Oct. 31, 1933. S. EVANS 1,932,451

PLUNGER CONSTRUCTION

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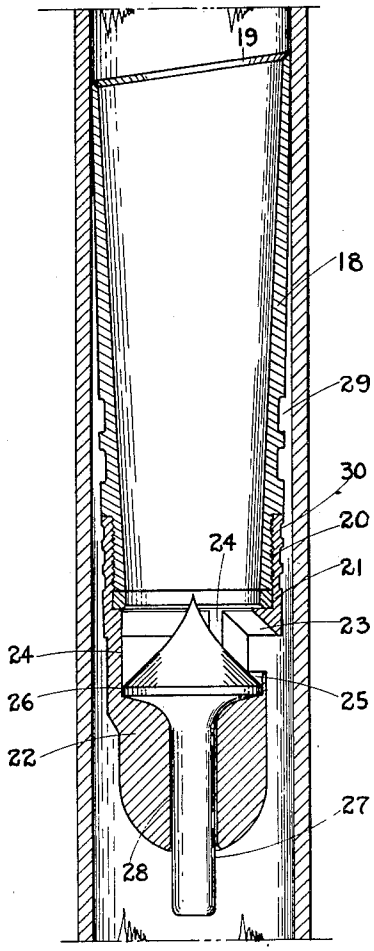

FIG. 1

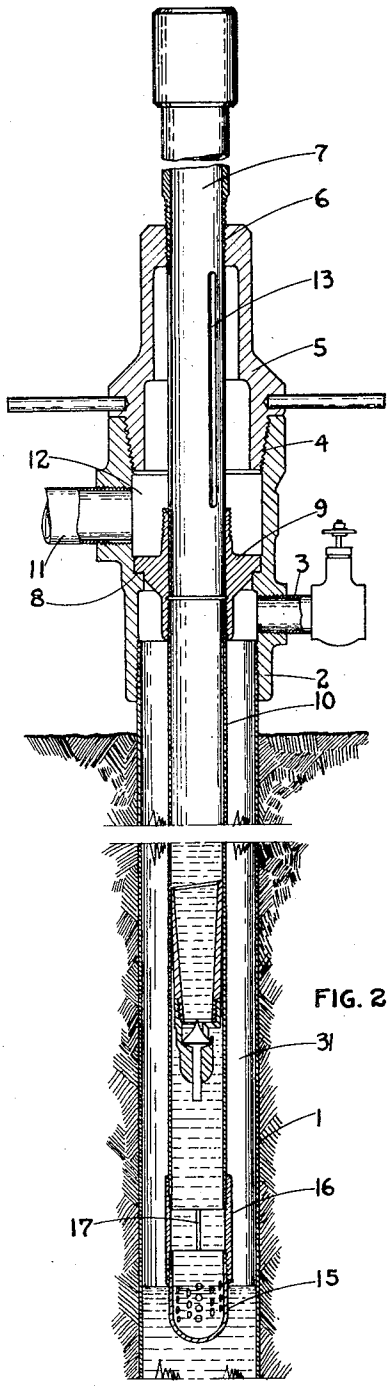

FIG. 2

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PLUNGER CONSTRUCTION

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8 Claims. (Cl. 103—52)

My invention relates to plunger lift pumps wherein the plunger is raised from the lower end of the well to the surface by pneumatic pressure.

In such pumps this plunger will act automatically through the force of the pressure fluid, and will operate repeatedly to raise its load of liquid, until the plunger is eventually clogged in its action by an accumulation of paraffin and the like in the eduction tube. Under usual operating conditions, therefore, it becomes necessary periodically to remove the plunger and clean the tube.

It is an object of my invention to so construct the plunger that it will clear the tube of paraffin and the like in its usual operation within the tube.

I contemplate cutting the upper edge of the plunger so that it will scrape the eduction tube, and to bevel, or incline, the angle of the upper edge relative to the axis so that it will not be perpendicular thereto. I also desire to cause the plunger to wabble or vibrate in its upward travel so as to bring the upper scraping edge of the plunger into contact with the inner wall of the eduction tube.

The invention lies in the particular construction of the plunger whereby it tapers slightly in a downward direction to allow side swinging of the said lower end in operation.

In the drawing herewith Fig. 1 is a central longitudinal section through a plunger embodying the invention, said plunger being shown in position in a pump barrel or eduction tube.

Fig. 2 is a central vertical section through a well equipment in which the improved plunger is operated.

The well in which my plunger is employed is equipped with a casing 1 having a casing head 2, with a lower side inlet 3, for pressure fluid when it is required. The upper end of the casing head is closed by a bonnet 5 screwed therein at 4. Said bonnet has a threaded connection at 6 with the eduction tube extension 7.

