W. J. COULSON.

PLUNGER FOR DEEP WELL PUMPS.

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1,337,593.

Patented Apr. 20, 1920.

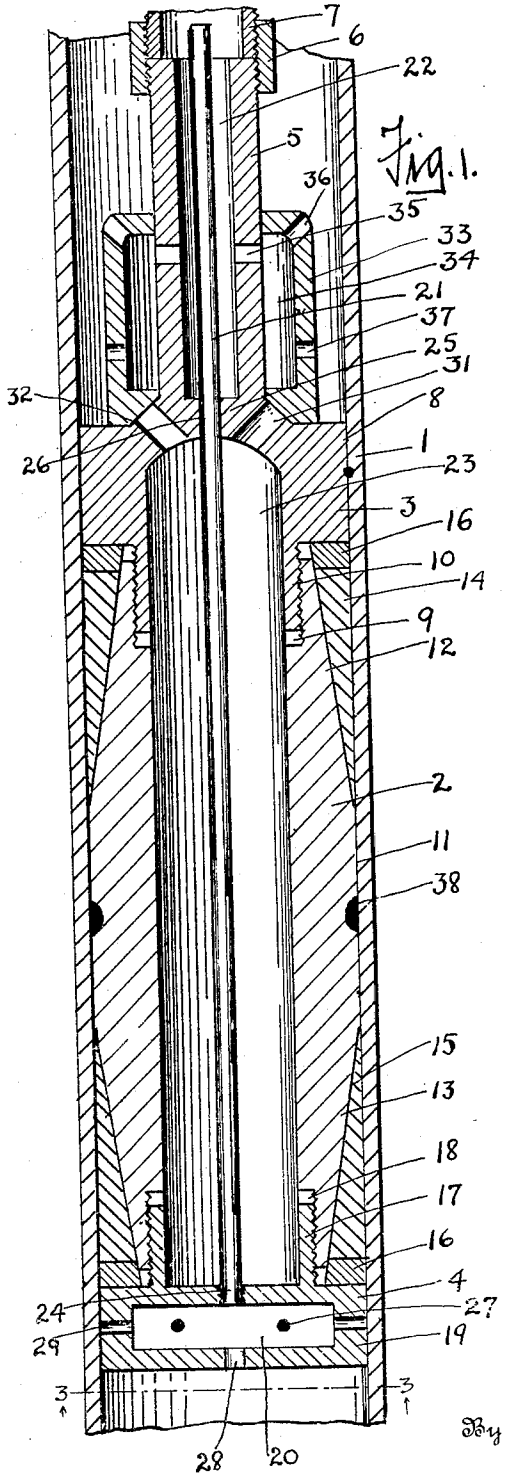



Fig. 1.

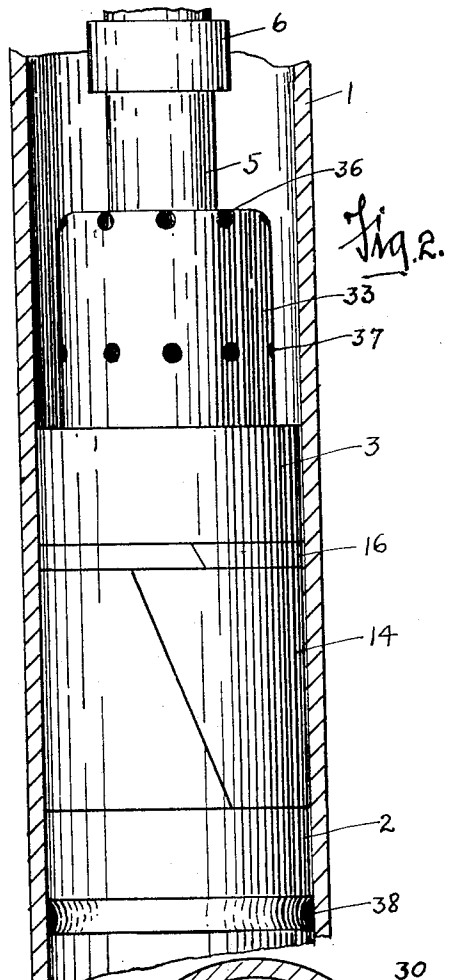



Fig. 2.

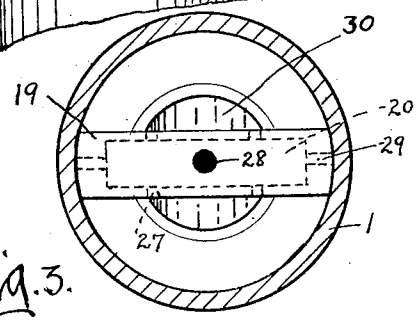



Fig. 3.

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# UNITED STATES PATENT OFFICE.

WILLIAM J. COULSON, OF HOUSTON, TEXAS.

