W. J. COULSON.

VALVE FLUSHING MEANS.

APPLICATION FILED AUG. 12, 1919.

1,338,907.

Patented May 4, 1920.

2 SHEETS—SHEET 1.

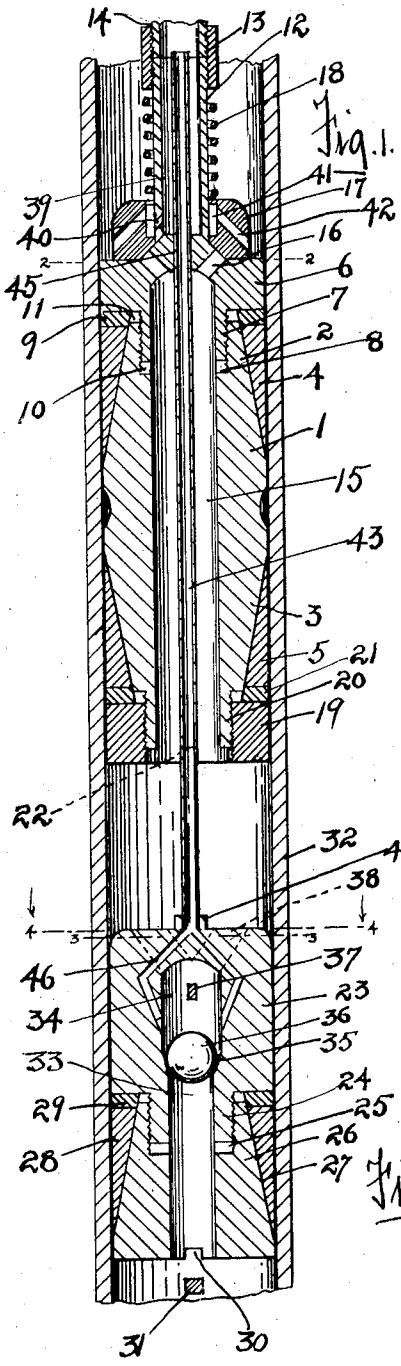


Fig. 1.

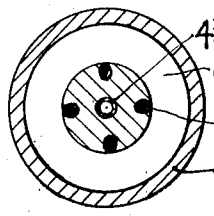


Fig. 2.

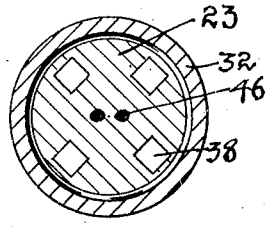


Fig. 3.

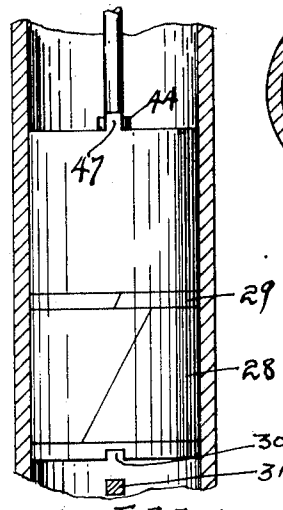


Fig. 5.

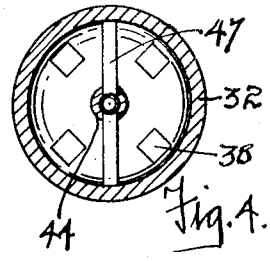


Fig. 4.

W. J. COULSON, Inventor

By Jesse R. Stone

Attorney

W. J. COULSON.

VALVE FLUSHING MEANS.

APPLICATION FILED AUG. 12, 1919.

1,338,907.

Patented May 4, 1920.

2 SHEETS—SHEET 2.

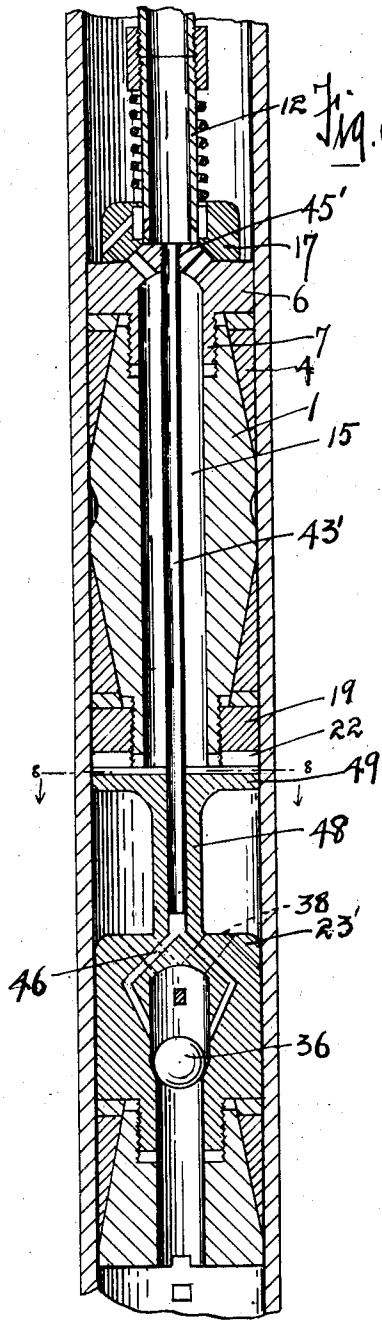


Fig. 6.

