

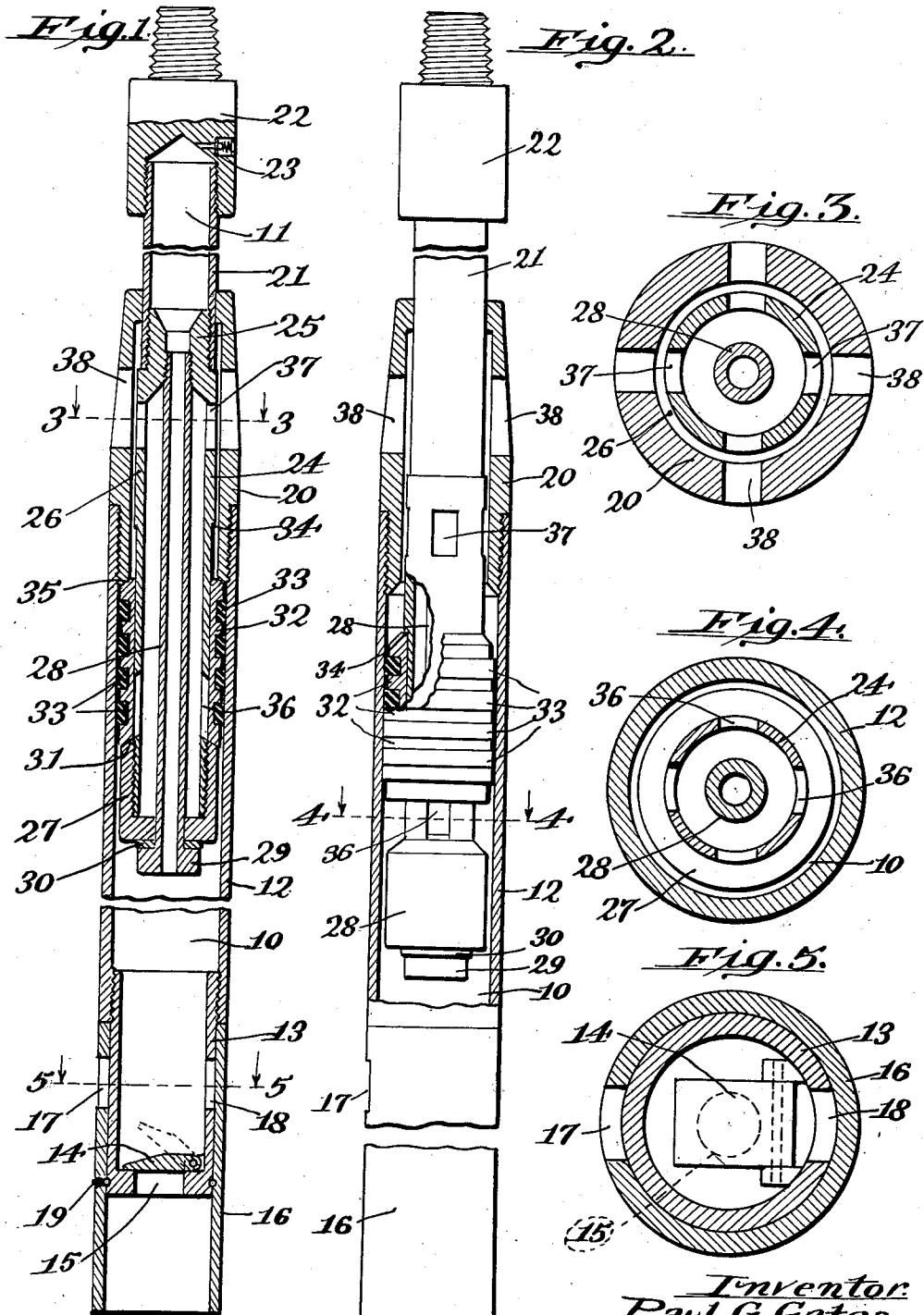
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PUMP TYPE BAILER

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PUMP TYPE BAILER

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This invention relates to improvements in bailers.

