Jan. 18, 1927. 1,614,771

J. C. AXELSON ET AL

PUMP HAVING STANDING VALVE PULLER

Filed August 13, 1923 2 Sheets-Sheet 1

Fig. 1.

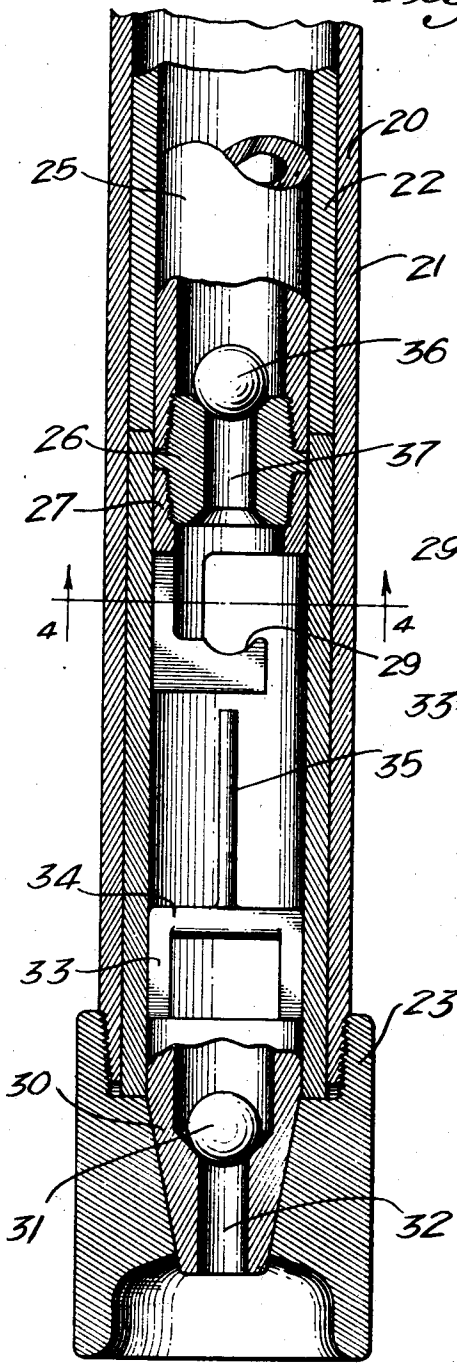


Fig. 2.

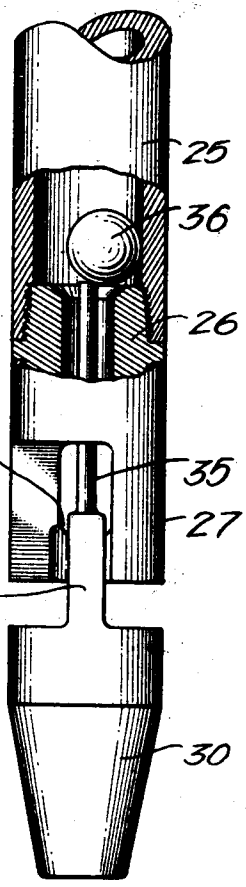


Fig. 3.

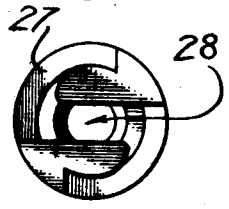
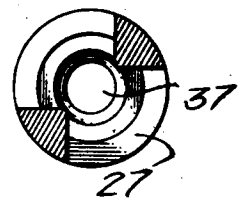


Fig. 4.



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PUMP HAVING STANDING VALVE PULLER

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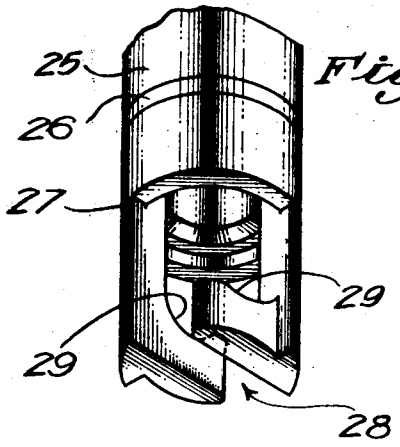


Fig. 5.

