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1,957,100

WELL BAILER

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Fig. 1

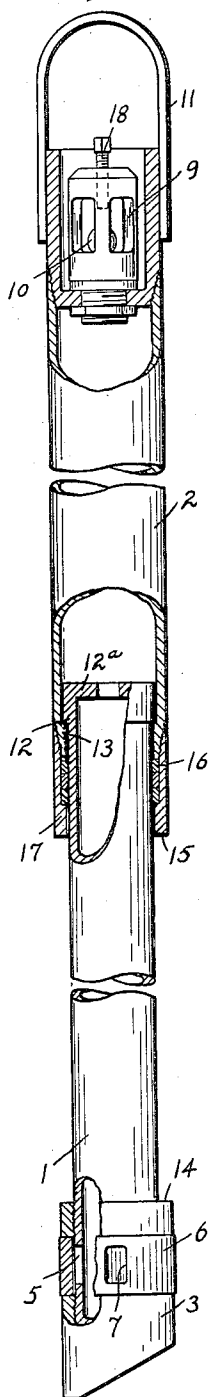


Fig. 2

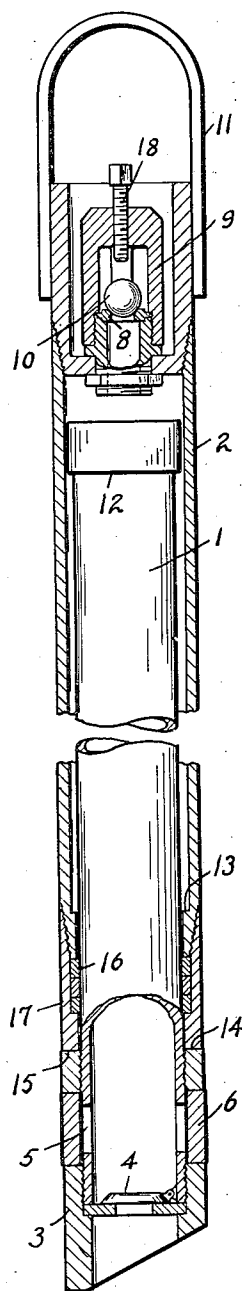
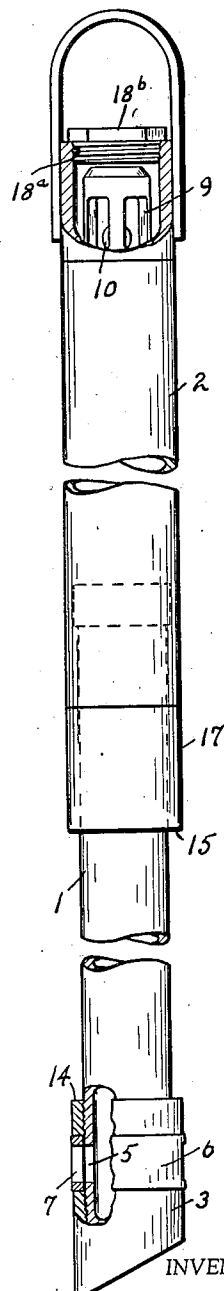


Fig. 3



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WELL BAILER

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12 Claims. (Cl. 166—19)

This invention is a well bailer of the sand pump type, and has for an object to insure the bailer being filled to capacity when in operation in a well.

5 A further object of the invention is to conveniently dump the bailer when it has been withdrawn from a well, by positively forcing the sand from the bailer.

10 A still further object of the invention is to provide for jarring the bailer, so that when compact sand is encountered the bailer may be readily forced into the sand and may then be jarred loose if it becomes stuck.

15 More particularly it is an object of the invention to provide a bailer or sand pump including a cylinder and a cooperating plunger, with the plunger comprising a tube adapted to telescope over the cylinder and having a check valve at its upper end, and the cylinder having a usual 20 flap valve at its lower end, whereby relative reciprocation of the plunger and cylinder draws sand past the flap valve with no possibility of the plunger packing the sand tightly around the valve. Consequently the flap valve remains 25 free to open and close so that a full load of sand may be drawn into the bailer.

30 The telescopic cylinder and plunger are preferably provided with abutments limiting their relative reciprocation, and by allowing the plunger to drop relative to the cylinder one set of abutments may be engaged for driving the cylinder into compact sand, and by elevating the plunger relative to the cylinder another set 35 of abutments may be engaged for upwardly jarring the cylinder so as to release it if it becomes stuck in the sand.

