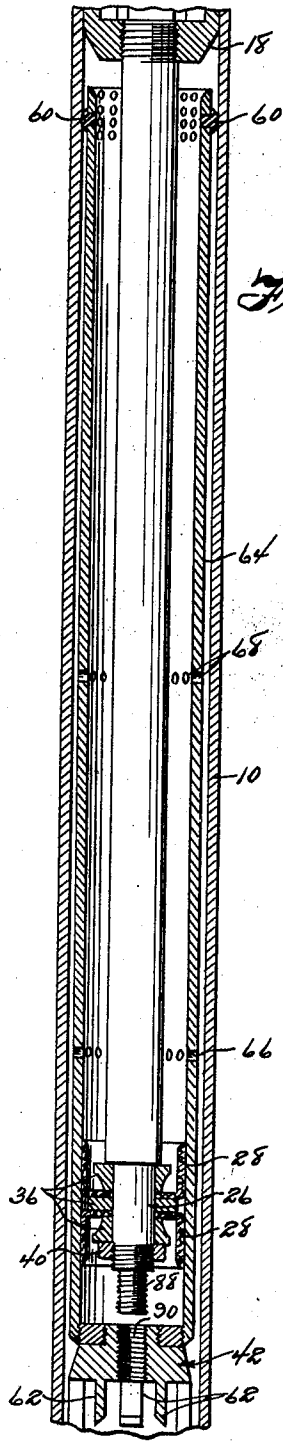
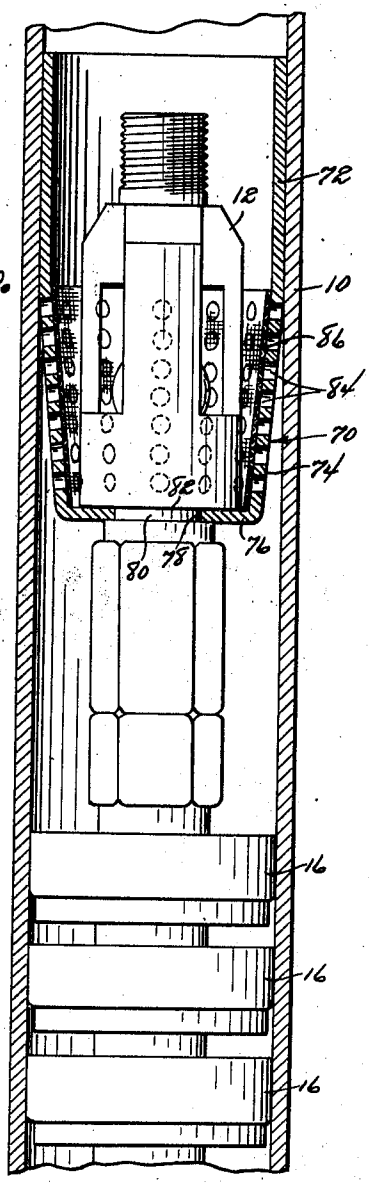


Fig. 6.



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SAND EXTRACTOR FOR OIL WELL PUMPS

Homer R. Pendleton, Tulsa, Okla.

Application January 21, 1942, Serial No. 427,653

10 Claims. (Cl. 103—204)

My invention relates to oil well pumps, and has among its objects and advantages the provision of an improved sand extractor.

In the accompanying drawings:

Figure 1 is a sectional view of a working barrel or pump jacket illustrating my invention incorporated therein;

Figure 2 is an enlarged sectional view along the line 2—2 of Figure 1;

Figure 3 is an enlarged sectional view taken along the line 3—3 of Figure 1;

Figure 4 is an enlarged sectional view taken along the line 4—4 of Figure 1;

Figure 5 is a view similar to Figure 4 but illustrating a slightly different form of construction; and

Figure 6 is a sectional view of a sand strainer associated with the traveling valve cage to prevent sand from falling back on the traveling valve cups.

In the embodiment selected for illustration, Figure 1 illustrates a conventional working barrel or pump jacket 10 provided with a conventional traveling valve cage 12 having a threaded pin 14 for connection with the valve or sucker rod (not shown). The usual fiber cups 16 are associated with the valve cage 12, which cups have engaging fits with the barrel 10. A connection cup 18 is threadedly connected with the cup and traveling valve cage assembly, which connector cup is hollow and slotted at 20 to have communication with the tubular cup and valve cage assembly.

In Figure 4, a tubular plunger rod 22 is threadedly connected at 24 with the cup 18. Plunger rod 22 is provided with an axial shaft 26 at its lower end. Cups 28 and 30 are mounted on the shaft 26 and engage the inner wall of a tubular booster barrel 32 arranged concentrically inside the working barrel 10. Booster barrel 32 is of smaller outside diameter than the inside diameter of the working barrel to provide a space 34 therebetween.

Spacers 36 are mounted on the shaft 26, with one spacer engaging the shoulder 38 on the plunger rod 22, the second spacer being interposed between the two cups 28 and 30, while the third spacer engages the lowermost cup. A nut 40 is threadedly connected with the shaft 26 for clamping the spacers and the cups into a unitary piston structure against the shoulder 38.

The lower valve cage 42 is provided with a threaded neck 44 for connection with a nut or ring 46 externally threaded for threaded connection at 48 with the lower end of the booster barrel 32.

Figure 1 illustrates the working barrel 10 as having threaded connection at 50 with the usual shoe extension 52. The body 54 of the standing valve cage 42 has a left hand thread connection 56 with the extension shoe 52.

The upper end of the booster barrel 32 is perforated, as at 58, and this end of the barrel is maintained in concentric relationship with the working barrel 10 by means of spacers 60 secured to the booster barrel and engaging the inner face of the working barrel.

