Feb. 1, 1955 E. L. CONDRA 2,701,020

PLUNGER TYPE BAILER

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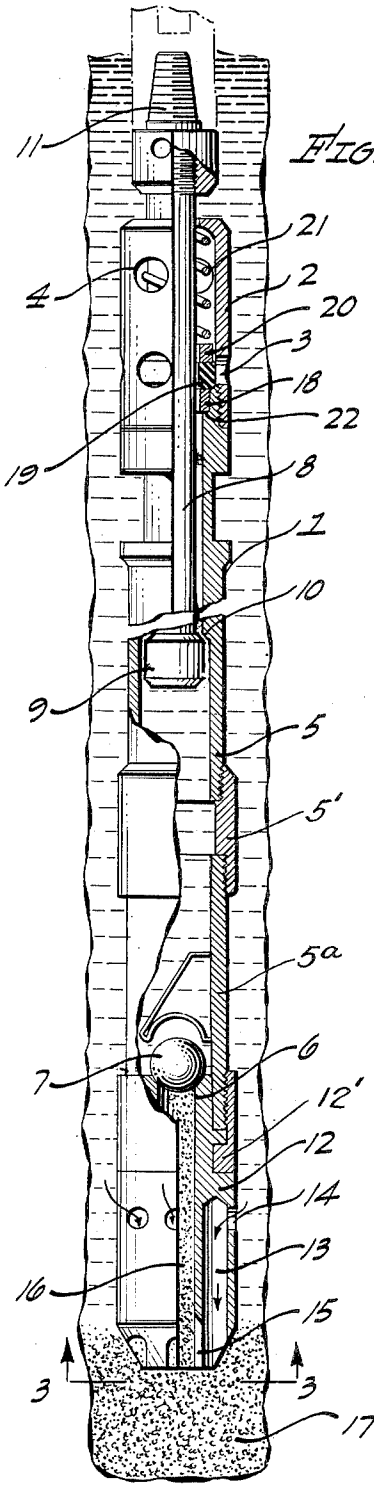


FIG. 1.

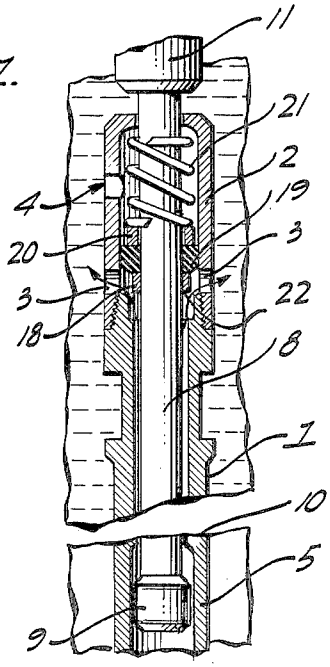


FIG. 2.

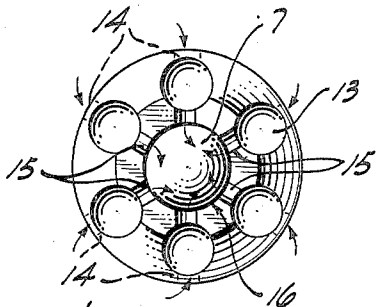


FIG. 3.

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PLUNGER TYPE BAILER

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2 Claims. (Cl. 166—109)

This invention relates to a plunger type bailer which is used in oil wells for the purpose of removing sand or other detritus from within the bore of the well. This invention relates particularly to the class of bailers in which a plunger reciprocates within the tubular body of the bailer.

An object of my invention is to provide a valve means which opens automatically when the plunger is lowered into the cylinder portion of the bailer body.

Still another object of my invention is to provide a novel bailer bottom construction in which incoming fluid is made to move in a path so that this moving fluid will pick up sand or other material from the bottom of the well.

A feature of my invention resides in the novel type of slide valve which opens under the hydraulic pressure caused by the lowering of the plunger into the cylinder area of the bailer.

Other objects, advantages and features of invention may appear from the accompanying drawing, the subjoined detailed description and the appended claims.

In the drawing:

Figure 1 is a longitudinal quarter sectional view of my bailer showing the plunger in raised position.

Figure 2 is a fragmentary longitudinal sectional view of the upper end of the bailer showing the plunger in lowered position.

Figure 3 is a bottom plan view of the bailer taken from line 3—3 of Figure 1.

Referring more particularly to the drawing, the numeral 1 indicates the tubular body of the bailer which includes a cap 2 threaded on to the upper end of the body and this cap is provided with one or more laterally extending outlet ports 3 for the relief of fluid in the bailer, as will be subsequently described.

A plurality of relief ports 4 in the upper end of the cap 2 permit fluid to flow readily both inwardly and outwardly so that the valve structure to be subsequently described will move freely in a vertical direction.

A cylinder section 5 is either an integral part of the body 1 or it may be threaded on to the body to form a complete cylindrical body assembly. A valve seat 6 is provided on the lower end of the body 1 and a ball valve 7 rests on this seat and moves vertically depending on the flow of the fluid into the bailer, as will be subsequently described. More particularly the body 1 consists of the upper cylinder section 5 on the lower end of which a collar 5' is threaded. A sleeve 5*a* screws into the bottom of the collar 5', and depends therefrom. The bailer bottom is attached to the sleeve 5*a*, as is subsequently described.

