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BAILER

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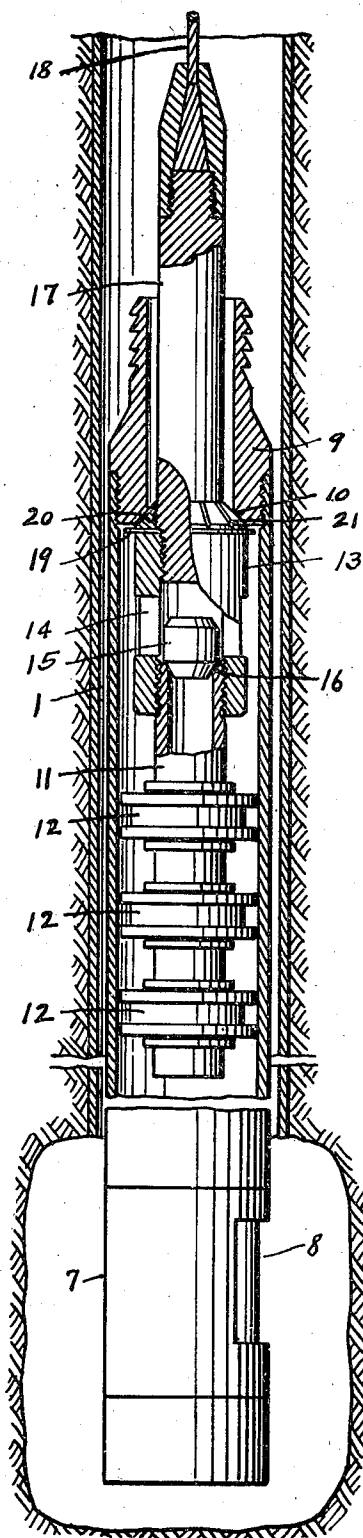


Fig. 1.

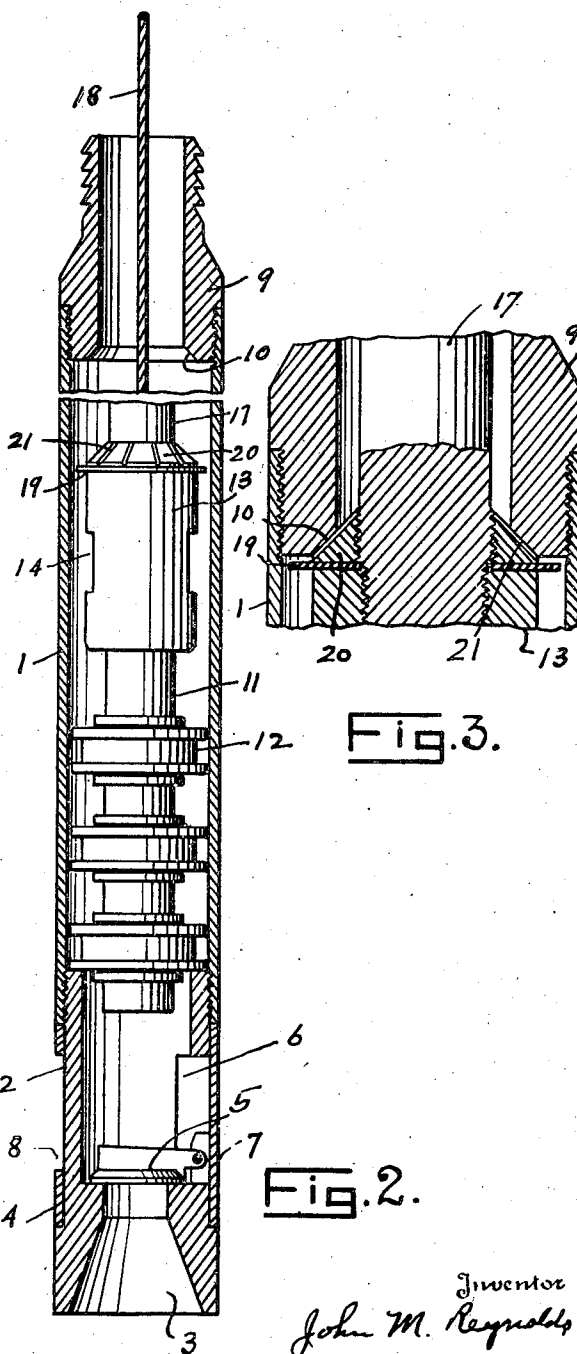


Fig. 2.