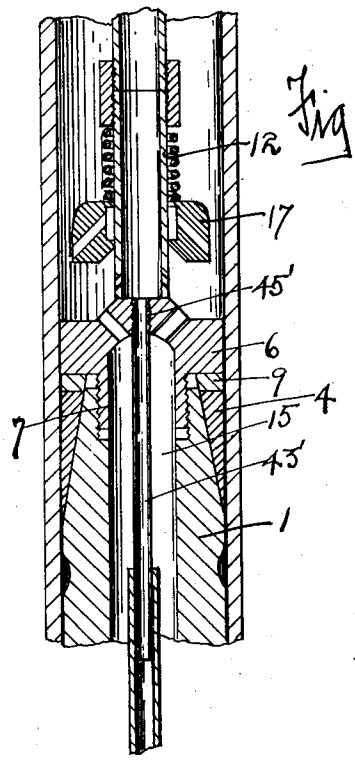


Fig. 7.

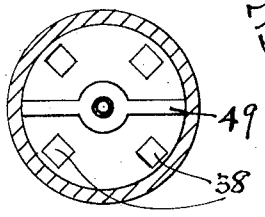


Fig. 8.

W. J. COULSON, Inventor

By Jesse R. Stone

Attorney

UNITED STATES PATENT OFFICE.

WILLIAM J. CCULSON, OF HOUSTON, TEXAS.

VALVE-FLUSHING MEANS.

1,338,907. Specification of Letters Patent. Patented May 4, 1920.

Application filed August 12, 1919. Serial No. 317,050.

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 Valve-Flushing Means, 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 means for maintaining the foot valve in reciprocating pumps free of sand or sediment which would otherwise tend to pack around the valve and clog its action.

In pumping oil, or other fluid from deep wells, large quantities of sand and sediment are frequently mixed with the oil to such an extent that in the operation of the pump, the valves are packed about with the sand so as to prevent the free movement thereof and in many cases to prevent the action of the pump entirely until the working parts have been removed from the well and cleaned.

An object of my invention is to provide a means for directing a current of water, steam or other fluid downwardly against the valve in such manner as to keep the same clear of sand.

Another object is to provide a foot valve for pumps which may be anchored at any point within the barrel of the pump by the simple rotation of the valve chamber within the pump barrel. Other objects and advantages will more clearly appear in the description which follows and will also be set forth more particularly in the claims.

For a more specific description of my invention attention is called to the drawing forming a part of this specification and wherein like numerals are applied to like parts throughout the several views. Figure 1 is a central longitudinal section through my improved valve flushing means shown located within a pump barrel. Fig. 2 is a transverse section on the plane 2—2 of Fig. 1. Fig. 3 is a transverse section on the plane 3—3 of Fig. 1. Fig. 4 is a similar section on the plane 4—4 of Fig. 1. Fig. 5 is a sectional view of the pump barrel showing my foot valve therein in elevation. Fig. 6 is a longitudinal section showing a different embodiment of my invention. Fig. 7 shows a slight modification of the embodiment disclosed in Fig. 6. Fig. 8 is a transverse section on the plane 8—8 of Fig. 6.

In Fig. 1, I have disclosed my invention shown in connection with the pump plunger such as is disclosed in my co-pending application filed July 29, 1919, Serial No. 314,151. The plunger consists of a central section 1 having tapered upper and lower ends 2 and 3 respectively on which are adapted to be seated the expanding collars 4 and 5, these collars being wedge-shaped in cross section, as shown in Fig. 1. An upper cylindrical section 6 is provided with a downwardly extending threaded nipple 7, which is adapted to be threaded within a recess 8 within the upper end of the section 1. Between the lower face of the section 6 and the expanding collar 4 is positioned an expanding ring 9, tapered on its inner face to slide upon the tapered surface 2 of the plunger. The nipple 7 of the section 6 is threaded within the upper end of the plunger so as to allow a space 10 at the lower end of the recess 8 and a space 11 between the lower face of section 6 and the upper face of section 1 of the plunger so that the further threading of section 6 downwardly into the plunger will force the split ring 9 down against the collar 4, causing it to be expanded by its movement along the tapered surface of section 1 of the plunger. The section 6 is provided with an upwardly extending tubular shank 12 threaded by means of a coupling 13 to a hollow sucker rod 14 extending upwardly to the pump at the surface of the ground.