40 The cylinder is provided with a normally closed dump port which is opened when the bailer is to be dumped, and means are preferably provided whereby the check valve of the plunger may be rendered inoperative and the plunger maintained closed during the dumping operation, so that by lowering the plunger relative to the cylinder the sand may be positively 45 forced outwardly through the open dump port.

Further objects of the invention will be readily understood from the following description of the accompanying drawing, in which:

50 Fig. 1 is a side elevation of the bailer, partly in axial section and showing its telescopic elements relatively expanded.

Fig. 2 is an enlarged axial section through the bailer, showing its telescopic elements relatively contracted.

55 Fig. 3 is a side elevation of the bailer, show-

ing the dumping operation and also showing a modified construction.

The bailer comprises a cylinder 1 and a plunger tube 2 adapted to telescope over the cylinder. A shoe 3 having an upwardly opening check valve, shown as a usual flap valve 4, is secured to the lower end of the cylinder, and the shoe has usual dump ports 5 normally closed by a sleeve 6 which is adapted to be rotated so that its ports 7 align with the ports 5 when the bailer is to be dumped. 65 The upper end of tube 2 has an upwardly opening check valve shown as a usual ball and cage valve structure including a seat 8, cage 9, and ball valve 10.

70 A connection for any usual suspension means is provided at the upper end of tube 2, shown in the present instance as a bail 11, and relative expansion of the telescopic elements 1—2 is limited by cooperating abutments comprising an external shoulder 12 at the upper end of cylinder 1 and an internal shoulder 13 at the lower end of tube 2. Cooperating abutments are also adapted for engagement when the telescopic elements are relatively contracted, and are shown as an external shoulder 14 formed by the upper end of shoe 3 and a longitudinally aligned shoulder 15 at the lower end of tube 2.

80 Packing is provided between the relatively telescopic elements 1—2, and is shown as a plurality of packing rings 16 held in place at the lower end of tube 2 by means of a collar 17 and adapted for sliding packing engagement with the outer peripheral surface of cylinder 1.

In operation the sleeve 6 is turned so that it closes dump ports 5 and the bailer is lowered into a well by usual suspension means (not shown) connected to bail 11, with the weight of the parts relatively expanding the telescopic elements 1—2 as shown in Fig. 1. When the shoe 3 engages sand, rock, shale or the like which is firm enough to support the weight of cylinder 1, continued lowering of plunger 2 telescopes it downwardly over the arrested cylinder as shown at Fig. 2, with the well fluid in the bailer which is displaced by this telescopic action escaping past the check valve 10. The plunger 2 is then elevated by its suspension means while the weight of the cylinder 1 retains the cylinder in its lowered position, thereby relatively expanding the telescopic elements 1—2 as shown at Fig. 1. During this operation the check valve 10 is closed by the pressure of well fluid above the bailer, and the flap valve 4 opens responsive to the resulting decreased pressure inside the bailer, so that sand or the like is drawn into the cylinder 1 past the open flap valve. 110

The operation is then repeated, i. e. the plunger 2 is successively lowered and elevated relative to the stationary cylinder 1, with the flap valve 4 closing and the check valve 10 opening on the down stroke, and the flap valve opening and the check valve closing on the up stroke. This operation may be repeated until the bailer is completely filled with sand. The bailer is then elevated by its suspension means and with the cooperating abutments 12—13 operatively engaged as shown at Fig. 1, the flap valve 4 remaining closed by the weight of the material in the bailer so as to retain the full load, and the bailer being dumped by opening ports 5 when the bailer has been withdrawn from the well.

It will be noted that by telescoping the plunger over the cylinder, the down stroke of the plunger will not tend to tightly pack that portion of the sand which is in the bailer immediately above the flap valve, and consequently the flap valve is not clogged and held against opening and closing movement by a compact body of sand such as would prevent the bailer being filled to capacity.

The construction also provides for jarring the bailer for forcing it into a compact body of material and then withdrawing it if it becomes stuck. For this purpose the plunger 2 is allowed to drop so as to strike abutment 15 against the abutment 14 for forcing the shoe 3 into compact sand or the like, and if the bailer sticks after being filled and when it is desired to withdraw it, the plunger 2 is elevated so as to strike abutment 13 against the abutment 12 for jarring the bailer loose. The abutment 12 may be reinforced as shown at 12a in order to prevent collapse of the cylinder 1 when thus jarring it loose.

