July 25, 1933. H. W. FLETCHER 1,919,547

PNEUMATIC SWAB PLUNGER

Filed Oct. 27, 1931

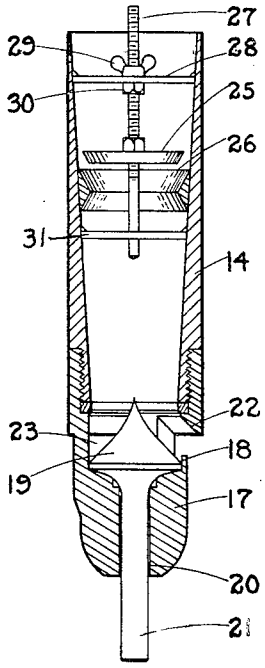


FIG. 2

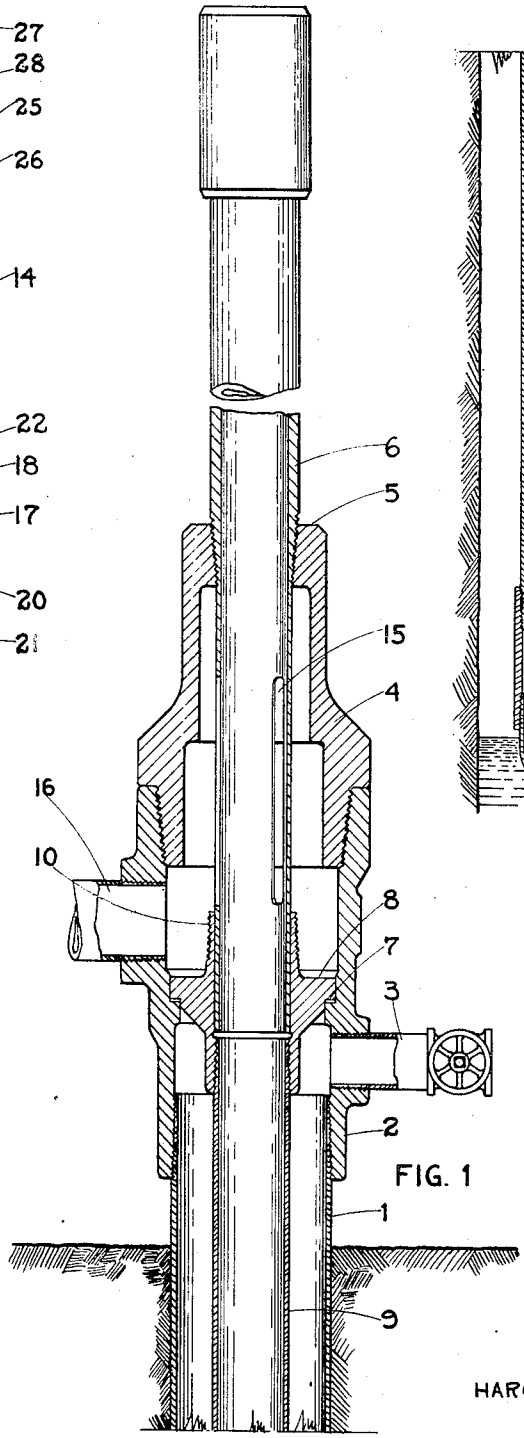


FIG. 1

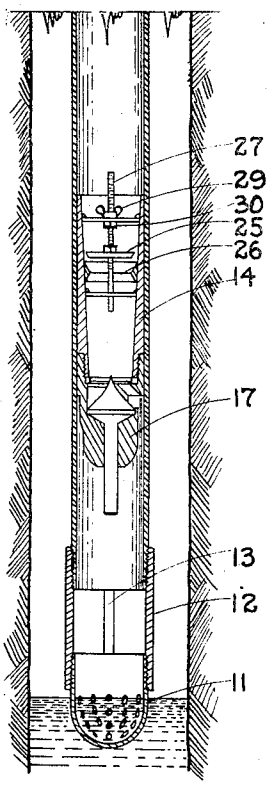


FIG. 3

HAROLD W. FLETCHER
INVENTOR

BY Jesse R. Stone

ATTORNEY

Patented July 25, 1933 1,919,547

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HAROLD W. FLETCHER, OF HOUSTON, TEXAS, ASSIGNOR TO HUGHES TOOL COMPANY, OF HOUSTON, TEXAS, A CORPORATION OF TEXAS

PNEUMATIC SWAB PLUNGER

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My invention relates to plungers for pneumatically operated swab devices.

In the construction of my improvement I aim to overcome certain difficulties now experienced in swab pumps. Where the well is shallow and where the flow of liquid into the eduction tube is slow, the plunger may reach bottom before there is a sufficient head of liquid above the plunger seat to cushion its fall with the result that the plunger hits a dry seat with great force tending to injure the apparatus.

It is an object of my invention to slow down the falling of the swab plunger after its upward stroke, and to thereby prolong the cycle in its operation to such an extent that before the plunger reaches bottom the liquid will have time to flow into the well and rise in the eduction tube to a point well above the stop seat for the plunger.

I wish to choke down the passage through the plunger so that the fluid below the plunger can pass only at a slow rate through the plunger as it falls and thus impede its falling velocity and also give time for the liquid to accumulate above the lower stop member.

