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3,046,904

TOP LOADING FLUID PUMP

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2 Sheets-Sheet 1

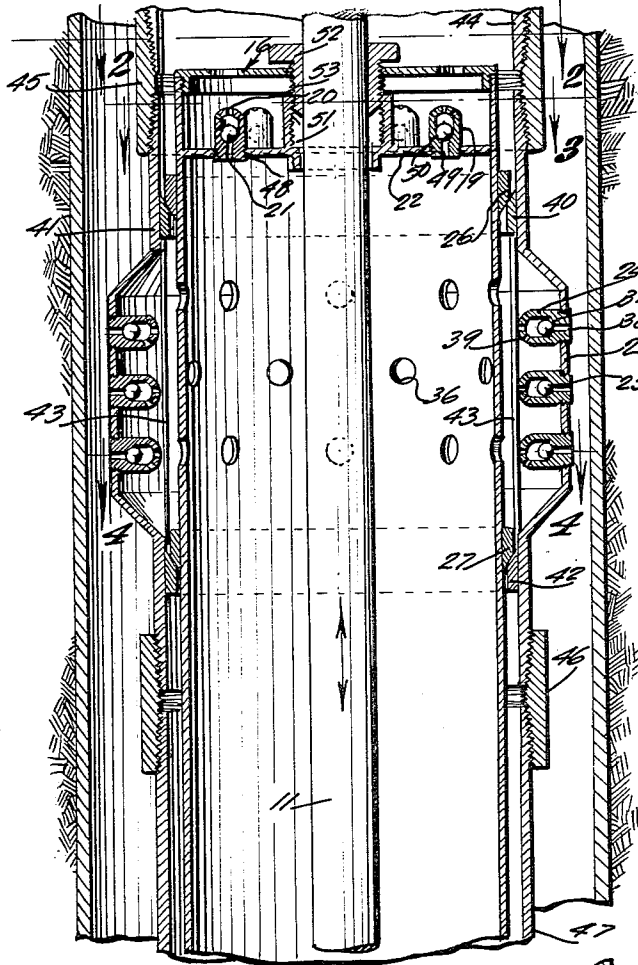
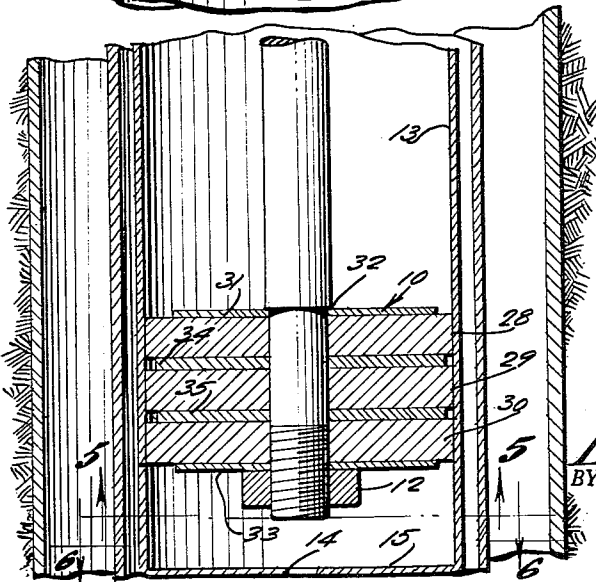


