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2,583,111

VALVED PISTON FOR DEEP-WELL LIFT PUMPS

Filed April 4, 1949

2 SHEETS—SHEET 1

Fig. 1.

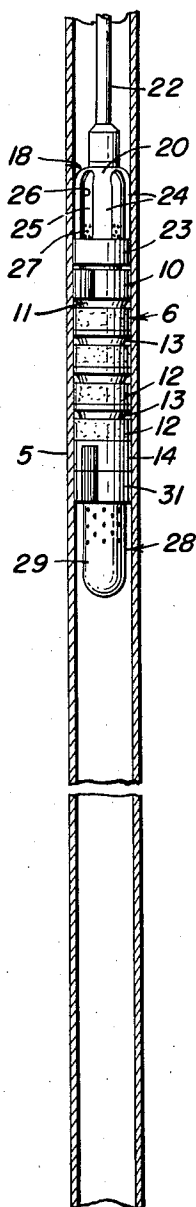
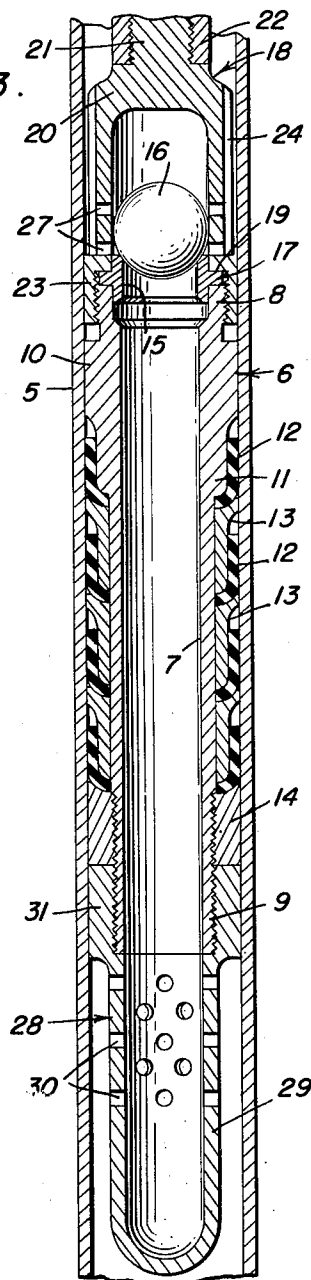


Fig. 3.



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2 SHEETS—SHEET 2

Fig. 2.

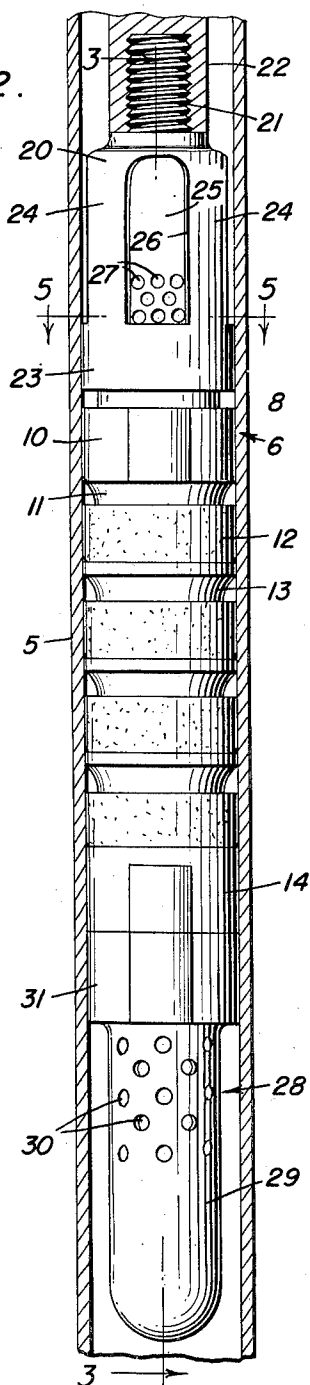


Fig. 4.

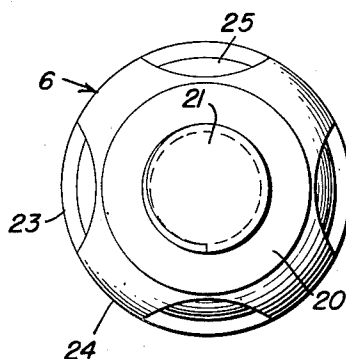
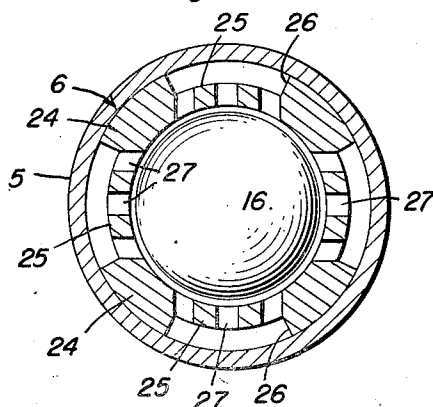


Fig. 5.



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UNITED STATES PATENT OFFICE

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VALVED PISTON FOR DEEP-WELL LIFT PUMPS

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Application April 4, 1949, Serial No. 85,306

2 Claims. (Cl. 103—225)

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This invention relates to deep-well lift pumps of the type commonly employed for pumping oil, and including a valved piston reciprocable in the well tubing by means including a sucker rod connected at its lower end to the upper end of the piston.