In operation, the oil well pump is conventional and is operated in the usual manner. The sand extractor is anchored to the standing valve cage 42. An upward stroke of the traveling valve draws oil into the booster barrel 32, in addition to oil which passes to the space 34. On the downward stroke, oil in the booster barrel 32 is forced upwardly in the space 34. Such movement of the oil provides a flushing action about the ball and valve seat of the standing valve cage. Such flushing action removes sand which otherwise collects thereabout. The sand drawn in at each stroke of the pump flows upwardly with the oil through the space 34, thereby permitting the traveling valve to pick up the sand.

The booster barrel 32 in combination with the piston structure of the plunger rod 22 has a tendency to hydraulically open the traveling ball and seat structure if it should become locked with sand, which frequently happens in cases where the well is not pumped for several hours. The present method of unlocking the traveling ball and seat from such a sand condition consists in bumping the traveling valve structure against the standing valve cage. This does not always unlock the valve.

The present invention prevents sand from accumulating in the working barrel between the standing and traveling valves. Sand pumped with the oil is maintained in motion so as to effectively prevent accumulation of interfering sand which impairs the working efficiency of the pump. Such sand remover eliminates the necessity of pulling the well as is necessary in cases where the pump becomes impaired through sand accumulation. The standing valve body is threadedly connected with the shoe extension so as to anchor the standing valve and the sand extractor to the bottom of the pump structure.

Stops 62 are provided in the standing valve cage 42 in the path of the usual ball operating therein. Thus the ball of the standing valve cage

may rise half way in the cage to permit sufficient fluid to be drawn into the booster barrel 32. The perforations 58 in the booster barrel provide outlets which eliminate any accumulation of sand on the top of the plunger structure.

Pump strokes vary. Figure 5 illustrates a booster barrel 64 provided with perforations 66 and 68 at different levels. These levels are so located as to accommodate variable pump strokes to keep the sand from riding on top of the booster barrel piston.

Figure 6 illustrates a sand strainer 70 in association with the valve cage 12. The strainer comprises a sleeve 72 slidably engaging the inner face of the working barrel 10 and having a tapered lower end 74 provided with a bottom 76 having a bore 78 fitting the neck 80 of the traveling valve. Thus the strainer 70 is secured between the shoulder 82 and the lower end of the valve cage.

Perforations 84 are provided in the tapered end 74 and a screen liner 86 is secured inside the tapered end to cover the perforations therein. The strainer 70 prevents the sand from falling back on the traveling valve cups. The perforations 84 and the fine meshed screen 86 permit the oil only to come in contact with the traveling valve cup underneath the valve cage. The strainer is easily secured in position by merely screwing the valve cage in position after placement of the strainer on the neck 80.

Figure 5 illustrates a pin 88 coaxially secured to the lower end of the shaft 26, which pin is provided with right hand threads threadedly receivable in the bore 90 in the standing valve cage 42. Thus the sand extractor and the standing valve may be removed by threading the pin 88 into the bore 90 and rotating the pump rod in a clockwise direction which unscrews the standing valve from the shoe extension 52 by reason of the left hand thread connection between the standing valve body 54 and the shoe extension.

Without further elaboration, the foregoing will so fully illustrate my invention, that others may, by applying current knowledge, readily adapt the same for use under various conditions of service.

I claim:

1. In an oil well pump, the combination of a working barrel provided with a traveling valve and a standing valve, a booster barrel secured to said standing valve, said booster barrel being of smaller outside diameter than the inner diameter of said working barrel to provide an oil passage therebetween and having an open upper end located beneath said traveling valve and a lower end flushingly communicating with said standing valve, and a piston slidable in said booster barrel and operatively attached to said traveling valve.

2. The invention described in claim 1 wherein there is provided a shoe extension on said working barrel for threaded connection with said standing valve, and a connector carried by said piston for threaded connection with said standing valve to turn the latter and threadedly disconnect the same from said shoe extension.

3. The invention described in claim 1 wherein said traveling valve is provided with a sand strainer.

4. The invention described in claim 1 wherein said booster barrel is threadedly connected at its lower end with said standing valve and in which the upper end of the booster barrel is provided with spacers engaging said working barrel.

5. The invention described in claim 1 wherein said booster barrel is provided with perforations located in vertically spaced planes about said piston providing sand and oil outlets above the piston at variable strokes thereof.

6. The invention described in claim 1 wherein said booster barrel is provided with perforations in its upper end margin.

7. The invention described in claim 1 wherein said standing valve includes a valve cage, and a threaded connection between the valve cage and the lower end of the booster barrel.

8. The invention described in claim 1 wherein said standing valve is provided with a valve cage communicating with said booster barrel, and in which said valve cage is provided with stops for a ball valve operating therein to maintain communication between the valve cage and the booster barrel in the open position of the ball valve.

9. The invention described in claim 1 wherein a plunger rod is attached to said piston, and a connection cup having a threaded connection with said traveling valve and a threaded and pin connection with said plunger rod, said connection cup having communication with said working barrel and said traveling valve.

10. In an oil well pump, the combination of a working barrel, a traveling valve in said working barrel, said traveling valve including a valve cage and a connection cup placing the working barrel in communication with the valve cage, a standing valve including a valve cage and a valve body, a shoe extension connected with said working barrel, said standing valve having a valve body provided with a left hand threaded connection with said shoe extension, a booster barrel secured to said valve cage and spaced from the working barrel to provide an oil passage therebetween, said booster barrel having flushing communication with said second-mentioned valve cage, a plunger rod secured to said connection cup, and a piston secured to said plunger rod and slidable inside said booster barrel, said booster barrel being provided with perforations located above the piston therein and having spacers engaging the working barrel.

HOMER R. PENDLETON.