Fig. 1



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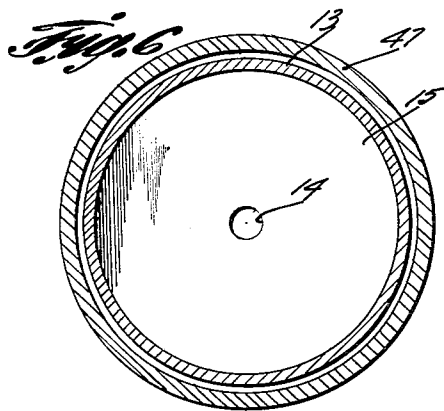
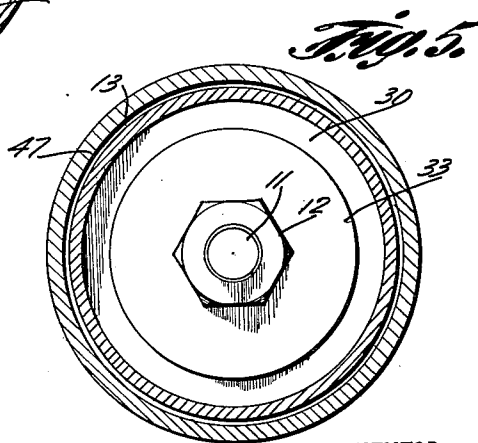
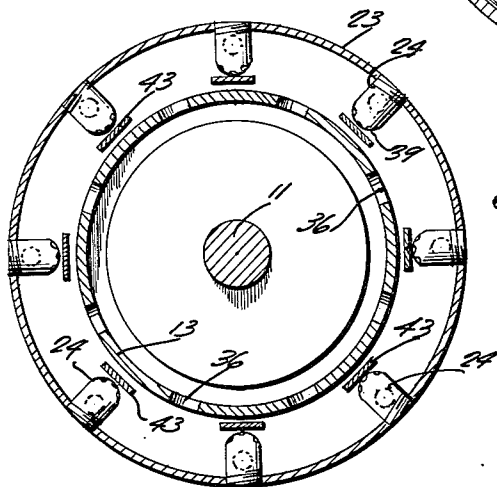
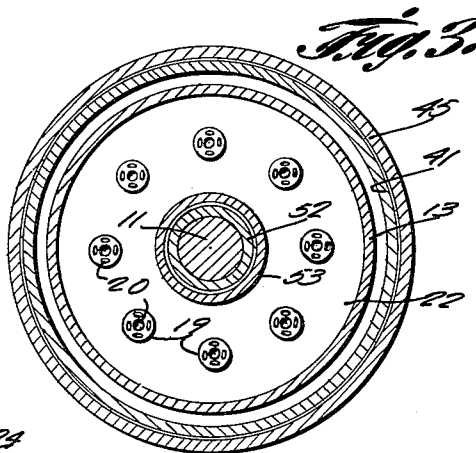
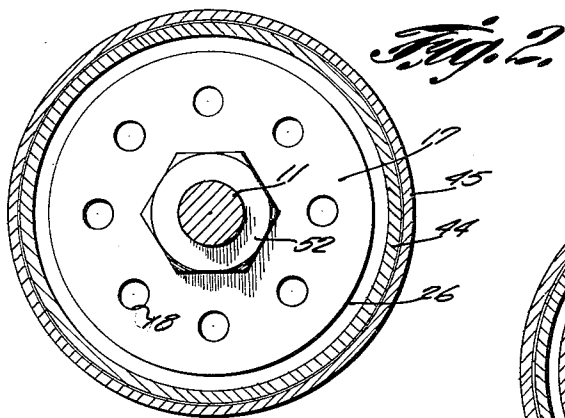
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2 Sheets-Sheet 2



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3,046,904
TOP LOADING FLUID PUMP
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This invention relates to pumps in well strings or casings, and in particular a pump having a piston or a sucker rod in a pump barrel with an outlet valve at the upper end of the barrel and with a perforated nipple having check valves therein positioned in a well string between the pump barrel and well casing and in registering relation with perforations in the pump barrel whereby upon upward movement of the piston on the piston rod the outlet valve opens permitting fluid to pass upwardly with valves of the perforated nipple closed and upon downward movement of the piston the valves of the outlet valve close with valves of the perforated nipple open whereby fluid is drawn from the well casing into the pump barrel.

The purpose of this invention is to provide a top loading fluid pump which, with the outlet valve at the top is more efficient than conventional pumps and which will not gas lock or pound fluid to crystalize sucker rods.