More particularly, the present invention relates to a novel valved piston or traveling valve for pumps of the above kind, and the primary object of the present invention is to provide such a piston which is highly efficient in use, and which includes means for effectively keeping the same clear of packing cup fragments and other fragmentary foreign material large enough to materially interfere with efficient action of the valve thereof.

The exact nature of the present invention will become apparent from the following description, when considered in connection with the accompanying drawings, in which:

Figure 1 is a view showing my improved piston within a well tubing, a fragment of the tubing being shown in vertical section, and the piston being in elevation.

Figure 2 is an enlarged view thereof partly broken away and in section.

Figure 3 is a vertical section taken on the line 3—3 of Figure 2.

Figure 4 is a top plan view of the piston; and

Figure 5 is an enlarged horizontal section taken on the line 5—5 of Figure 2.

Referring in detail to the drawings, the numeral 5 designates the well tubing and 6 designates the present piston reciprocable in said tubing.

The piston 6 includes a tubular member 7 having externally threaded upper and lower ends 8 and 9, and provided near its upper end with an enlarged portion 10 whose reduced lower part 11 forms a seat for the upper one of a plurality of packing cups 12 which are disposed on the outside of the member 7, with interposed spacers or followers 13, the cups and spacers being held in compacted relation on member 7 by a nut 14 screwed onto the upper part of the lower end 9 of said member 7, directly beneath and against the lower one of said cups. A removable valve seat member 15 for a ball valve 16 has its lower portion fitted in the upper end of member 7 and its intermediate external flange 17 seated on the upper end edge thereof.

A cage 18 for a ball valve 16 has its lower end screwed on to the upper end 8 of member 7, and is provided near its lower end with an internal shoulder 19 to engage the flange 17 of seat mem-

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ber 15 and clamp it against the upper end edge of said member 7. The cage 18 includes a cap portion 20 provided with a threaded stem 21 for connection with the lower end of a sucker rod 22, a lower annular portion 23, uniformly spaced bars 24 integrally connecting the cap and lower portions 20 and 23, and webs 25 between adjacent ones of the bars 24. The webs 25 are relatively thin and disposed to leave external recesses 26 in the cage between the bars 24, and they are provided in their lower portions with numerous restricted or small perforations 27 that freely permit escape of oil from the cap but effectively prevent entrance of packing cup fragments and other fragmentary foreign material therein that would interfere with proper action or seating of valve 16. The lowermost perforations 27 are located directly at the top of seat 15 to permit escape of fine sand or small foreign material that might enter the piston and accumulate in the cage so as to interfere with proper seating of valve 16 or cause damaging action on the latter and seat 15.

A screen 28 is attached to the lower end of member 7 to prevent entrance of relatively large packing cup fragments or other material into the piston which might interfere with proper action of valve 16. This screen consists of a tube 29 having its lower end closed and provided with numerous restricted or small perforations 30 in its upper portion only, said tube having an integral nut 31 on its upper end which is screwed onto the lower part of the lower end 9 of member 7 and jammed against the nut 14 to lock the latter against loosening or unscrewing. By having the perforations only in the upper portion of the tube 29, many foreign particles which do not rise above the lower portion of said tube will be excluded from the interior of the piston.

When the pump is in operation, the piston is reciprocated up and down in the barrel or tubing, the oil entering the piston on its down strokes through perforations 30, passing upwardly into the cage 18 by unseating the valve 16, and flowing from the cage 18 through perforations 27 into the barrel or tubing above the piston. On the upstroke of the piston, valve 16 will seat to prevent entrance of oil into cage 18 through the perforations 27, thereby causing the oil above the piston to be lifted and discharged from the well at the surface.

From the foregoing description, it is believed that the construction, operation and advantages of the present invention will be readily under-

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stood and appreciated by those skilled in the art. The piston is especially valuable for use in connection with wells which are not continuously pumped and are known as "stripper" wells in which the output of the well is limited and large particles are often encountered in the oil.

Having described the invention, what is claimed as new is:

1. In a deep-well lift pump, a valved piston comprising a tubular member having open and externally threaded upper and lower ends, and provided near its upper end with an enlarged portion having a reduced lower part forming a seat for a packing cup, a plurality of packing cups disposed on the outside of said tubular member, the upper one of said cups being engaged with said seat, a plurality of spacers disposed on said tubular member and spacing said cups, a nut screwed on to the upper part of the lower end of said tubular member against the lower one of said cups and holding the cups and spacers thereon in compacted relation, a second nut screwed onto the lower part of the lower end of said tubular member and jammed against the first named nut, a cage having its lower end screwed onto the upper end of said tubular member and provided near its lower end with an internal shoulder, a ball valve in said cage, and a seat member for said ball valve having its lower portion fitted in the upper end of said tubular member and provided with an external flange clamped between

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the upper end edge of said tubular member and the internal shoulder of the cage, said cage comprising a cap portion provided with means to connect same to a sucker rod, a lower annular portion, uniformly spaced bars connecting the cap and lower portions, and webs between the bars having perforations in their lower portions, said webs being relatively thin and disposed to provide external recesses in the cage between the bars.

2. The construction defined in claim 1, in combination with a screen on the lower end of said tubular member including a tube integrally connected at its upper end with the second nut and provided with perforations in its upper portion.

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