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BAILER

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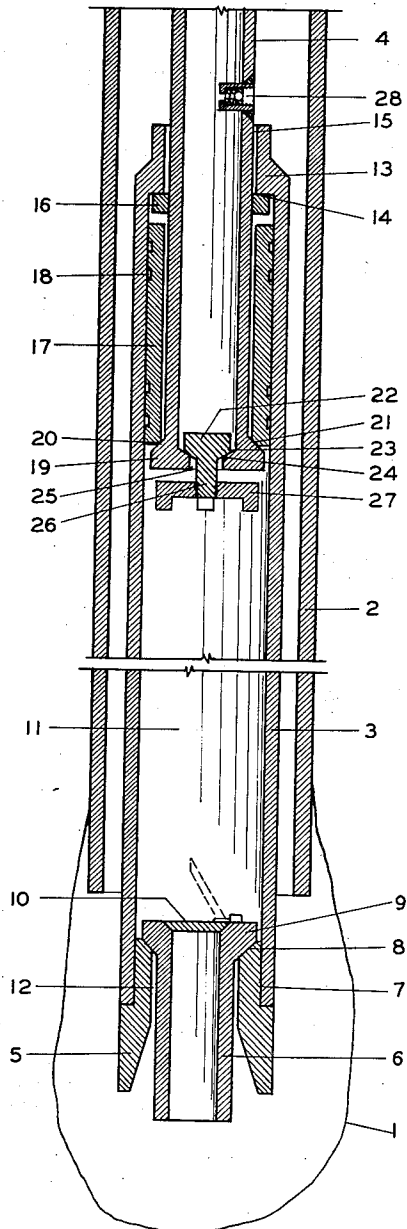


FIG. 1

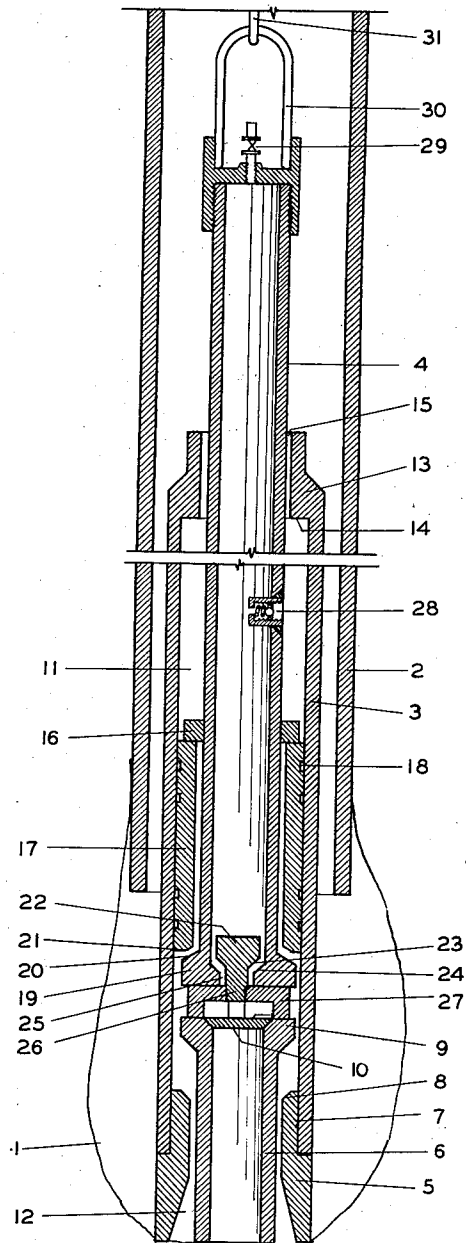


FIG. 2

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BAILER

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5 Claims. (Cl. 166—19)

This invention relates to improvements in bailers which have been primarily designed for bailing oil wells. More specifically it relates to mechanical equipment for bailing and removing sand or other particles from oil wells.

Heretofore bailers have been provided wherein the interior chamber of the bailer was kept under a vacuum which chamber upon the landing of the bailer on the bottom of the well hole was opened to cause an inflow into the chamber of well liquid having in suspension sand and silt. Such bailers, while having certain advantages are disadvantageous in that no provision is made for washing away the particles and debris which are clogging the sand particles around the well hole. With the above mentioned type of bailer, as well as in the conventional type of bailer, the bailer lands in the debris in the bottom of the well without having cleaned the well hole above the bottom of the well. The debris that is caused to enter the barrel of the bailer is only that debris which is ahead of or beneath the bailer. The debris which is opposite the sides of the bailer remains in close contact therewith and should there be any material settling or caving, such types of bailers may become stuck in the well.