The piston is provided with a central channel 15 for the fluid being pumped, this channel extending upwardly to a point adjacent the upper end of the section 6 from which extend laterally inclined ducts 16, leading to the face of the section 6 at each side of the shank 12. Around the shank 12 is placed a ring valve 17 shaped to form a seat upon the upper face of the section 6 and close the ducts 16. This ring is held resiliently downward upon its seat by means of a spring 18 bearing at its upper end upon the coupling 13 and at its lower end upon the valve ring 17.

The lower collar 5 upon the surface 3 of the plunger is held in place thereon by means of a nut 19 at the lower end of the plunger, said nut being threaded upon the lower threaded end 20 of section 1. Between the nut 19 and the collar 5 is another split ring 21 similar to the ring 9 previously described. This nut has radial slots 22 at the lower end for contact with a diametrical

flange or ridge provided on the upper end of the foot valve, which will be presently described. By this means the nut will be held stationary while the plunger is rotated, thus screwing the nut further upon the plunger and forcing the collar 5 upwardly and expanding the same.

The foot valve member 23 has a cylindrical outer surface and comprises two sections threaded together by means of a downwardly extending nipple 24 upon the upper section threaded within the recess 25 in the lower section 26. The section 26 is similar to the upper end of the section 1 of the plunger, having a tapered surface 27 upon which is fitted a longitudinally divided collar 28 and having between the collar and the upper section 23 a split ring 29 which will be operated by the threading of section 23 further within the lower section 27 to force the collar 28 downwardly on the tapered surface and expand the same. The lower end of the section 26 is provided with a slot 30 by means of which it may be held stationary when desired by dropping the valve member downwardly into contact with a cross bar 31 positioned at a point adjacent the lower end of the pump barrel 32.

The valve chamber has a central channel 33 extending from the lower end upwardly for connection with the valve chamber 34. The lower end of the valve chamber is tapered at 35 to form a seat for the ball valve 36. A cross rod or bar 37 toward the upper end of the valve chamber limits the upward movement of the valve so as to prevent the closure of the outlet ducts 38 leading from the valve chamber out the upper end of the section 23.

I have provided a means by which the valves 17 and 36 may both be flushed by a stream of water conducted downwardly through the hollow sucker rod 14 and through the shank 12 of the plunger. The channel 39 in the sucker rod terminates at the lower end of the shank 12 of the plunger and has laterally inclined ducts 40 leading therefrom outwardly into the chamber 41 on the inner face of the valve ring 17. From this chamber 41 ducts 42 lead in an inclined direction downwardly so as to discharge the flushing water outwardly against the upper face of the plunger. When the valve ring 17 is in raised position the water discharged through the ducts 40 will be projected directly upon the valve seat, thereby clearing the same of sand and causing an upwardly whirling discharge of fluid acting to clean the valve of sediment.

Water is conducted to the foot valve from the channel 39 in the shank 17 of the plunger by means of a small pipe 43 secured within a nipple 44 at the upper end of the foot valve member 23. This pipe extends upwardly through the central channel 15 in the plunger, and through a passage 45 leading from the plunger upwardly into the hollow shank 12. The pipe fits slidably within the passage 45 and extends upwardly some distance within the sucker rod so that the plunger may reciprocate telescopically upon the pipe 43 and still maintain a discharge means for water or other fluid from the sucker rod downwardly to the foot valve at all times.

The lower end of the pipe 43 connects with a plurality of branching ducts 46 which are inclined outwardly a short distance and then inwardly and downwardly in such manner as to discharge the fluid from the pipe 43 directly against the foot valve 36 and to thus flush the valve and keep the same free from sand. It is not contemplated that it will be necessary to place a packing or stuffing box within the passage 45 of the plunger but if it is found that leakage occurs at that point it is within the scope of this invention to provide a packing means at that point if desired.

The operation of this embodiment of my invention is as follows: The foot valve member 23 is placed within the upper end of the pump barrel and a pipe having a slot in the lower end thereof is placed over the upper end of the said foot valve member and the foot valve is forced downwardly to the point desired within the well. The lower slot 30 of the foot valve member coming in contact with the cross bar 31 and fitting therein serves as a means to prevent rotation of the lower section 27 thereof. The upper face of the member 23 of the foot valve is provided with an upwardly projecting ridge or flange 47 extending diametrically across the same and against which the lower slotted end of the pipe will fit. By means of the pipe the section 23 is screwed downwardly within lower section 27 and the collar 28 expanded tightly to hold the foot valve member stationary at that point.