## PLUNGER FOR DEEP-WELL PUMPS.

1,337,593. Specification of Letters Patent. Patented Apr. 20, 1920.

Application filed August 12, 1919. Serial No. 317,051.

*To all whom it may concern:*

Be it known that I, WILLIAM J. COULSON, a citizen of the United States, residing at Houston, Harris county, Texas, have invented a certain new and useful Improvement in Plungers for Deep-Well Pumps, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in plungers for deep well pumps to be used especially in deep wells where the fluid, such as oil or water, is accompanied by quantities of sand or sediment which tend to rapidly wear the plunger and clog the valves thereof in such manner as to cause the frequent removal and repair of the working parts.

The object of my invention is to provide a plunger which may be automatically adjusted to take up wear which may occur due to the sand, and to provide a means for flushing the valves of the plunger and working barrel so as to prevent the clogging of the sand and sediment about the valves and plunger in such manner as to prevent their operation. For a more detailed statement of my invention reference is made to the drawings forming a part of this specification and wherein like numerals of reference are applied to like parts throughout the several views. Figure 1 is a central longitudinal section through a pump plunger and working barrel showing an embodiment of my invention. Fig. 2 is a broken side elevation of the same, and Fig. 3 is a bottom plan view showing the working barrel in section on the plane 3—3 of Fig. 1.

In the drawing I have illustrated my improved plunger seated within a working barrel 1 of a pump. The plunger comprises three sections or parts, there being a central section 2, an upper section 3, and a lower section 4. The upper section 3 has a cylindrical outer surface at 8 and a reduced upwardly extending shank 5 thereon, the shank 5 being threaded at its upper end for attachment by means of a coupling 6 to a hollow sucker rod 7. This section is also provided with a downwardly extending hollow nipple 10 threaded for attachment within the recess 9 in the upper end of the central section 2.

The section 2 is a tubular member cylindrical on its central portion 11 and tapered smoothly at the upper end, as shown at 12, and also at the lower end 13 to provide seats for expanding collars 14 and 15, respectively, said collars being adapted to expand and take up wear which may occur in the operation of the pump. These collars are wedge shaped in cross section, as shown in Fig. 1, and are adapted to be expanded by being forced toward the central portion of the central section. This is accomplished in the case of the upper collar 14 by placing between the upper end thereof and the lower face of the section 3 a split ring 16, which is beveled on its inner face to seat upon the tapered surface 12. When the collar is in its normal position when first placed in the well, the section 3 is not screwed completely down into the recess 9 in the upper end of section 3 thereby making it possible to screw these sections together when desired so as to force the expanding collar downwardly upon the tapered surface on which it is seated.

The lower collar 15 is expanded in the same manner as is the upper collar, having adjacent to it a split ring 16, which is adapted to be forced upwardly against the collar and move it outwardly into contact with the working barrel 1. This is accomplished in the case of the lower collar by means of the lower section 4 which comprises a tubular threaded nipple 17 formed to be threaded within the recess 18 at the lower end of the central section 2. The lower portion of the section 4 comprises a cross member 19 which extends diametrically across the lower end of the plunger and contacts at each end thereof with the working barrel. The cross member 19 is hollowed out interiorly thereof to provide a central chamber 20 to receive the flushing fluid with which to stir up the sand or sediment about the lower end of the plunger and about the foot valve.

Water or other flushing fluid is conducted into the chamber 20 by means of a small central pipe 21, which extends downwardly from the lower end of the sucker rod 7 through the passage 22 in the shank 5 and the enlarged channel 23 in the plunger and is threaded at 24 within an opening in the lower end of the chamber 20. The passage 22 in the shank 5 of the plunger terminates adjacent the lower end of the said shank, and the wall 25, separating the lower end of this passage from the upper end of the

channel 23, is bored at 26 with an opening through which the tube 21 fits snugly. Water or other flushing fluid which is pumped through the hollow sucker rod will find a partial exit through the pipe 21 which will conduct the fluid downwardly to the chamber 20, from which it is sprayed or spurted outwardly against the sides of the working barrel and also against the foot valve. Side passages or ducts 27 are provided on the sides of the chamber by means of which the fluid is projected against the walls of the working barrel. A lower duct 28 serves to project a downward stream against the foot valve in the lower end of the working barrel and stir up the sand and sediment about the same, and passages 29 also allow an exit of part of the flushing material against the sides of the working barrel in such position as to keep the same flushed with fluid at all times.

The fluid being pumped by the action of this plunger enters the central channel 23 therein through the openings 30 on each side of the cross member 19 at the lower end thereof and discharges upwardly through laterally branching passages 31 at the upper end of the said channel. The upper face of the section 3 is beveled at 32 adjacent the central shank 5 and through this beveled surface the passages 31 find an outlet.

