July 12, 1932. D. E. WEBBER 1,866,828

COMBINATION SAND PUMP AND BAILER

Filed June 21, 1928

Fig. 1.

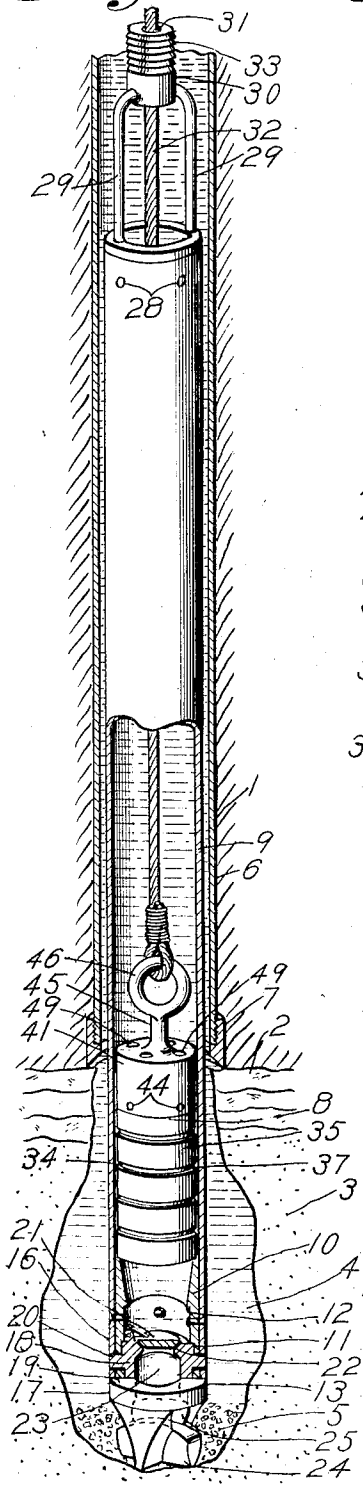


Fig. 2.

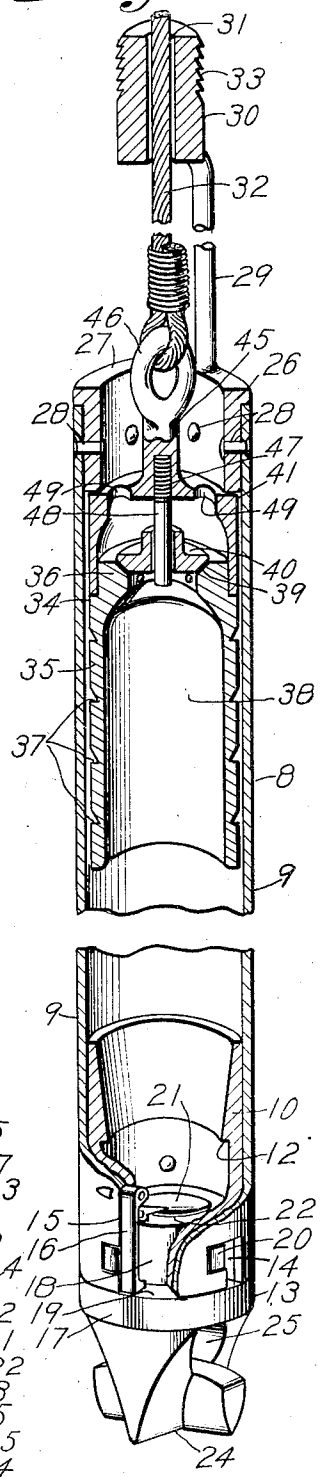


Fig. 3.

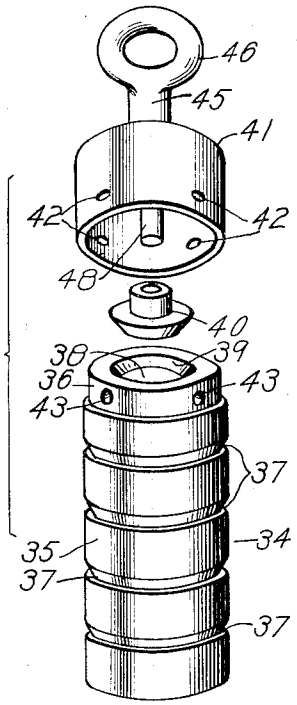
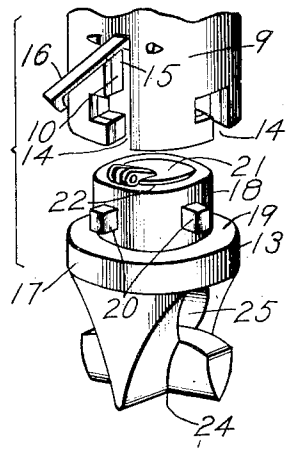


Fig. 4.



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UNITED STATES PATENT OFFICE

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COMBINATION SAND PUMP AND BAILER

Application filed June 21, 1928. Serial No. 287,091.