An object of the present invention is to provide an improved bailer and oil sand washer wherein the bailer carries with it a supply of fluid under high pressure which fluid is released on the landing of the bailer on the bottom of the well and causes a washing and agitation of the sand particles forming the wall of the well. By releasing fluid pressure in the well, the discharged fluid will enlarge the cavity in the debris which is penetrated and formed by the bailer so that there is less danger of the bailer sticking or becoming frozen in the well.

A further object of this invention is to provide an improved bailer which will loosen tightly packed cavings, sand, silt, wax and other residues collected in the bottom of the well or accumulated along the sides of the well or on the sand faces.

A further object of this invention is to provide a pumping action to fill the bailer with the loosened material that is to be removed from the well hole when the pressure fluid has been exhausted.

A still further object of the invention is to provide an improved bailer which has a simple and efficient means for dumping or removing the material from the bailer when removed from the well hole.

A still further object of the invention is to

provide an improved bailer which has a simple and effective means for releasing the pressure fluid from the chamber when the bailer strikes the bottom of the well hole.

A still further object of the invention is to provide an improved bailer in which considerable jarring action can be effected within the bailer to jar the bailer loose in the hole if it should become stuck therein.

With the foregoing and other objects in view, which will be made manifest in the following detailed description and specifically pointed out in the appended claims, reference is had to the accompanying drawing for an illustrative embodiment of the invention, wherein:

Fig. 1 is a vertical sectional view through the lower end portion of the improved bailer showing the same in a well hole and before the pressure fluid has been released.

Fig. 2 is a vertical sectional view through the improved bailer showing the same in the well hole and the position of the parts when the fluid pressure is being released.

Referring to the accompanying drawing wherein similar reference characters designate similar parts throughout, in Fig. 1 the improved bailer is shown as comprising a lower barrel portion 3 having reciprocally mounted therein the upper barrel portion 4. The bailer may be constructed of two sections of seamless steel tubing, each about thirty feet in length with the lower section or barrel being of a larger diameter than the upper section 4 as to allow for the reciprocating action between the respective members. In the drawing the bailer is shown as passing down through the casing 2 into the well hole 1 and as represented the bailer has not as yet struck the bottom of the well hole.

The lower end of the bailer has mounted therein a sleeve member 5 which along with the sliding valve member 6 acts as a closure means for the bottom end of the lower barrel member 3. The sleeve 5 may be attached to the barrel 3 by either screw threads or lugs as shown at 7, but the connection used should be easy to disassemble because when the bailer has been filled with sand and silt and is lifted to the ground level, the members 5 and 6 are removed from the lower barrel portion in order to empty the contents of the bailer and prepare the same for another trip into the well. The sleeve member 5 presents a seat portion 8 at the top thereof and the sliding valve member 6 has a ledge portion 9 which portions have a very close ground joint fit in order to form a seal at this point.

The member 6 has mounted in the top thereof a flapper valve 10 which operates to admit sand and silt from the well hole to the chamber 11 of the lower barrel, but will close from the weight of the material in the chamber when the bailer is lifted out of the well hole. The sliding member 6 is concentric with the sleeve member 5 and spaced therefrom, leaving the channel or space 12 between the two members 5 and 6. The member 6 extends somewhat below the end of the member 5 so that it is the first portion of the bailer to strike the bottom of the well hole, and being slidable will telescope in the member 5 until the end of member 5 strikes the bottom of the well hole and all motion of the bailer downwardly in the well hole is halted. On the downward travel of the bailer in the casing, the ledge 9 on the slidable valve member is in sealing engagement with the seat 8 on the sleeve 5, thus closing off the channel 12. When the sleeve 6 strikes the bottom of the well hole, the ledge 9 is lifted off the seat 8 thus putting the channel 12 in communication with the chamber 11.