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BAILER

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3 Claims. (Cl. 166—19)

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This invention relates to a bailer specially designed for removing sand and other loose foreign matter from wells.

An object of the invention is to provide a bailer of the character described embodying a barrel and a plunger therein and which may be lowered into the well and manipulated to draw a load of the sand, or other matter to be removed, into the barrel and trapped therein for removal to the ground surface. The bailer is of such construction that it will entrap and retain a sufficient amount of fluid under pressure, if there is pressure in the well, to unload the barrel when the unloading valve is opened at the surface, and also embodies novel construction whereby the barrel will be opened when the pressure within the barrel is equal to or below the pressure on the outside.

Other objects and advantages of the invention will be explained more specifically and in detail in this specification which is illustrated by the accompanying drawings wherein—

Figure 1 shows a side elevation of the bailer partly in section with the plunger in its upper position, that is, at the end of the intake stroke.

Figure 2 shows a side elevation thereof, partly in section, showing the plunger in its lower position, that is to begin the intake stroke; and

Figure 3 shows an enlarged, fragmentary, sectional view of a novel type of valve employed.

Referring now more particularly to the drawings wherein like numerals of reference designate the same parts of each of the figures, the numeral 1 designates a tubular barrel which may be made of any desired length and whose lower end is formed into a tubular valve cage 2 having a downwardly diverging inlet opening 3 and an inside annular valve seat 4. This valve seat is normally closed by an upwardly opening flap valve 5 which is pivoted to one side of the cage as shown in Figure 2. The valve cage has a side discharge opening 6 which may be opened and closed by the sleeve valve 7 mounted to rotate about the cage and having a side opening 8 adapted to be brought into and out of registration with the opening 6.

Screwed into the upper end of the barrel there is a tubular head 9 whose lower end is formed with a downwardly flared valve seat 10.

There is a tubular plunger rod 11 in the barrel and mounted on this rod are the piston rings 12, 12, 12 whose outside diameter is slightly smaller than the inside diameter of the barrel 1 so as to provide clearance between the rings and the barrel to reduce the wear caused by sand and grit in the material drawn into the bailer.

Attached to the upper end of the plunger rod

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11 there is a valve cage 13 which has the side openings 14 and located in this cage there is a valve 15. The upper end of the rod 11 is formed with an upwardly flared valve seat 16 and the lower end of the valve 15 is tapered to fit said seat.

Screwed into the upper end of the cage 13 there is a stem 17 whose upper end is provided with a cable socket for the attachment of an operating cable 18 thereto.

The numeral 19 designates an annular flexible valve 19 which is clamped against the upper end of the cage 13 by the clamp nut 20. This clamp nut is screwed onto the stem 17 and its upper side tapers to conform to the taper of the seat 16 and it is provided with the external grooves 21 for a purpose to be hereinafter explained. The margin of the valve 19 is free and extends out almost, but not quite, to the inside wall of the barrel as is more accurately shown in Figure 3. The valve 19 is preferably formed of rubber although it may be formed of any other suitable, flexible material. When the plunger is in its upper position the tapering portion of the nut 20 will seat against the seat 16, as shown in Figure 3, and the valve 19 will be spaced a short distance beneath the lower end of the head 9 and the grooves 21 will remain open unless there is a greater pressure inside the barrel than outside the barrel in which case the valve 19 will close.