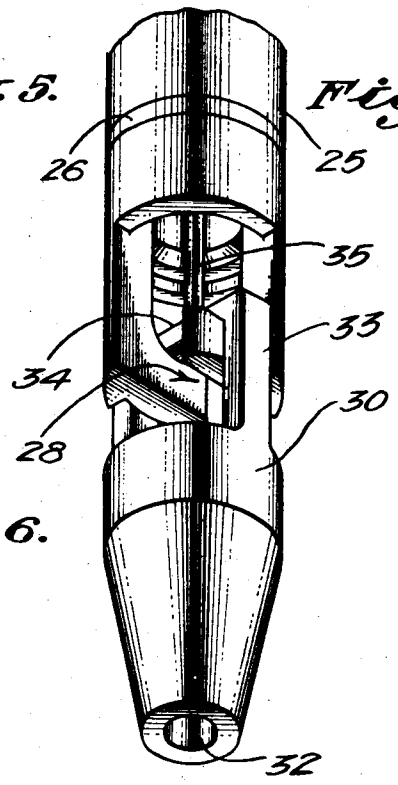


Fig. 7.

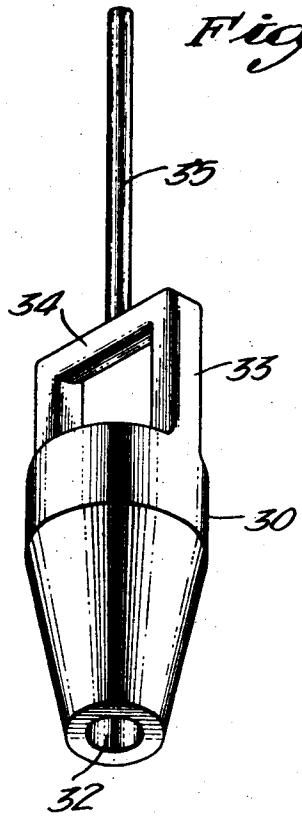


Fig. 6.

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UNITED STATES PATENT OFFICE.

JULE C. AXELSON AND WILHELM JARDH, OF LOS ANGELES, CALIFORNIA, ASSIGNORS TO AXELSON MACHINE CO., A CORPORATION OF CALIFORNIA.

PUMP HAVING STANDING-VALVE PULLER.

Application filed August 13, 1923. Serial No. 657,170.

Our invention relates to the art of pumping oil wells and is particularly applicable to the pumping of deep wells.

It is common practice in the art to provide an oil well pump barrel which is usually placed at or near the bottom of a string of tubing which is suspended in the casing of the well. This barrel contains a plunger which fits tightly therein and which has an opening therethrough, the opening being closed on the up stroke of the plunger by a working valve. There is also provided a standing valve carried in a standing valve cage seated in the bottom of the barrel, this valve closing on the down stroke of the plunger, thus holding any oil which may have been drawn therethrough during the up stroke of the plunger.

It is often necessary to pull the plunger from the well by means of the sucker rods for purposes of inspecting, cleaning or repair, and it is an object of our invention to provide means for unseating the working valve during the pulling operation so that the oil carried in the pump tubing can readily drain therethrough, thus obviating what is known in the oil fields as a "wet job." It is highly desirable to provide in such a pump means by which the standing valve can be removed, if desired, with the plunger for purposes of inspection or repair.

It is a still further object of our invention to provide means on the plunger by which the standing valve cage can be readily picked up by the plunger and withdrawn from the well.

It is a further object of our invention to provide means on the standing valve cage for unseating the working valve whenever the plunger engages the standing valve cage.

Further objects and advantages will be made evident hereinafter.

Referring to the drawings which are for illustrative purposes only:

Fig. 1 is a view partly in section of the lower portion of the barrel of an oil well pump embodying our invention, together with the standing valve cage and co-operative parts, the plunger being shown at the lower end of its working stroke.

Fig. 2 is a view partly in section showing the position assumed by the plunger and the standing valve cage when the standing valve cage is being removed from the well.

Fig. 3 is a plan view of the lower end of the plunger as seen from below.

Fig. 4 is a section on a plane represented by the line 4—4 of Fig. 1.

Fig. 5 is a perspective view of the lower end of the plunger.

Fig. 6 is a perspective view of the standing valve seat.

Fig. 7 is a perspective view showing the standing valve seat engaged and carried by the plunger.

In the form of the invention illustrated, we provide a barrel 20 which can be conveniently formed of an outer shell 21, a series of liners 22, a bottom casting 23, and a top casting 24. The shell 21 is continuous and is threaded in the castings 23 and 24, the liners 22 being ground accurately to fit inside the shell, being clamped in place between the members 23 and 24. Sliding in the bore of the liners 22 is a plunger 25, into which a working valve seat 26 is screwed. A pick-up member 27 is threaded on the lower end of the member 26 and has the form shown in Fig. 5. The member 27 is provided with a central slot 28 extending upwardly therein, and with hooks 29 on either side thereof.