The upper end of the barrel 3 has a head portion 13 which has a shoulder portion 14 within the barrel and an opening 15 through which the upper barrel 4 has a sliding or reciprocating movement. Within the chamber 11 of the lower barrel 3, the upper barrel has a shoulder or flange 16 which contacts the shoulder 14 on the outer barrel to hold the two barrels assembled when in fully extended position. Mounted within the chamber and on the lower end of the barrel 4 is a flange 19 which presents a seat 20. Mounted between the shoulders or flanges 16 and 19 is a piston member 17 having a sliding fit with the inner wall of the lower barrel 3 and piston 17 has mounted therein piston rings to seal the piston with the wall of the lower barrel 3. The piston has a seat portion 21 on the bottom thereof which forms a ground joint seal with the seat 26 when the barrel 4 is in fully extended position to thus seal the chamber 11 from the exterior. The bottom of the barrel 4 has a seat 24 and a valve 22 mounted in the barrel 4 and presenting a surface 23 to rest on the seat 24 and thus act as a closure for the bottom of the barrel 4. The barrel 4 has an opening 25 in the bottom thereof which the valve 22 closes off. The valve 22 has a stem 26 which projects through the opening 25 and is slidable therein. Mounted on the bottom of the stem 26 is a spider 27 to limit the upward movement of the valve stem. It is noted that the valve stem 26 does not completely fill the opening 25 but a considerable space is left between the stem 26 and the wall of opening 25 so as to make a flow channel.

Mounted in the side wall of the barrel 4 is a gas fill valve 28 which is exposed when the barrel 4 extends from the barrel 3, its greatest distance. Mounted at the top of the barrel 4 is the valve structure 29 which is opened to allow air to exhaust from the chamber of barrel 4 when the same is being charged with gas. A bail 30 is welded to the upper end of the bailer and attached to the sand line or cable 31 for raising and lowering the bailer in the well and also for the pumping and jarring action of the barrel 4.

To operate the bailer it is necessary to fasten the sand line or cable 31 to the bail 30 or rope socket attached to the upper end of the inner section or barrel 4. The inner section of tubing or barrel 4 is withdrawn from the outer section of tubing or lower barrel 3 until the gas pressure fill valve 28 is exposed and in a position so that

a man standing on the derrick floor may attach a high pressure gas line to this fill valve and fill the gas chamber which is the inner chamber of the inner section of tubing or the upper barrel 4 with high pressure gas. The gas employed is the volatile gas which comes from the crude oil in the oil well or any other hydrocarbon gas available. If the pressure of this gas is not sufficient as it comes from the well, the pressure of the same is raised sufficiently by pump means before being placed in the bailer. The pressure of the gas will depend upon the well conditions and will differ for most wells. During this filling operation the top air exhaust valve 29 is opened so that any air within the gas chamber is forced out by the incoming high pressure gas. Gas and air make an explosive mixture so it is very necessary that all the air be exhausted from the chamber of barrel 4 before placing the bailer in the well. When all the air is expelled the air exhaust valve 29 is closed and the gas allowed to build up within the gas chamber until the desired pressure is obtained. The lower fill valve is then closed and the bailer is ready to lower into the well.

In the lowering position the inner section of tubing or barrel 4 is withdrawn from the outer section or lower barrel 3 until the piston 17 on the lower end of the inner section of tubing 4 is in the upper end of the outer section of tubing and the shoulder 16 is in contact with the head 13 forming the upper end of the outer section of tubing. This is readily accomplished because the weight of the outer section of tubing and the loose fit about the inner section of tubing will cause the outer section to slide to the lowest point.

When the bailer reaches the bottom of the well as shown in Fig. 2, the lower sliding valve member 6 which is mounted in the sleeve 5 and adapted to slide therein will be raised or unseated from the seat portion 9 thus opening the channel 12 to the chamber 11. When the lowering cable 31 is slacked off, the inner section of tubing 4 will settle by its own weight due to the force of gravity within the outer section of tubing 3. As the spider 27 connected to the sliding valve 22 which is mounted in the lower end of the inner section of tubing 4, comes in contact with the top of the sliding sleeve valve member 6 located in the bottom of the outer section of tubing 3, valve 22 closing the gas chamber of the inner section of tubing 4 will be lifted from the seat 24 thus placing the channel 25 in communication with the interior of the gas chamber. This in turn will allow the high pressure gas within the chamber to escape through the channel 25, thence through the spider 27 and finally through the channel 12 into the sand and silt in the bottom of the well.