In the drawing herewith, Fig. 1 is a central vertical section through the upper end of the well equipment for a well swabbing device.

Fig. 2 is a longitudinal section through my improved plunger.

Fig. 3 is a section showing the plunger at the lower end of the eduction tube, spaced slightly from the stop member.

I have illustrated my plunger in a well equipment now in use. It includes an outer casing 1, with a casing head 2 thereon. Said casing head has a lateral pipe connection 3 thereon, whereby pressure fluid may be supplied where necessary, and its upper end has a bonnet 4 screwed thereon. Said bonnet has a threaded seat 5 at its upper end to connect with the eduction tube extension 6 and form a fluid tight joint therewith.

Within the casing head is an annular shoulder 7 to support the head 8 upon the eduction tube 9. The upper end of the head 8 has a machined recess to receive the lower end of the extension 6 and is threaded at 10 to receive a setting tool or pipe whereby the eduction tube may be lowered into position during assembly.

The eduction tube has a strainer nipple 11 at its lower end secured to the tube by a special coupling 12 having a cross-shaped spider 13 therein to form a stop for the plunger 14 on its downward stroke. At the lower end of the tube extension 6, within the casing head, said extension is slotted at 15 to allow an outlet for the fluid to the discharge pipe 16. The extension is closed at its upper end by a cap 17 in the usual manner.

The plunger 14 is cylindrical on its outer periphery and has a downwardly converging inner bore. At its lower end is secured a block or support of somewhat smaller outer diameter formed with a recess 18 to receive the valve 19 and support it in open position. Said support is provided with an axial guide opening 20 to receive the valve stem 21 which projects below the support when the valve is open, and is adapted to engage the stop member 13 and move the valve upwardly into a seat 22. The support 17 is provided with fluid openings above the recess 18 as seen at 23 to allow fluid to pass through the plunger.

The choke which I provide for the plunger is placed within the upper end thereof. It comprises a disc 25 tapered downwardly to fit within a seat 26 formed in a ring of metal secured rigidly upon the inner face of plunger. The disc 25 is mounted upon a stem 27 which is threaded along its upper portion and projects through the upper guide bar 28. Nuts 29 and 30 above and below the guide bar make it possible to adjust the position of the disc 25 relative to the seat 26 in an obvious manner. A guide bar 31 below the seat serves to center the stem 27 for accurate operation.

In the operation of the swab, the plunger will drop through liquid at the bottom of the eduction tube with the valve 19 open and when it contacts with the stop member the valve will be forced shut. There will be a charge of liquid in the eduction tube before the plunger reaches this stop if the

device is working properly so that there will be no excessive jar upon the valve or the stop when contact occurs. The gas pressure accumulating in the well will raise the plunger with its load of liquid to the surface and the liquid load will be discharged through the slots 15 and the outlet pipe 16. The plunger will then be blown past the openings 15 with force sufficient to trap fluid in the extension 6 and thus the valve 19 in the plunger will be forced open and the plunger will fall. The gas below the plunger will be exhausting as the plunger falls and will have to pass through the open valve 19 and past the choke member 25. I set this choke to allow the plunger to fall but slowly, and the opening through the choke will be adjusted in accordance with the amount of escaping gas, so that the plunger will be delayed in reaching bottom to allow a cushion of liquid to accumulate. In fact, it is desired that the desired load of liquid be allowed to enter the tube before the plunger reaches its seat upon the stop member 13.

The choke disc 25 thus enables me to control the dropping of the swab plunger so that the operation of the apparatus will be accurate and uniform and injury to the apparatus may be avoided.

What I claim as new is:

1. A pneumatic swab plunger including a cylindrical tubular body, a valve seat at the lower end thereof, a valve to fit said seat, a support for said valve when said valve is open, and a choke device in said body above said valve adjustable to impede the passage of fluid through said plunger to the amount desired.

2. A pneumatic swab plunger including a tubular body, a downwardly opening valve in said plunger, and additional means to choke the flow of fluid through said body, said means being adjustable to control the rate of flow of said fluid.

3. A pneumatic swab including a tubular plunger body having a fluid passage, a downwardly opening valve therein, a constriction in said passage, and a choke disc adjustable to and from said constriction to regulate the passage of fluid through said plunger.

4. In a pneumatic swab device, an eduction tube, a plunger movable from the lower end to the upper end thereof, a stop member for said plunger adjacent the lower end of said tube, a valve adapted to open at the upper end of its travel and additional means in said plunger to regulate the passage of fluid therethrough and thus control the dropping of said plunger in said tube to said stop member.

5. In a pneumatic swab device, an eduction tube, a tubular plunger having a fluid passage therethrough and movable from end to end of said tube, a stop for said plunger adjacent the lower end of said tube, a valve in said passage and additional means in said plunger to regulate the size of said passage and thus control the movement of fluid therethrough.

6. A pneumatic swab plunger comprising a tubular body having its upper end open, a valve to regulate the passage of fluid positioned at the lower end of said body, and means supported on the inner wall of said body between the ends thereof to control the size of the passage through said body.

HAROLD W. FLETCHER.