Seated in a conical opening in the casting 23 is a standing valve cage 30, in which is a ball valve 31 normally closing an opening 32 which extends through the cage 30. Extending upwardly from the top of the cage 30 are two arms 33 which are connected by a cross-bar 34. Extending upwardly from the cross-bar 34 in the center of the barrel 20 is a stem 35.

Seated on and adapted to close an opening 37 extending through the member 26 is a working valve 36.

The method of operation of our invention is as follows:

The parts being in the position shown in Fig. 1, the plunger 25 is raised by means of the sucker rods 50, and oil is drawn upwardly through the opening 32 into the space above the standing valve 31 and below the working valve 36. On the down stroke the working valve 36 is raised from its seat by oil flowing through the opening 37 and the oil enters the interior of the plunger 25 and flows upwardly through the pump tubing to the top of the well.

To allow the standing valve to be removed

with the plunger, we provide the structure illustrated in Figs. 1 to 7 inclusive. When it is desired to pull the standing valve cage 30, the plunger is allowed to move downwardly from the position shown in Fig. 1 until the bottom of the plunger rests upon the top of the standing valve cage.

Referring to Figs. 5 and 6, it will be noted that it is necessary to turn the plunger 25 through an angle of 90 degrees in either direction from the position shown in Fig. 5, to enable the cross-bar 34 to enter the slot 28. With the plunger so turned, the cross-bar 34 can enter the slot 28 and when so entered, the cross-bar can be readily caught by the hooks 29 by turning the plunger 25 in a right hand direction. If the plunger 25 is then raised, the parts assume the position shown in Fig. 7 and Fig. 2, and the standing valve cage 30 may be readily withdrawn from the well with the plunger. With the parts in the position shown in Fig. 2 and Fig. 7, it will be noted that the stem 35 projects up and lifts the valve 36 from its seat. This allows the oil to drain downwardly through the opening in the member 26 and to escape as the pump rods are pulled from the well.

We claim as our invention:

1. In an oil well pump, the combination of: a barrel; a standing valve supporting member arranged at the lower end of said barrel; a standing valve cage supported in said supporting member, said standing valve cage having a horizontal bar extending through the axis of said pump; a hollow plunger in said barrel; a valve member comprising a seat and a ball, situated at the lower extremity of said barrel; a tubular lifting member extending downwardly from said plunger having hooks diametrally disposed and arranged to define a central slot of greater width than said bar of said standing valve cage, and said hooks being of such shape as to engage and support said bar when the plunger is rotated with said bar in place in said slot; and an axially disposed pin extending upwardly from said horizontal bar and of such length as to displace said ball of said working valve when said hooks are in engagement with said bar.

2. In an oil well pump, the combination of: a barrel; a standing valve supporting member arranged at the lower end of said barrel; a standing valve cage supported in said supporting member, said standing valve cage having a horizontal bar extending through the axis of said pump; a hollow plunger in said barrel; a valve member comprising a seat and a ball, threaded into the lower end of said barrel; a tubular lifting member extending downwardly from, and in threaded engagement with said valve member, having hooks diametrally disposed and arranged to define a central slot of greater width than said bar of said standing valve cage, and said hooks being of such shape as to engage and support said bar when the plunger is rotated with said bar in place in said slot; and an axially disposed pin extending upwardly from said horizontal bar and of such length as to displace said ball of said working valve when said hooks are in engagement with said bar.

3. In an oil well pump, the combination of: a plunger; a cylindrical working valve seat threaded to the lower end of the plunger; a valve on the seat; a cylindrical hook member threaded to the lower end of the working valve seat, said member being of the same diameter as the plunger and being provided with hooks; and a standing valve cage provided with a cross bar which serves to retain a valve in the cage and which is adapted to be engaged by the hooks when the plunger is lowered and partly turned.

4. In an oil well pump, the combination of: a plunger; a cylindrical working valve seat threaded to the lower end of the plunger; a valve on the seat; a cylindrical hook member threaded to the lower end of the working valve seat, said member being of the same diameter as the plunger and being provided with hooks; a standing valve cage provided with a cross bar which serves to retain a valve in the cage and which is adapted to be engaged by the hooks when the plunger is lowered and partly turned; and a rod extending from the cross bar axially of the plunger for the purpose of unseating the working valve when the plunger is lowered for the hooks to engage the cross bar.

In testimony whereof, we have hereunto set our hands at Los Angeles, California, this 7th day of August, 1923.

JULE C. AXELSON.
WILHELM JARDH.