A plunger 8 extends into the top of the body 1 and through the cap 2, substantially as shown, and this plunger is provided with a piston or piston head 9, which operates within the cylinder 5. In the raised position of the plunger 8, the piston 9 rests on a seat 10 at the upper end of the cylinder 5. In this position of the piston the fluid is trapped within the cylinder 5 and none of this fluid can move upwardly past the piston. On the upward stroke of the piston 9 fluid will move past the ball valve 7. When the piston 9 stops moving, the valve 7 will seat and fluid will be trapped in the cylinder 5. The piston 9 fits loosely within the cylinder 5 when moved downwardly below the seat 10 so that fluid can readily pass upwardly around the piston. The plunger 8 extends upwardly out of the bailer body 1 and is provided with

a threaded coupling 11 at its upper end and suitable weights called "sinker bars" are attached to the coupling 11 and these sinker bars in turn are connected to a cable, all of which is usual and well known in the art.

A bailer bottom 12 is attached to the sleeve 5*a* by means of the collar 12' which threads onto the sleeve. The collar 12' is mounted on the bailer bottom 12 by cutting the collar 12' vertically, then assembling the cut collar on the bailer bottom, and then welding the collar in its assembled position around the bailer bottom and this bailer bottom is provided with a number of vertical non-axial auxiliary bores 13, each non-axial bore being open at the bottom and closed at the top. An inlet port 14 is drilled into each of the bores 13, adjacent the top of the bore and also a second passage 15 is drilled through the inner wall of each non-axial bore at the bottom to communicate with the central passage 16, through the bailer bottom. This central passage 16 extends entirely through the bailer bottom 12, and the non-axial auxiliary bores 13 are arranged around the bore 16. The valve 7 is seated in the central passage 16 substantially as shown.

In operation, the bailer is lowered into the well on the suspending cable and in this position the piston 9 rests on the seat 10. The bailer drops into the well until bottom is reached where the accumulated sand 17 rests. The bailer bottom 12 partially buries itself into this sand and while the bailer is dropping it fills with fluid in the well since the valve 7 is free to unseat itself and fluid will pass upwardly through the passage 16. Therefore, when bottom is reached, the cylinder section 5 will be filled with fluid. By slacking off on the cable, the weight of the sinker bars causes the plunger 8 to drop into the cylinder 5 and the piston 9 moves off of its seat 10.

At the same time, the valve 7 is seated due to increased hydraulic pressure within the cylinder 5. The fluid within the cylinder 5 can now move upwardly past the piston 9 and this causes the metal ring 18 to be pushed upwardly along with the rubber or plastic packing 19 which rests on this ring as well as a second annulus 20, which rests on top of the packing 19. A light spring 21 normally urges the packing 19 and the rings 18 and 20 downwardly. The packing 19 normally fits rather closely around the plunger 8 and also fits rather closely within the bore of the cap 2. Thus, any pressure exerted within the cylinder 5 by the lowering of the piston 9 and the plunger 8 will act against the bottom of the packing 19 as well as against the ring 18, causing the entire assembly to raise against the tension of the spring 21, as shown in Figure 2. This opens the outlet port 3 and permits excess fluid to flow out through the outlet port.

When the piston 9 and the plunger 8 are raised, thus relieving pressure within the cylinder 5, the spring 21 will again push the rings 18 and 20 of the packing 19 downwardly, thus closing the ports 3 and preventing the flow of fluid out of the cylinder 5. The upward movement of the piston 9 and plunger 8 in the cylinder 5 will thus cause a partial vacuum within the cylinder 5 which unseats the ball 7 and causes fluid to flow through the ports 14 and 15 and past the accumulated sand 17, thereby picking up this sand along with the fluid as fluid flows upwardly through the passage 16 and thence past the valve 7 and into the bottom of the cylinder 5.

Reciprocation of the plunger and the piston is continued until an adequate supply of sand is accumulated above the valve 7 and thereafter the tool is returned to the surface and dumped. The ring 18 rests on a shoulder 22 in its lowered position, thus limiting the further downward movement of the assembly 18 and 19 and 20.

Having described my invention, I claim:

1. A plunger type bailer comprising an outer tubular body, a plunger extending into the top of said body and reciprocally mounted therein, said plunger being of lesser diameter than said body to provide a fluid space around said plunger, a cable attached to the upper end of the plunger whereby said plunger is reciprocated, a piston on the lower end of the plunger positioned within said body, a seat in the body against which the piston rests in the raised position of said piston, said body including a cylindrical chamber portion below the seat and said piston being of lesser diameter than the cylinder por-

tion of the body, a valve in the lower end of said body, a seat in said cylindrical chamber portion and on which said valve rests, said valve being below the piston, said valve acting as a check to prevent downward movement of fluid thereby, the upper end of said tubular body having ports extending laterally through the wall thereof, said ports being positioned above the cylindrical chamber portion, a seat in the body below said ports, and a ring valve surrounding the plunger and normally resting on the last named seat and closing said ports when resting on the seat, said valve being slidable vertically within the body and on the plunger to move above said ports and open the same.

2. A plunger type bailer comprising an outer tubular body, a plunger extending into the top of said body and reciprocally mounted therein, said plunger being of lesser diameter than said body to provide a fluid space around said plunger, a cable attached to the upper end of the plunger whereby said plunger is reciprocated, a piston on the lower end of the plunger positioned within said body, a seat in the body against which the piston rests in the raised position of said piston, said body including a cylindrical chamber portion below the seat and said piston being of lesser diameter than the cylinder portion of the

body, a valve in the lower end of said body, a seat in said cylindrical chamber portion and on which said valve rests, said valve being below the piston, said valve acting as a check to prevent downward movement of fluid thereby, the upper end of said tubular body having ports extending laterally through the wall thereof, said ports being positioned above the cylindrical chamber portion, a seat in the body below said ports, and a ring valve surrounding the plunger and normally resting on the last named seat and closing said ports when resting on the seat, said valve being slidable vertically within the body and on the plunger to move above said ports and open the same, and a spring bearing against the ring valve and urging said ring valve against the last named seat.

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