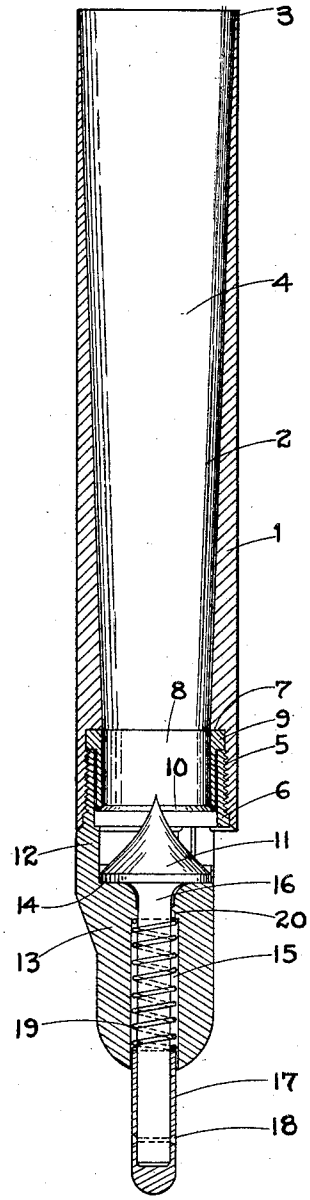
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SWAB PLUNGER

Filed Feb. 1, 1932



NORMAN H. RICKER INVENTOR

BY Jesse R. Stone

ATTORNEY

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NORMAN H. RICKER, OF HOUSTON, TEXAS, ASSIGNOR TO HUGHES TOOL COMPANY, OF HOUSTON, TEXAS, A CORPORATION OF TEXAS

SWAB PLUNGER

Application filed February 1, 1932. Serial No. 590,073.

My invention relates to plungers to be employed in plunger lift devices in lifting liquid from deep wells and in which the plunger is moved from the lower end to the upper end thereof by fluid pressure.

This invention is an improvement upon the device disclosed in my prior patent taken jointly with Harold W. Fletcher No. 1,769,637, issued July 1, 1930.

It is an object of my invention to provide a plunger in which the valve opens downwardly therein and is held resiliently from its seat, and in which the valve may be forced against the action of the spring to its closed position by fluid pressure.

It is also an object to provide a valve seat construction in which the seat is readily removable and replaceable.

In the usual plunger lift apparatus the plunger is movable from a seat at the lower end of the eduction tube to the upper end by pneumatic pressure, either through the pressure of gas or air delivered to the well under pressure from the surface. When the plunger has been raised in the eduction tube to the upper end thereof, it is sometimes difficult to properly open the valve and retain it in opened position while dropping again to its seat at the lower end of the tube. The force of the rising current of air or gas below the plunger will sometimes act upon the valve to close it, and in other cases there is not sufficient compression of fluid above the plunger at the upper end of the tube to properly open the same.

It is therefore an object of my invention to provide a spring which is adapted to act upon the valve with a predetermined pressure sufficient to normally open the same and retain it in opened position, but which is of insufficient strength to pull the valve open against the lifting action of the pressure fluid.

In the drawing herewith the construction of my improved plunger is shown in central vertical section.

There is an upper body member 1, which is cylindrical on its outer surface, to fit loosely within the eduction tube not shown. The interior wall 2 of the body is reduced in thickness upwardly so that the upper edge 3 is formed into a scraping edge which may remove material from the interior of the tube. The passage 4 through the body converges downwardly to form a stream-line passage preventing turbulence in the liquid. The lower end of the body is increased in internal diameter, and threaded at 5 to receive a ring 6.

Where the body is increased in diameter at the lower end, the shoulder 7 is formed above the threaded portion 5 to receive a seat member 8, said seat member having a flange 9 at its upper end fitting between the shoulder 7 and the ring 6, and thus enabling the seat member to be held rigidly in position. The lower end of the seat member is extended downwardly and beveled at 10 to receive the valve 11.

The ring 6 is connected by means of arms 12 to a supporting member 13 for the valve 11. Between the supporting arms are openings through which the liquid can find entrance through the plunger from below. The support 13 is of smaller diameter than the body of the plunger, and has a recess 14 at its upper end to receive the valve 11, and it will be noted that the lower end of the valve is allowed to drop into said recess so that liquid passing into the plunger will not tend to raise the valve. The upper portion of the valve member 11 is tapered so as not to interfere with the flow of liquid past the same. The supporting member 13 has an axial passage 15 therethrough to receive the valve stem 16, which projects downwardly from the valve through the supporting member and below the same.

The valve stem 16 is provided with a sleeve or cap 17 secured to the lower end thereof by means of a throughpin 18. The upper end of the cap furnishes a support for a spring 19, which bears at its upper end against a shoulder 20 in the passage 15. The spring is under tension to a limited amount, and tends to hold the valve in opened position with a moderate force.

When the plunger in operation reaches the lower end of its stroke, the valve will be forced to its seat by contact of the lower end

of the valve stem with the usual stop member, not shown. The force of the pressure fluid below the valve will then be exerted against the lower side of the valve head 11, and will retain it in closed position against the action of the spring. When the plunger has been moved to the upper end of the stroke by means of fluid pressure and the plunger has passed the exhaust openings in the eduction tube, the pressure below will be relieved and the spring will tend to open the valve allowing the plunger to drop.

The use of the spring overcomes the difficulty ordinarily experienced through the failure of the valve to open due to the force of fluid under pressure from below the plunger. It will thus be possible to operate the plunger uniformly without interruption due to the failure of the valve to properly open and remain in opened position. The spring supplements the action of gravity and will assure the proper action of the valve in the upward stream of fluid.

What I claim as new is:

1. A swab plunger comprising a tubular body member, a valve seat at the lower end thereof, a valve adapted to close upwardly into said seat, a support for said valve below said seat, and means within said support normally acting to move said valve to open position.

2. A swab plunger including a body cylindrical on its outer surface but with its inner wall converging downwardly, a seat at the lower end of said body, a valve below said seat, and a spring normally resisting the closing of said valve upwardly into its seat.

3. A swab plunger including a body cylindrical on its outer surface but with its inner wall converging downwardly, a seat secured removably at the lower end of said body, a valve below said seat, a support for said seat, and a spring normally resisting the closing of said valve upwardly into its seat.

4. A swab plunger including a tubular body, a valve seat thereon, a valve below said seat, a support therefor, a stem on said valve extending through said support, and a spring cooperating with said stem and said support to open said valve.

5. A swab plunger including a tubular body, a valve seat at the lower end thereof, a support below said seat, a valve, a stem on said valve extending through said support, and a spring housed in said support and acting on said stem to open said valve.

In testimony whereof, I hereunto affix my signature this the 18th day of January, A. D. 1932.

NORMAN H. RICKER.