In use the sleeve valve 7 is turned to close the openings 6 and 8 as shown in Figure 2. The bailer is then lowered into the well, as illustrated in Figure 1, until it lands on bottom and the cable 18 is then slacked off allowing the plunger to move downwardly into the position shown in Figure 2, the liquid beneath the plunger passing upwardly around the plunger and mainly through the hollow plunger rod 11 lifting the valve 15 and passing out through the openings 14. The stem 19 will pass down into the barrel 1 when the plunger moves to its lowermost position. The plunger is then pulled upwardly, the liquid above it passing on up through the tubular head 9 and the suction drawing into the barrel a load of sand or other well detritus past the upwardly opening valve 5 whereupon said valve will close to trap the contents of the barrel. When the stem enters the passageway through the head 9 said passageway will be greatly restricted thus, temporarily, trapping the liquid in the barrel between the plunger and the lower end of the head 9 thus forming a fluid cushion so that the stroke of the upper end of the tapering nut 20 against the seat 10 will be relieved. The plunger may be re-

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ciprocated up and down one or more times, if necessary, to secure a load and the bailer may then be withdrawn from the well.

The tapering nut 20 will contact the seat 10 upon upward movement of the bailer. If there is well pressure at the bottom of the well, that is, if the well is a "live" well, the pressure fluid will be drawn into the barrel but since the pressure on the outside of the bailer is the same as that on the inside of the barrel the valve 19 will remain open, as shown in Figure 3. However, as the bailer is elevated the pressure outside of the bailer gradually decreases and eventually during the upward movement of the bailer the pressure fluid within the barrel will exceed that outside the barrel sufficiently to force the valve 19 against the lower end of the head 9 to completely close the ducts 21 and retain sufficient pressure within the barrel for unloading purposes.

When the bailer has reached the ground surface the valve 7 may be opened and the pressure in the barrel will force the load out through the opening 6.

Should there be no pressure in the well, that is, should the well be "dead" the load may be drawn in as before but it will not be under pressure and the valve 19 will remain, at all times, open. In this case when the bailer reaches the ground surface and the valve 7 is opened air may readily enter the upper end of the barrel through the ducts 21 so as to prevent the formation of a vacuum, or partial vacuum, therein thus allowing the load to freely discharge itself from the barrel through the opening 6.

Broadly, the invention embodies a bailer that will retain sufficient well pressure, if any, to discharge the load when the discharge valve is opened at the ground surface and which, if there is no pressure in the well, will automatically admit air into the barrel when the bailer reaches the surface and the discharge valve is opened, to facilitate the gravity discharge of the load.

What I claim is:

1. A bailer comprising, a barrel having an entrapping chamber provided with entrapping means at its inlet, a plunger reciprocable in said chamber and adapted upon reciprocation to draw a load into the chamber and cause the liquid therein to be expelled therefrom to thereby induce inflow into the chamber past the entrapping means, a valve seat at the upper end of the chamber against which the upper end of the plunger may seat, said bailer having a restricted liquid passageway between the seat and upper

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end of the plunger when said end is seated against said seat, an annular valve on, and movable with, the plunger and having its free margin flexible for closing said passageway and retaining in the chamber at least a substantial portion of the pressure existing in the well in which the bailer may be lowered to be subsequently utilized to facilitate unloading said chamber.

2. A bailer comprising, a barrel having a chamber having an inlet and provided with entrapping means at its inlet, said chamber having an outlet, a plunger reciprocable in the chamber and adapted to draw a load into the chamber and cause the liquid therein to be expelled therefrom through said outlet to thereby induce inflow into the chamber past the entrapping means, the plunger being shaped to only partially close said outlet when said plunger has reached the limit of its movement in one direction, an annular valve on, and movable with, the plunger and having its outer margin free and flexible and being thus adapted to be moved by pressure within the barrel to completely close said outlet as the bailer moves upwardly, if there is excess pressure in the barrel, so as to retain the charge in the barrel under pressure.

3. A bailer comprising, a barrel having a chamber provided with an inlet and an outlet, a seat around the outlet, entrapping means controlling the inlet, a plunger reciprocable in the chamber and adapted to draw material into the chamber past the entrapping means and to engage the seat and only partially close the outlet, an annular valve on, and movable with, the plunger and which is normally open and which has a flexible, free margin and is thus adapted to be moved against said seat and completely close said outlet by pressure within the chamber, when the plunger is in its uppermost position, to close said outlet.

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