The gas will stir up the sand and break up caked and compacted particles of sand and silt and go into suspension with the oil in the bottom of the well. When the pressure gas has been completely exhausted from the inner section of tubing 4, the inner section of tubing may be drawn upward by the cable 31. By drawing the inner section of tubing upward, the ledge 20 is made to seal on the seat 21 and the valve 22 drops downwardly by gravity thus sealing on the seats 23 and 24. Continued upward movement of the inner section of tubing 4 in the outer tubing 3 will create a vacuum in the chamber 11, which in turn will cause the flapper valve 10 to open and allow the oil with the sand and silt in suspension to rush into the chamber 11. The inner

section of tubing may be reciprocated several times to insure complete filling of the chamber 11.

5 In case the bailer becomes so firmly embedded in the sand that it cannot be freed readily after it is filled, there will be sufficient space left between the inner and outer sections that they may be used as a set of jars to free the bailer from the sand and silt. Considerable jarring action 10 can be affected by reciprocating the inner section of tubing 4 and bringing it into contact with the head 13 of the outer section of the tubing 3.

15 After the bailer is filled with sand and is lifted free of the bottom of the well, the lower sleeve valve 6 will seat on the seat 8 on top the sleeve 5 and the flapper valve 10 will be closed by the weight and force of the sand within the chamber 11. To remove the contents of the bailer after the same has reached the surface of the well, it is 20 only necessary to raise the bottom sleeve valve 6 which will allow the contents of the bailer to be discharged through the passage 12. As the lower sleeve valve is held in the outer section of tubing 3 by a threaded or lugged coupling, the entire 25 bottom of the bailer including the sleeve valve C may be removed from the bailer and discharge the contents by this method.

30 It is to be understood that the form of our invention, herewith shown and described, is to be taken as a preferred example of the same, and that various changes in shape, size and arrangement of parts may be resorted to, without departing from the spirit of our invention or the scope of the subjoined claims.

35 Having thus described our invention, we claim:

1. A bailer comprising an outer tubular section, an inner tubular section mounted in the outer tubular section and reciprocable therein, a piston member surrounding the inner tubular section 40 having a sliding fit with the inner wall of the outer tubular section and reciprocable with the inner tubular section, said inner tubular member being closed at both ends to form a gas tight chamber for holding fluid under pressure and means 45 for releasing the pressure fluid upon the landing of the bailer on the bottom of the well hole.

2. A bailer comprising an outer tubular section, an inner tubular section mounted in the outer tubular section and reciprocable therein, a piston member surrounding the inner tubular section 50 having a sliding fit with the inner wall of the outer tubular section and reciprocable with the inner tubular section, the lower end of the inner tubular section having a ledge which seats 55 on the bottom end of the piston to thus form a seal, said inner tubular member being closed at

both ends to form a gas tight chamber for holding fluid under pressure and means for releasing the pressure fluid upon the landing of the bailer on the bottom of the well hole.

3. A bailer comprising an outer tubular section, 5 an inner tubular section mounted in the outer tubular section to reciprocate therein, said inner tubular member being closed at both ends to form a gas tight chamber for holding fluid under pressure, and means comprising a sliding valve 10 mounted on a seat portion in the lower end of the inner tubular section and held in sealing engagement with the seat by the pressure of the fluid in the chamber, and said valve being unseated for releasing the pressure fluid upon the landing of the bailer on the bottom of the well 15 hole.

4. A bailer comprising an outer tubular section, an inner tubular section mounted in the outer tubular section to reciprocate therein, said outer 20 tubular section being closed at the bottom thereof by a sliding sleeve valve member and closed at the top by the inner tubular section forming thereby a closed chamber, said inner tubular member being closed at both ends to form a gas 25 tight chamber for holding fluid under pressure, and means comprising a sliding valve mounted on a seat portion in the lower end of the inner tubular section and held in sealing engagement 30 with the seat by the pressure of the fluid in the chamber, and said valve being unseated for releasing the pressure fluid upon the landing of the bailer on the bottom of the well hole.

5. A bailer comprising an outer tubular section, an inner tubular section mounted in the outer 35 tubular section to reciprocate therein, said outer tubular section being closed at the bottom thereof by a sliding sleeve valve member and closed at the top by the inner tubular section forming thereby a closed chamber, said sliding valve member being raised upon the bailer striking the well 40 bottom to thereby establish communication between the chamber in the outer tubular section and the well hole, said inner tubular member being closed at both ends to form a gas tight 45 chamber for holding fluid under pressure, and means comprising a sliding valve mounted on a seat portion in the lower end of the inner tubular section and held in sealing engagement with the seat by the pressure of the fluid in the chamber and said valve being unseated for releasing 50 the pressure fluid upon the landing of the bailer on the bottom of the well hole.

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