The casing head has an inner annular shoulder 8 to receive the head 9 for the eduction tube 10. The interior of the casing head above the head 9 is thus closed except for the outlet 11 from the chamber 12. The extension 7 for the eduction tube is slotted at 13 within the chamber 12 to allow outlet for fluid.

The eduction tube 10 extends downwardly to the liquid in the well and has a perforated plug 15 connected therewith by a special coupling 16 having a cross shaped stop member 17 therein.

The plunger in the eduction tube includes a body member 18 which is adapted to fit the eduction tube at its upper end but tapers downwardly both on its outer and inner surfaces. The upper margin of the body is beveled upwardly and outwardly to provide a scraping edge 19. The scraping edge is not perpendicular to the axis of the body member but is inclined somewhat relative thereto as will be obvious from the drawing.

The lower end of the body member is connected at 20 to the upper ring 21 of the valve support 22. On the lower end of the ring is an upwardly tapered valve seat 23. The ring 21 is connected to the support 22 by legs 24. Said support 22 is rounded on its lower end and its upper side is recessed at 25 to receive the valve 26.

The valve 26 is tapered upwardly to fit the seat 23 and to provide a streamline shape which allows the valve to remain open while fluid is passing upwardly through the plunger. The valve has a stem 27 which projects through a guide opening 28 in the support.

The outer surface of the body 18 and the ring 21 may be grooved circumferentially as shown at 29 and 30 to act as a fluid packing and by creating a turbulence in the liquid, prevent leakage to a large extent.

The plunger in Fig. 2 is shown as dropping to the bottom of the well through the liquid which has risen in the eduction tube through the pressure of gas in the space in the casing. When the stem 27 of the plunger strikes the stop 17 the valve will be closed and the gas pressure below the plunger will soon force the plunger with its load of liquid upwardly in the tube sc as to discharge the load through the openings 13 and 11 to storage.

While the plunger is rising the gas below the plunger will attempt to pass around the same and the lower end of the plunger will sway or wabble in the tube, thus bringing the upper scraping edge 19 of the plunger into scraping contact with the inner wall of the eduction tube. The grooves 29 and 30 in the plunger create sufficient turbulence in fluid tending to pass the plunger and limit the amount of leakage and, at the same time, create an irregular side sway in the lower end of the plunger. In this operation, the upper edge scrapes paraffin from the tube and carries it upwardly with the load of liquid with which it is discharged from the well. By thus preventing accumulations of paraffin, asphalt and similar material from clogging the eduction tube, the pump will be enabled to operate for long periods without cleaning.

When the load has been discharged the gas

behind the plunger will exhaust and liquid will again rise in the eduction tube and when the plunger reaches the bottom the operation previously described will be repeated.

The advantage of my improved plunger is that it prevents clogging of the eduction tube. It makes the pump self cleaning and enables the operation to be continuous without the necessity of cleaning.

Furthermore, the particular downwardly tapered form of the plunger allows the plunger to drop more easily, unimpeded by the paraffin accumulations remaining on the tube. The contact with the tube is only about the upper end of the plunger and there is less drag on the tube.

What I claim as new is:

1. A plunger for pumps of the character described including a tubular body member tapered downwardly on its outer periphery, a valve seat at the lower end of said body, and an upwardly closing valve adapted to fit said seat.

2. A plunger for pumps of the character described including a tubular body member tapered downwardly both on its interior and its exterior surfaces, a valve seat at the lower end of said body, and a valve adapted to fit upwardly into said seat.

3. A plunger for pumps of the character described including a tubular body member tapered downwardly on its outer periphery, circumferential grooves on the outer surface thereof, a valve seat at the lower end of said body, and a valve adapted to fit said seat.

4. A pump plunger of the character described including a tubular body member, the upper rim of which is beveled to make one side longer than the other, a scraping edge on said rim, and a valve controlling the passage through said tubular body.

5. A pump plunger of the character described including a tubular body member tapered downwardly on its outer surface, the upper end thereof being formed into a scraping edge inclined from one side to the other at an angle to the axis of said body other than a right angle, and a valve at the lower end of said body.

6. A pump plunger of the character described including a body tapered downwardly from the upper end, and having one side of said body slightly longer than the other, and a valve in the lower end of said body.

7. A pump plunger body tapered downwardly on its outer periphery, and having a passage therethrough, an upwardly closing valve in said passage, and an upper scraping edge on said body tending to engage the eduction tube when said plunger is moved upwardly therein.

8. A pump plunger of the character described one side of which is slightly longer than the other, an upper scraping edge on said plunger, said plunger being shaped to sway laterally at its lower end in operation to bring said scraping edge into contact with a tube in which it travels.

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