Various types of pumps have been provided for well casings and although such pumps are considered efficient conventional pumps of this type operate with a downward push on the fluid making it necessary for the fluid to pass downwardly and then upwardly through the well string.

Such pumps require considerable power and exert excessive strains in the pump elements. With this thought in mind this invention contemplates a pump in which the action is reversed whereby the piston forces fluid upwardly providing a direct circulating path through an outlet valve in the upper end of the pump barrel and by this means the force required to operate the pump is reduced.

The object of this invention is, therefore, to provide a well pump that is loaded from the upper end.

Another object of the invention is to provide a well pump that loads from the upper end on top of the piston so that the pump will not gas lock.

A further object of the invention is to provide a well pump in which the outlet valve is positioned at the top with the result that the efficiency of the pump is increased.

A still further object of the invention is to provide a top loading well pump in which the pumping elements do not pound fluid to crystalize sucker rods.

And a still further object is to provide a well pump that pulls easy and that is of a simple and economical construction.

With these and other objects and advantages in view the invention embodies an outer well casing, a well string having a perforated nipple extended around the upper end positioned in the well casing, a pump barrel having an outlet valve on the upper end positioned in the well string and a piston having a piston rod connected to a sucker rod of the pump extended through the outlet valve and upper end of the pump barrel.

Other features and advantages of the invention will appear from the following description taken in connection with the drawings, wherein:

FIGURE 1 is a vertical section through the improved pump assembly with intermediate parts of the elements broken away.

FIGURE 2 is a sectional plan through the upper part of the pump assembly taken on line 2—2 of FIGURE 1 showing, in particular, perforations of the outlet valve in the upper end of the pump valve.

FIGURE 3 is a sectional plan taken on line 3—3 of FIGURE 1 showing the valve sealing cages in the upper end of the pump valve.

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FIGURE 4 is a sectional plan taken on line 4—4 of FIGURE 1 showing the valves of the perforated nipple.

FIGURE 5 is a cross-section taken on line 5—5 of FIGURE 1 looking upwardly toward the lower end of the piston.

FIGURE 6 is a sectional plan taken on line 6—6 of FIGURE 1 showing the vent in the lower end of the pump valve.

Referring now to the drawings wherein like reference characters denote corresponding parts the improved top loading well pump of this invention includes a piston 10 secured on the lower end of a piston or sucker rod 11 by a nut 12, a pump barrel 13 having a vent 14 in a lower end 15 thereof, an outlet valve assembly 16 positioned in the upper end of the pump barrel and including a disc 17 having perforations 18 therein, valve cages 19 having perforations 20 in upper ends thereof and sealing balls 21 therein positioned in a disc 22 in the upper end of the pump barrel, and a perforated nipple 23 having valve cages 24 with sealing balls 25 therein positioned between an upper seal ring 26 on the outer surface of the pump barrel and a lower seal ring 27 also on the outer surface of the pump barrel and positioned below the perforated sleeve.

The piston 10 includes cup pump washers 28, 29 and 30 positioned between an upper washer 31 retained against a shoulder 32 of the piston rod and a lower washer 33 positioned under the nut 12. The piston also includes intermediate washers 34 and 35 positioned between the discs, as shown.

The upper end of the pump barrel is provided with perforations 36 that are positioned in registering relation with the valve cages 24 whereby with downward movement of the piston fluid is drawn inwardly, moving the balls 25 away from seats 37 of the valve cages 24 so that fluid is drawn inwardly through openings 38 in the base portions of the valve cages and also through perforations 39 in the arcuate ends of the cages. From the perforations 39 the fluid passes through the perforations 36 of the pump barrel whereby the pump barrel is filled with fluid.

