Feb. 20, 1934. H. W. FLETCHER 1,947,587

PLUNGER LIFT VALVE CLOSING DEVICE

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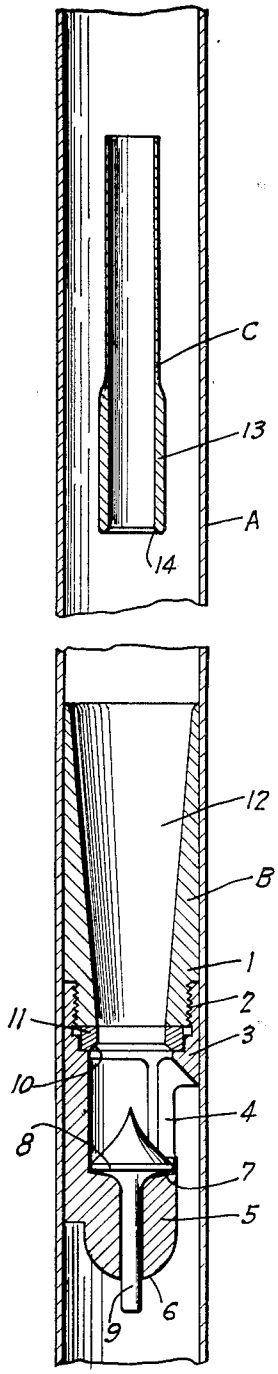


Fig. 1

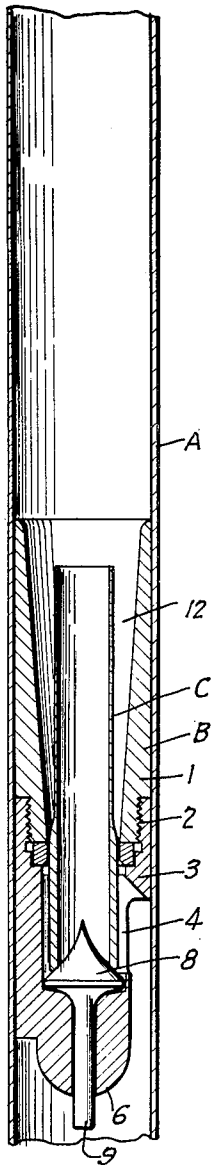


Fig. 2

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PLUNGER LIFT VALVE CLOSING DEVICE

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4 Claims. (Cl. 103—52)

This invention relates to plungers employed in plunger lift devices where the plunger and its load of liquid are elevated from the bottom of the well to the surface by pneumatic pressure.

In devices of this character the plunger falls from the upper end of its stroke to the bottom end of its stroke by gravity alone. As the eduction tube, in which the plunger works, may be several thousand feet long and as the fluid being pumped often contains a material amount of sand and sediment, the plunger may, at times, get stuck in the tube on its downward stroke and fail to reach bottom. When this occurs, it becomes necessary to employ some sort of fishing tool to loosen the plunger and bring it back to the surface so that the tube may be cleared. The valve in the plunger is always open on its downward stroke so that, if pneumatic pressure is exerted below the plunger, it will blow through the valve and the plunger without appreciable effect.

It is an object of my invention to provide a means to be inserted into the plunger to close the passage so that the plunger can be moved by fluid pressure from below and thus raised to the surface.

It is also an object to provide means to assist in closing the valve in the plunger so that fluid pressure may be employed in raising the plunger.

In the drawing Fig. 1 is a central longitudinal section through a section of eduction tube and plunger with my invention shown therewith.

Fig. 2 is a similar view with the valve closing device in position against the valve.

The eduction tube is shown at A. The plunger B fits somewhat loosely in the tube and is adapted to be raised therein with its load of liquid by the pressure of gaseous fluid from below.

The plunger B is shown as having a tubular body member 1 which has a cylindrical outer periphery to engage with the tube. The lower end of the body is reduced and threaded at 2 to connect with a ring 3 having downwardly extending legs 4 connecting the same with a valve support 5. The support is formed with a streamline lower end 6 and is recessed on its upper end at 7 to receive the valve 8, the stem 9 of which extends through said support to engage with the usual stop member at the bottom of the tube, not shown.

The upper end of the valve is tapered to an apex and shaped to fit within an upper seat 10 formed on a ring 11 clamped between the lower end of the body 1 and the ring 3. The interior passage 12 through the body converges downwardly to the passage through the valve seat.

During the downward dropping of the plunger the air or liquid below the plunger will pass between the legs 4 and above the valve into the passage through the plunger and the valve will tend to remain unseated. The streamline contour of the upper end of the valve will be acted upon by the fluid passing through the valve to tend to assist in keeping the valve open.

If the plunger should stick on its downward stroke, I contemplate dropping down, from the upper end of the eduction tube, a fishing sleeve shown at C. This sleeve is of thin material, but has its lower end 13 thickened so that its outer periphery will form a fairly close sliding fit within the passage through the valve ring 11. It may drop to contact with the upper surface of the valve as shown in Fig. 2 thus closing the passage of fluid past the valve and up through the passage 12. The lower end of the sleeve C is beveled slightly at 14 on its inner face so as to fit with the upper face of the valve and seal therewith.

If then, fluid pressure is exerted upwardly below the plunger, the valve will be raised to its seat and the plunger forced back up to the surface. The passage of the fluid through the valve will be shut off by the sleeve and the lifting effect of the fluid below can be exerted upon the plunger so as to lift it without difficulty along with the sleeve. All that is necessary to extract the plunger when it becomes stuck is to drop the sleeve C and turn on the fluid pressure. The advantages of this method will be obvious.

What I claim as new is:

1. In a plunger lift device, an eduction tube, a plunger fitting therein and adapted to drop by gravity therein, a passage through said plunger, a valve seat in said passage, a valve normally open below said seat, and a sleeve adapted to be dropped in said tube to engage through said seat and fit upon said valve to close the passage of fluid through said plunger.

2. A plunger lift plunger having a downwardly tapered fluid passage therethrough, a valve seat at the lower end of said passage, a valve held open by gravity below said seat, and a sleeve adapted to be dropped through said passage and said seat to fit upon the upper end of said valve and close the passage of fluid through said plunger.

3. A plunger lift device including an eduction tube, a plunger fitting therein, a passage through said plunger, an upwardly closing valve in said passage held normally open by gravity, and means adapted to be dropped in said tube to engage in said plunger and close the passage of fluid through the same.

4. A plunger lift device including an eduction tube, a plunger fitting therein, a passage through said plunger, an upwardly closing valve in said passage held normally open by gravity, a support for said valve below said passage, the upper end of said valve being tapered, and a device adapted to be dropped in said eduction tube and through the passage in said plunger to engage the tapered end of said valve and close the passage of fluid through said plunger.

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