The pipe is then again withdrawn and the plunger is secured upon the sucker rod and inserted downwardly into the pump barrel so that the pipe 43 will extend upwardly through the seat 45 in the upper end thereof in the position shown in Fig. 1. The reciprocation of the plunger will, on the downward stroke, cause the ring valve 17 to be lifted, allowing fluid within the channel 15 to be forced upwardly around the sucker rod and within the pump barrel. The lower foot valve will then be closed. On the upward stroke of the plunger, the foot valve will open and the ring valve upon the plunger will close and oil or other fluid being pumped will fill the chamber within the pump barrel and between the foot valve and plunger. During this operation, water, steam or other fluid will be pumped down-

wardly through the hollow sucker rod and will act to flush the ring valve upon the plunger and the foot valve in an obvious manner. When the plunger wears so that it no longer fits snugly in the working barrel, it will be possible to lower the plunger into contact with the flange 47 on the upper end of the foot valve and to then rotate the sucker rod to expand the collars thereon so as to obtain a tight fit between the same and the walls of the working barrel.

The embodiment disclosed in Fig. 6 is similar to that shown in the embodiment just described with the exception of the fact that the pipe 43′ for the flushing water is threaded within the seat 45 so as to be fixed relative to the plunger. It projects downwardly through the channel 15 in the plunger and fits within an upwardly extending sleeve 48 on the upper end of the section 23′ of the foot valve. It is telescoped in this sleeve so as to be slidable as the pump plunger reciprocates and allows the passage of flushing water down through the sucker rod and shank 12 to the foot valve where it is conducted through branching ducts 46 so as to flush the foot valve in the manner already described.

At the upper end of the sleeve 48 the same is formed with two laterally projecting flanges 49, as shown particularly in Figs. 6 and 8. This provision serves to reinforce and steady the upper end of the sleeve 48 and also provides a seat for the nut 19 at the lower end of the plunger, the slot 22 therein being adapted to fit upon the flange 49.

It is obvious that the flushing water may be carried downwardly through the plunger and into connection with the foot valve in either of the ways which have been illustrated, or it is possible for a small pipe to be connected with the plunger and another with the foot valve and have them arranged to telescope at any point between the two. This embodiment is illustrated in Fig. 7 and it is intended to be understood that my invention contemplates the use of any one of these means by which the flushing water may be conducted from the hollow sucker rod downwardly so as to be discharged during the operation of the pump against the foot valve so as to prevent its becoming clogged with sand.

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 foot valve member, a plunger reciprocable in said working barrel, a valve in said foot valve member and means to conduct fluid downwardly through said plunger and into contact with said foot valve during the operating of said plunger.

2. In a pump the combination of a working barrel, a foot valve member therein, means to anchor the same within the working barrel, a plunger above said foot valve member, a hollow sucker rod on said plunger and means to conduct water from said sucker rod through said plunger upon said valve during the operation of said plunger.

3. In a pump the combination of a working barrel, a foot valve member therein, an expanding collar thereon serving to anchor said foot valve in said working barrel, a reciprocating plunger above said foot valve member, a central channel through said plunger, a hollow sucker rod on said plunger, means to conduct water from said sucker rod through said plunger to said foot valve, during the operation of the pump.

4. In a pump the combination of a working barrel, a foot valve member therein, means to anchor said foot valve member in the well actuated by the rotation of said member, a plunger reciprocable in said working barrel and means connected with said plunger to conduct flushing fluid downwardly to said foot valve member.

5. In a pump the combination of a working barrel, a foot valve member anchored in said working barrel, a chamber in said member, a ball valve in said chamber, an upwardly extending pipe connected with said valve chamber, a reciprocating plunger above said foot valve member, a hollow sucker rod thereon, and a slidable telescopic connection between said sucker rod and said pipe whereby the flushing fluid is delivered from said sucker rod upon said foot valve member.

6. In a pump the combination of a working barrel, a foot valve chamber secured in said working barrel, a reciprocating plunger in said working barrel above said foot valve, a hollow sucker rod thereon, a ring valve at the upper end of said plunger and means connected with said plunger to project flushing water against said ring valve and said foot valve.

7. In a pump the combination of a working barrel, a foot valve therein, a reciprocable plunger above said foot valve, and means connected with said plunger to flush said foot valve with fluid as desired.

8. In a pump the combination of a working barrel, a foot valve therein, a plunger reciprocable in said working barrel, means extending through said plunger to supply a stream of flushing fluid to said foot valve during the operation of the pump.

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

WILLIAM J. COULSON.