These passages 31 are closed on the upward stroke of the plunger by means of a ring valve 33 which fits snugly about the shank 5 of the plunger and is held by gravity upon its seat. This ring valve 33 is hollowed out on its inner face to provide an annular chamber 34 into which water or other fluid is forced from the hollow interior 22 of the shank through lateral passages 35. The fluid thus entering the chamber is discharged around the ring valve through a series of upwardly inclined ducts 36 and another series of lateral ducts 37. The water thus discharged about the ring valve causes an eddying of the currents of fluid within the working barrel and prevents the sand or sediment which might be in the fluid being pumped from settling about the valve and around the plunger in such manner as to impede its action and to cause excessive wear.

Midway of the central section 2, on the cylindrical portion thereof, I have provided an annular groove 38 which is intended to act to carry the water and other lubricant against the side of the working barrel and which may, in some instances, collect any sand or sediment which may force its way upwardly around the plunger and between the same and the working barrel.

While the details of the expanding collars 14 and 15 upon my plunger are new, they form no part of the present invention but are included within the claims of my co-pending application filed July 29, 1919, Serial No. 314,151. The specific details of the means by which the valves and plunger are kept free of sand, however, are thought to be new and form the subject of my present invention.

In the operation of my improved plunger the downward stroke of the plunger will force the oil or other fluid being pumped upwardly through the channel 23 and the passages 31 and cause the lifting of the valve 33 filling the working barrel above the plunger with the fluid. On the upward stroke the ring valve 33 will seat over the openings 31 and the fluid being pumped will be raised upwardly toward the surface. During this operation a current of flushing fluid will be pumped downwardly through the hollow sucker rod and through the branching ducts 35 to keep the upper valve ring 33 constantly flushed with laterally directed currents of water. A portion of the flushing fluid will also be forced downwardly through the pipe 21 and be discharged or sprayed from the chamber 20 against the sides of the working barrel and also directed downwardly against the foot valve, thus also keeping sand from lodging below the plunger.

It is contemplated that there shall be at the upper end of the foot valve, or adjacent thereto, a slot formed, into which the projecting spraying member 19 may fit. Thus when the collars upon the plunger become worn by the sand and sediment in the fluid being pumped the lower end of the plunger may be dropped into the recess thus provided and the rotation of the sucker rod will serve to thread the upper section 3 downwardly within the section 2 of the plunger and expand the upper ring 14. The lower section 4 will also be threaded upwardly within the lower end of the plunger 2 to expand the lower collars. The expansion of the two collars may be simultaneous or it may be that but one of them will expand at a time, but it is plain that both collars will be eventually expanded so as to keep the plunger constantly in snug contact with the inner face of the working barrel as is necessary in the pumping operation.

Having thus described my invention, what I claim as new and desire to protect by Letters Patent is:

1. In a pump, the combination of a working barrel, a plunger reciprocable therein, means to prevent the lodging of sand or sediment about the said plunger comprising a hollow sucker rod, a pipe connected therewith, a flushing chamber at the lower end of said plunger connected with said pipe and adapted to spray flushing fluid against the working barrel and the foot valve of the pump.

2. In a pump, the combination of a working barrel, a plunger reciprocable therein, a hollow sucker rod on said plunger, a central channel in said plunger, a ring valve closing the outlets from the upper end of said chamber, said ring valve having an interior chamber and passages to conduct fluid from said sucker rod to said chamber and passages to discharge the same laterally and upwardly against the working barrel.

3. In a pump, the combination of a working barrel, a plunger reciprocable therein, a hollow sucker rod on said plunger, an interior passage through said plunger, a chamber in the lower end of said plunger, a pipe connecting said sucker rod and said chamber and means to discharge fluid from said chamber to flush the sand and sediment from the working parts of the pump.

4. In a pump, the combination of a working barrel, a plunger reciprocable therein, means to take up wear between the plunger and the working barrel, a ring valve at the upper end of said plunger, means to flush the sand from about said ring valve and means to flush the sand from the space below said plunger.

5. In a pump, the combination of a working barrel, a plunger therein, a hollow sucker rod on said plunger, a spraying member on the lower end of said plunger comprising a nipple threaded within the lower end thereof, a longitudinal chamber on said nipple, passages leading from said chamber in lateral and downward directions and means connecting said sucker rod and said chamber to furnish flushing fluid to said chamber.

6. In a pump, the combination of a working barrel, a plunger therein, a ring valve at the upper end thereof, a chamber at the lower end thereof and means to discharge a flushing fluid around said valve and from said chamber.

7. In a pump, the combination of a working barrel and a plunger reciprocable therein, said plunger having a central fluid passage therethrough, a valve closing the upper outlet of said passage, means to flush said valve and means to project flushing fluid from the lower end of said plunger during operation thereof.

In testimony whereof, I hereunto affix my signature this the 7th day of August, A. D., 1919.

WILLIAM J. COULSON.