The upper seal ring 26 is positioned to co-act with a seal ring 40 on the inner surface of the section 41 of the well string and the seal ring 27 is positioned to co-act with a similar ring 42 also positioned on the inner surface of the well string 41. The seal rings 26 and 27 and the co-acting rings 40 and 42 are provided with beveled meeting surfaces. The perforated nipple 23 is provided with reinforcing straps 43 that extend from the seal ring 42 upwardly to the seal ring 40.

The well string 41 is secured to the lower end of a well string unit 44 by a coupling 45 and the lower end of the string 41 is connected by a coupling 46 to the upper end of a string 47.

The valve cages 19 of the outlet valve are threaded in openings 48 of the disc 22 and the base portions of the valves are provided with openings 49 at the upper ends of which are valve seats 50 upon which the balls 21 are seated in the downward movement of the piston 10.

The outlet valve is provided with a packing gland 51 and a packing nut 52, which extends through the disc 17 is threaded in the upper end of a hub 53 of the disc 22.

With the parts assembled as illustrated and described and with the piston rod 11 connected to a conventional sucker rod the piston is reciprocated in the pump barrel 13 and in upward movement of the piston the balls 21 of the valve cages 19 are unseated permitting fluid to flow through the openings 49 and perforations 20 into the outlet valve and through the perforations 18 of the disc 17 into the well string whereby the fluid is forced upwardly. In the return movement of the piston the sealing balls 21

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are seated on the valve seats 50 closing the openings 49 and the balls 25 are unseated from the seats 37 permitting fluid to pass inwardly through the openings 38 and perforations 39 and from the perforations into the chamber within the perforated nipple from which the fluid passes through the perforations 36 into the pump barrel with downward movement of the piston.

By this means, and with the outlet valve at the top, the fluid is pushed upwardly by the upper end of the piston 10 providing a direct upward thrust so that fluid in the area around the well string is drawn into the pump barrel and ejected from the upper end of the pump barrel upon reciprocation of the piston.

Upon downward movement of the piston fluid trapped in the area between the lower end of the piston and lower end of the pump valve is forced outwardly through the vent 14 whereby such fluid thoroughly washes and cleans the lower end of the well string.

The ball and sealers in the outlet valve will be as large as possible to give a more free flow of the fluid, thus relieving all pressure possible on the pump piston.

It will be understood that modifications, within the scope of the appended claims, may be made in the design and arrangement of the parts without departing from the spirit of the invention.

What is claimed is:

1. A top loaded pump for a well casing comprising a pump barrel having an outlet opening in the lower end and perforations spaced downwardly from the upper end, an outlet valve positioned in the upper end of the pump barrel, a piston in the pump barrel, a piston rod extended from the piston through said outlet valve, a well string positioned around the pump barrel, a perforated nipple

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carried by the well string and having check valves therein and seal rings between the pump barrel and well string and positioned above and below the perforated nipple, and said perforated nipple being positioned in registering relation with the perforations in the pump barrel.

2. In a top loaded well pump, the combination which comprises an outer well string, an inner well string, a pump barrel positioned in the inner well string and having a vent in the lower end, said pump barrel having perforations spaced downwardly from the upper end thereof, an outlet valve including check valves mounted in the upper end of the pump barrel, said check valves permitting fluid to flow upwardly from the pump barrel and preventing fluid to return downwardly into the pump barrel, a piston positioned to reciprocate in said pump barrel, a piston rod extended from the piston through the outlet valve, a perforated nipple mounted in the inner well string and positioned in aligned registering relation with perforations in the upper part of the pump barrel, check valves in the nipple and positioned to permit fluid to be drawn into the pump barrel with downward movement of the piston and to prevent outward passage of fluid with upward movement of the piston, and seal rings positioned between the pump barrel and inner well string and above and below said perforated nipple.

References Cited in the file of this patent

UNITED STATES PATENTS

30	38,157	Elliott	Apr. 14, 1863
	251,256	Lewis	Dec. 20, 1881
	1,025,878	Martin	May 7, 1912
	1,200,746	Martin	Oct. 10, 1916