My invention relates to bailers and more particularly to a device of that character for use in well drilling operations for removing sand, detritus or other deleterious substances from the bottom of a well and for taking samples of fluid from the well; the principal object of the invention being to provide greater effective lifting space for a bailer between the floor and crown block of a derrick, to eliminate the rod connection ordinarily provided between the plunger of a bailer and a lifting cable, and to connect the cable directly to the plunger, thereby permitting the use of bailers of greater length in the derrick space.

Further objects of the invention are to provide an effective liquid seal between the plunger and the cylinder of the bailer for the intake stroke of the plunger, to lubricate the members in their sliding contact, and to prevent sand or detritus from adhering to the walls of the members.

In accomplishing these and other objects of the invention, I have provided improved details of structure, the preferred forms of which are illustrated in the accompanying drawing, wherein:

Fig. 1 is a vertical section of the lower portion of an oil well, illustrating application of my improved bailer thereto.

Fig. 2 is an enlarged longitudinal section of the bailer showing the plunger at the upper limit of its travel and the intake and outlet valves closed.

Fig. 3 is a detail perspective view of parts of a disassembled plunger.

Fig. 4 is a detail perspective view of the lower portion of the bailer cylinder and the intake valve cage, particularly illustrating the means for joining and locking the members in assembly.

Referring in detail to the drawing, 1 designates an oil well extending through cap rock 2 above the oil sand 3 and terminating in a pocket 4, and 5 designates sand or débris accumulated in the bottom of the pocket as a result of shooting of the well, reaming, or natural dislodgment from the walls of the pocket.

The well hole above the cap rock is lined with casing 6 supported by a shoe 7 on the cap rock, the casing serving as a channel through which a bailer 8 constructed in accordance with my invention may be lowered into a well for taking samples of fluid or for cleaning out the débris collected at the bottom of the well hole.

The bailer 8 comprises a barrel 9 of less diameter than the casing so as to pass freely into the well, and fixed in the lower end of the barrel a reinforcing sleeve 10 having spaced annular shoulders 11 and 12 formed on its inner wall for engagement with various types of valve cages, the lower shoulder 11 being herein shown engaged by a valve cage 13 especially adapted for well cleaning purposes.

Formed in the lower end walls of the barrel and sleeve are bayonet slots 14, one of the slots having an upward extension 15 in the upper end of which is hingedly mounted a locking tongue 16 adapted for locking the cage in assembled relation with the barrel as will hereafter be described.

The valve cage 13 comprises a ring portion 17 having an outside diameter equal to the outside diameter of the barrel and a collar 18 protruding upwardly from the ring and of less diameter than the ring, to provide a shoulder 19 engageable with the end of the barrel. The collar 18 fits within the sleeve 10 with its upper end abutting the shoulder 11, and stop lugs 20 equally spaced on the periphery of the collar are received by the slots 14 and locked therein by means of the locking tongue 16, as shown in Fig. 2.

Hingedly mounted on the collar 18 is a clapper or check valve 21 fitting in a seat 22 at the upper end of an opening 23 (Fig. 1) extending centrally through the upper portion of the valve cage. A cutter blade 24 depending from the ring 17 is provided with a transversely extended opening 25 communicating with the opening 23, so that the intake of fluid through the openings into the barrel is controlled by the valve 21.

Fitted in the upper end of the barrel is a collar 26 having a shouldered flange 27 at its upper end resting on the top of the barrel, the collar being secured to the walls of the barrel by rivets or like fastening means 28, the

collar providing an inwardly extending plunger-engaging shoulder in the barrel.

Extending upwardly from the top of the collar and preferably formed integrally therewith are bails 29 carrying a neck 30 axially aligned with the barrel, the neck being provided with a central opening 31 for receiving a cable 32 for free slidable movement therein. Annular corrugations 33 are provided on the periphery of the neck for engagement by fishing tools for recovering the bailer from a well, in the event of breakage of the cable.

Mounted for free slidable movement in the barrel 9 is a plunger 34 including a tubular body 35 having materially less diameter than the barrel to form an annular channel between the plunger and the barrel, and reduced at its upper end to form a neck 36 and provided throughout its length with equally spaced annular grooves 37.

The opening 38 through the body 35 is restricted at its upper end and provided with a valve seat 39 for seating a valve 40.

Fitted on the neck 36 is a valve cage 41 equal in outside diameter to the body 35 and having equally spaced openings 42 registering with openings 43 in the neck (Fig. 3); and rivets 44 (Fig. 1) applied through the openings serve to secure the members in assembled relation.

Formed on the top of the cage 41 is a stem 45 having a ring 46 at its upper end to receive the cable 32, the cable being inserted through and tied immediately above the ring to permit the cable to pass through the collar 26 and lift the plunger 34 to the upper limit of its travel.

Extending upwardly into the stem 45 from within the cage 41 is a threaded socket 47 engaged by a pin 48, the pin depending centrally into the valve seat opening and being slidably engaged by the valve 40 for retaining the valve in its proper working relation with the valve seat 39.