When the bailer has been withdrawn from the well and is to be dumped, the ports 5 are opened by turning sleeve 6 so that ports 5—7 are in alignment as shown at Fig. 3, and a means is preferably provided for positively forcing the sand outwardly through the open ports 5 rather than relying merely upon gravity flow. For this purpose the upper end of plunger 2 is adapted to be closed against the functioning of check valve 10, so that by lowering the plunger relative to cylinder 1 as shown at Fig. 3, the closed plunger will exert pressure on the sand in the bailer for positively discharging it through the open ports 5. The upper end of the plunger may be thus closed in various ways, as for example by the modifications shown at Figs. 2 and 3 respectively.

At Fig. 2 a set screw 18 is threaded into the upper end of cage 9 and is normally adjusted so as to clear ball valve 10 to permit it to open and close for operating the bailer, but when the bailer is to be dumped the set screw is adjusted so as to engage and hold the ball valve to its seat, thereby rendering the check valve inoperative and thus closing the upper end of the plunger so that it is adapted to exert downward pressure for discharging sand at the open ports 5.

At Fig. 3 a modification is shown wherein the upper end of plunger 2 is threaded as shown at 18a for reception of a closure plug 18b. The plug 18b is removed for normal operation of the bailer, but when the bailer is to be dumped the plug is screwed into place, thereby closing the upper end of the plunger so that the check valve 10 no longer functions, and thus adapting the plunger to exert downward pressure for discharging sand at the open ports 5.

I claim:

1. In a bailer, a cylinder having an upwardly opening check valve, and a plunger tube adapted

to telescope over the cylinder and having an upwardly opening check valve at its upper end.

2. In a bailer, a cylinder having an upwardly opening check valve at its lower end, a normally closed dump port in the cylinder above said valve, means for opening said dump port, and a plunger tube adapted to telescope over the cylinder and having an upwardly opening check valve at its upper end.

3. In a bailer, a cylinder and plunger having valvular means and adapted for relative reciprocation for drawing material into and retaining said material in the cylinder, and cooperating abutments on the cylinder and plunger adapted for engagement for jarring the bailer.

4. In a bailer, a cylinder and plunger having valvular means and adapted for relative reciprocation for drawing material into and retaining said material in the cylinder, and cooperating abutments on the cylinder and plunger adapted for engagement upon downward movement of the plunger relative to the cylinder for downwardly jarring the cylinder.

5. In a bailer, a cylinder and plunger having valvular means and adapted for relative reciprocation for drawing material into and retaining said material in the cylinder, and cooperating abutments on the cylinder and plunger adapted for engagement upon upward movement of the plunger relative to the cylinder for upwardly jarring the cylinder.

6. In a bailer, a cylinder and plunger having valvular means and adapted for relative reciprocation for drawing material into and retaining said material in the cylinder, and cooperating abutments on the cylinder and plunger, one set of said abutments being adapted for engagement upon downward movement of the plunger relative to the cylinder for downwardly jarring the cylinder, and another set of said abutments being adapted for engagement upon upward movement of the plunger relative to the cylinder for upwardly jarring the cylinder.

7. In a bailer, a cylinder and plunger having valvular means and adapted for relative reciprocation for drawing material into and retaining said material in the cylinder, the plunger comprising a tube adapted to telescope over the cylinder.

8. In a bailer, a cylinder and plunger having valvular means and adapted for relative reciprocation for drawing material into and retaining said material in the cylinder, the plunger comprising a tube adapted to telescope over the cylinder, and cooperating abutments on the cylinder and plunger tube for limiting relative reciprocation of said elements.

9. In a bailer, a cylinder and plunger having valvular means and adapted for relative reciprocation for drawing material into and retaining said material in the cylinder, the plunger comprising a tube adapted to telescope over the cylinder, and packing between the cylinder and the plunger tube.

10. In a bailer, a cylinder and plunger having valvular means and adapted for relative reciprocation for drawing material into and retaining said material in the cylinder, said valvular means including a check valve in the plunger, means for rendering said check valve inoperative so as to close the plunger, and means for opening the cylinder for discharge therefrom.

11. In a bailer, a cylinder and plunger having valvular means and adapted for relative reciprocation for drawing material into and retaining

said material in the cylinder, the plunger comprising a tube adapted to telescope over the cylinder, said valvular means including a check valve in the plunger tube beyond the end of the cylinder, means for rendering said check valve inoperative so as to close the plunger, and means for opening the cylinder for discharge therefrom. 5

mally closed dump port in the cylinder above said valve, means for opening said dump port, a plunger tube adapted to telescope over the cylinder and having an upwardly opening check valve at its upper end, and means for rendering the last mentioned check valve inoperative so as to close the upper end of the plunger. 80

12. In a bailer, a cylinder having an upwardly opening check valve at its lower end, a nor-

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