UNITED STATES PATENT OFFICE

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Vacuum Sand Bailer

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This invention relates to improvements in bailers for use in well drilling, particularly in oil well operations.

As is well known, it frequently occurs in oil well drilling that sand fills the lower part of the drill hole and seriously interferes with the flow of oil thereinto, if it does not completely stop the same. This sand must, therefore, be removed before the pumping of the oil from the well can continue and tools of various types have been devised for bailing out this sand.

While, in the majority of cases, the tools employed for removing the sand from the bottom of a well simply act by allowing the sand to flow by gravity thereinto, when the tool is lowered to the proper position, the primary object of the present invention is to provide a bairer in which a vacuum is created which causes the sand to be stirred up and sucked into the lower part of the tool. This obviates the necessity for using agitators in advance of the introduction of the bairer, or for employing a stirring or agitating element as a part of the bairer structure.

A further object of the invention is to provide a vacuum sand bairer having certain novel features of construction which make it easy to operate and enable the user to easily and quickly remove the sand from the well.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawings forming part of this specification, the understanding, however, that the invention is not confined to any strict conformity with the showing of the drawing but may be changed or modified so long as such changes or modifications mark no material departure from the salient features of the invention as expressed in the appended claims.

In the drawings:

Figure 1 is a longitudinal sectional view of the bairer embodying the present invention.

Figure 2 is a view in cross-section of the same taken on the line 2—2 of Figure 1.

Referring more particularly to the drawings, wherein like numerals of reference indicate corresponding parts throughout the several views, the numeral 1 indicates generally the cylinder of the present bairer to the lower end of which is connected, by a flush joint connection, a valve body 2 having an inlet opening through the lower part thereof, as indicated at 3, which is controlled by an upwardly or inwardly opening check valve 4.

The upper end of the cylinder 1 has connected therewith the head 5, the connection between the head and the cylinder being flush the same as the connection between the valve casing 2 and the cylinder and the upper part of this head is reduced to form the collar 6. This head 5 is also provided, adjacent the point where it connects with the cylinder 1, with openings 7 in the wall thereof, the purpose of which will become apparent as the description proceeds.

Extending through the neck 6 of the head 5, and having a snug fit therein, is a tubular stem 8 which carries upon the end within the cylinder the piston head 9, the center of the head having an opening therethrough communicating with the stem 8, as shown.

Surrounding the stem 8, and positioned upon the head 9, is a relatively thick rubber body 10 which bears against the wall of the cylinder and forms a fluid seal, as will be hereinafter described.

The piston head and the rubber body or fluid seal 10 have the passages 11 there-through, each of which is closed at its upper end by an upwardly opening flap valve 12 so that fluid may be transferred from beneath the piston to the top side thereof as the piston descends in the cylinder, without interfering with this descent, and be ejected by the piston on its return movement and, when the valves 12 are closed, through the openings 7 into the well. A spring body 13 surrounds the stem 8 and is interposed between the head 5 and the fluid seal body 10 which forms a part of the piston head structure, which serves as a cushion for the piston head when the same is drawn upwardly.

At its upper end the stem 8 is covered by a screen 14 and over this screen is positioned a clevis 15 by means of which connection is...
made between the tool and an operating cable (not shown).

At a point below the upper end of the stem a joint is made at which point an upwardly opening check valve is positioned within the stem, and exteriorly thereof there is secured to the stem the bumper which is designed to be brought into contact with the upper edge of the collar of the head, in the operation of the tool.

In operation, when the bailer is lowered to the bottom of the well the fluid which will have entered the lower part of the bailer is displaced by the piston and stem and passes up through the passages past the valves and may also flow up through the stem past the valve and escape through the top of the stem. When a pull is applied to the cable connected with the close the piston will be moved upwardly in the cylinder and thus create a suction therebeneath which will cause the sand laden liquid in the well to be drawn in past the valve into the lower part of the cylinder. The operator of the bailer may then allow the piston to lower again and thus repeat this operation until the lower part of the bailer is completely filled with sand. It will, of course, be understood that the liquid which flows through the passages will be moved upwardly and will be forced to flow out through the escape openings at the top of the cylinder. The weight of this fluid above the piston, upon the rubber seal, will cause the same to expand and contact firmly with the wall of the cylinder and thus prevent the leakage of the fluid back past the piston.

The screen serves to prevent gravel or large stones passing through the bailer to the upper side thereof and the bumper serves, through its heavy contact with the top of the head, to force the lower end of the cylinder down into the sand of the well.

Having thus described the invention, what is claimed is:

1. A well bailer of the character described, comprising an elongated cylinder, an inwardly opening valve in one end of the cylinder, a piston in the cylinder having a tubular stem extending through the other end thereof, said stem opening through the piston, valve means controlling the passage of fluid through the stem, a compressible body surrounding the stem and resting upon said piston, said body and piston having passages therethrough, and valves controlling said last passages to pass fluid from the lower end to the upper end of the cylinder past the piston, for escape through apertures formed in the upper end of the cylinder.

2. A vacuum sand bailer, comprising an elongated cylinder having a head at one end reduced to form a collar, a valve controlling the other end of the cylinder and opening inwardly, a piston within the cylinder having a tubular stem extending through and snugly engaging in said collar, said stem opening through the piston, an upwardly opening valve in said tubular stem, a rubber body surrounding the stem and resting upon the piston and engaging the wall of the cylinder, said rubber body and piston having passages therethrough for the transfer of fluid from the lower to the upper part of the cylinder, check valves controlling said passages, and resilient means interposed between the body on the piston and the head of the cylinder, said cylinder having fluid outlet apertures at its upper end.

3. A vacuum sand bailer, comprising an elongated cylinder having a head at one end reduced to form a collar, a valve controlling the other end of the cylinder and opening inwardly, a piston within the cylinder having a tubular stem extending through and snugly engaging in said collar, said stem opening through the piston, an upwardly opening valve in said tubular stem, a rubber body surrounding the stem and resting upon the piston and engaging the wall of the cylinder, said rubber body and piston having passages therethrough for the transfer of fluid from the lower to the upper part of the cylinder, check valves controlling said passages, resilient means interposed between the body on the piston and the head of the cylinder, said cylinder having fluid outlet apertures at its upper end, and a screen preventing the passage of large particles of matter through said stem.

4. A vacuum sand bailer, comprising an elongated cylinder having a head at one end reduced to form a collar, a valve controlling the other end of the cylinder and opening inwardly, a piston within the cylinder having a tubular stem extending through and snugly engaging in said collar, said stem opening through the piston, an upwardly opening valve in said tubular stem, a rubber body surrounding the stem and resting upon the piston and engaging the wall of the cylinder, check valves controlling said passages, resilient means interposed between the body on the piston and the head of the cylinder, said cylinder having fluid outlet apertures at its upper end, and a bumper surrounding said stem exteriorly of the cylinder and adapted to contact with said collar.

In testimony whereof I hereunto affix my signature.

ALLEN H. FLETCHER.