Ports 49 are provided in the top of the valve cage 41 so that the fluid admitted to the barrel through the intake valve 21 during the downward movement of the barrel may pass by the check valve 40 during the downward movement of the plunger in the barrel and thus be trapped in the portion of the barrel above the plunger.

In practicing with my improved bailer, its operation is as follows:

When the bailer is attached to the sand line or cable 32 and suspended from the crown block in a derrick, the parts are in position as shown in Fig. 2. The valves 21 and 40 are closed on their seats, and the plunger connected with the sand line supports the bailer through engagement of the top of the valve cage 41 of the plunger with the collar 26 in the upper end of the barrel.

When the bailer is being lowered into a well, the parts remain in the position shown in Fig. 2 until the column of fluid is encountered, whereupon the valve 21 swings open and the fluid passes upwardly into the barrel, lifting the valve 40 from its seat and passing thence upwardly through the ports 49 and out through the top of the barrel.

When the bailer arrives at the bottom of the well and rests on the bottom of the well pocket 4, the valve 21 is relieved of pressure from below and closes, the plunger 34 moves downwardly in the barrel, the valve 40 remaining open so that the fluid continues to pass through the plunger and valve cage, until the plunger arrives at the lower limit of its travel and rests on the reinforcing sleeve 10, as shown in Fig. 1.

With the bailer resting on the bottom of the well pocket and with the plunger in its down position, the bailer is situated for receiving a fluid charge of sand and débris from the bottom of the pocket. As lifting movement is imparted to the sand line the plunger is drawn upwardly in the barrel 9. Since the plunger is loosely fitted in the barrel, the fluid trapped above the valve cage escapes between the walls of the plunger and barrel, and is interrupted in its downward passage by the grooves in the plunger, thereby effecting a fluid seal and lubricating the contact surface of the members.

The upward movement of the plunger thus sealed and packed results in the opening of the valve 21 and the drawing of a charge through the openings 25 and 23 into the barrel.

When the plunger arrives in engagement with the collar 26 at the top of the barrel, the barrel starts upwardly with the plunger, the valve 21 closes, thus trapping the fluid charge drawn into the bailer, and the bailer is then lifted from the well.

The key 16 may then be pivoted out of locking position, the cage 13 rotated to disengage the bayonet joint members, and the cage removed to permit outflow of the charge.

The bailer thus described occupies a vertical space equal only to the length of the barrel when withdrawn and will therefore require a relatively small space above the floor of the derrick in discharging positions, and a relatively longer bailer may be employed in limited derrick space.

What I claim and desire to secure by Letters Patent is:

1. In a bailer including a barrel and a plunger having circumferential spaced apart oil retaining grooves in its outer surface reciprocable in the barrel and having a reduced opening in its upper end, means for supporting the barrel from the plunger including an inner shoulder on the barrel, and a valve cage having air passage means secured to the upper end of the plunger engageable at its top with said shoulder, a cable-receiving

ring carried by the cage extensible into the barrel, a valve-guiding pin removably secured in the interior of the cage, and a valve freely slidable on said pin controlling said opening.

2. In a device of the character described including a barrel having an internal shoulder at the upper and lower ends thereof and a valve controlled opening in its bottom, a cable guide connected to the barrel in spaced relation with the upper end thereof, a cable extending through said guide, and a plunger provided with fluid receiving and retaining grooves in its outer face located in the barrel, a valve cage fixed to the upper end of the plunger and having sufficient diameter to engage the shoulder at the upper end of the barrel upon upward movement of the plunger in the barrel and provided with a cable-receiving ring freely movable through the opening formed by said shoulder at the upper end of the barrel.

3. In a device of the character described, a barrel having a bottom provided with a valve controlled opening, internal stop shoulders adjacent its upper and lower ends, and a hollow plunger reciprocable in the barrel, supporting means for the plunger including an apertured disk engageable with the shoulder at the upper end of the barrel having a depending skirt fixed to the plunger so as to form a valve chamber, an axial boss on said disk adapted to receive a cable, a valve operable in said chamber for closing the upper end of the plunger, and a guide pin depending from said disk, said guide pin adapted to extend through said valve.

4. A combination sand pump and bailer comprising a tubular barrel, a cage having a valve controlled opening therethrough carried by the lower end of said barrel, a sleeve located within said barrel and above said cage, a hollow piston closed at its upper end located in and of less diameter than said barrel, said piston having spaced apart fluid receiving and retaining circumferential grooves formed in its outer face, a valve controlled passage through the upper end of said piston, a cage having an apertured top secured to the upper end of said plunger, a guide pin depending in said cage and passing axially through said valve, means extending upwardly from said cage for the attachment of a line, a collar secured in the upper end of said barrel, a neck having a central opening located axially above said barrel, and bails for securing said collar and neck together.

In testimony whereof I affix my signature.

DONALD E. WEBBER.