An object of the invention is to provide an improved bailer having an entrapping chamber which may be lowered into a well and to provide a mechanism by which fluid in the top of the entrapping chamber may be pumped out by vertical reciprocation of a part of the bailer so as to induce inflow into the bottom of the bailer. Heretofore various types of "explosion type" bailers have been frequently used wherein air is entrapped in an air chamber in the bailer at substantially atmospheric pressure, after which the bailer is lowered into the well. When the bailer has reached the bottom of the well it is tripped or otherwise operated so as to open the air chamber allowing fluid in the well to quickly enter it and compress the air therein. This induces inflow into the entrapping chamber. In many instances the bailer is intended to be tripped by its landing at the bottom of the well. A difficulty with "explosion type" bailers of these characters is experienced where the well is extremely crooked or there is some other obstruction that is encountered by the bailer as it is being lowered that causes the bailer to be prematurely tripped. The purpose of the present invention is to provide a bailer which can be used in wells that are under conditions apt to prematurely trip "explosion type" bailers. In the present bailer the bailer may be lowered into the well regardless of its crookedness or regardless of tripping obstructions and on reaching the bottom of the well it may be effectively pumped to induce inflow into the entrapping chamber. The pumping may be continued until the operator or driller is satisfied that the entrapping chamber has been loaded, after which the bailer is withdrawn.

Another object of the invention is to provide a pump type bailer having an entrapping chamber and an air chamber telescopically connected thereto, the air chamber being formed so as to be in constant communication with the entrapping chamber and having means associated therewith by which the entrapping chamber may be pumped so as to be loaded. In this manner the air within the air chamber is compressed by the hydrostatic pressure at the bottom of the well and is retained under high pressure for use as an expelling medium for dumping or unloading the bailer when it is withdrawn to the surface.

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 ac-

companying drawing for an illustrative embodiment of the invention, wherein:

Fig. 1 is a vertical section through the improved bailer.

Fig. 2 is a view similar to Fig. 1, parts of the interior of the bailer being shown in elevation.

Fig. 3 is a horizontal section taken substantially upon the line 3—3 upon Fig. 1.

Fig. 4 is a horizontal section taken substantially upon the line 4—4 upon Fig. 2.

Fig. 5 is a horizontal section taken substantially upon the line 5—5 upon Fig. 1.

Referring to the accompanying drawing, wherein similar reference characters designate similar parts throughout, the improved bailer comprises means providing an entrapping chamber 10 and an air chamber 11. The entrapping chamber may be formed by a suitable length of tubing or pipe 12 into the bottom of which there is screwed an entrapping valve seat 13 having an entrapping valve 14 which is adapted to open and close port 15. A sleeve 16 surrounds the entrapping valve seat and is provided with ports 17 that may or may not be caused to register with ports 18 in the entrapping valve seat 13. Sleeve 16 is rotatably attached to the entrapping valve seat, such as by forming ball races on the exterior of the entrapping valve seat 13 and the interior of sleeve 16 and placing balls therein through a plugged opening 19. The top of pipe 12 has screwed therein a cap 20.

The air chamber 11 is formed by one or more sections of tubing or pipe 21 and the top is closed by a cap 22 in which may be mounted a relief valve 23. The bottom of the air chamber has a hollow stem 24 secured thereto by means of a coupling 25. This hollow stem extends downwardly into the top of the entrapping chamber with a loose fit so that there is a substantial clearance as indicated at 26. The bottom of the hollow stem is closed by a cap 27. A tube 28 having a head 29 extends upwardly through cap 27 and stem 24 and it has its upper end screwed into coupling 25. The head is tightened against a gasket or packing 30. The top of cap 27 forms a shoulder or seat 31 limiting downward movement of the packing carrier 32 which carries packing rings 33 snugly fitting the interior of pipe 12. This packing carrier and its packing rings constitute a type of piston slidable upon stem 24 between shoulder 31 afforded by cap 27 and shoulder 34. The packing carrier has its upper end also engageable with shoulder 35 formed by bottom of cap 20. One or more ports 36 are formed in the bottom of stem 24 adapted to be opened

and closed by the piston or packing carrier 32. In the top of the stem 24 there are formed one or more ports 37 and corresponding ports 38 are formed in cap 20.

Fig. 1 shows the bailer with the air chamber in its uppermost position whereas Fig. 2 shows the bailer with the air chamber in a lowered position.

The operation and advantages of the improved bailer are as follows:

When the bailer is lowered into the well its interior is empty except for being filled with air. Sleeve 16 is rotated so that ports 17 are out of registration with ports 18. As the bailer is lowered into the well, usually by means of a cable or line, the entrapping chamber forming means is suspended from the air chamber by the engagement of the top of the packing carrier 32 with shoulder or seat 35. As the hydrostatic pressure on the exterior of the bailer increases during the lowering operation the air within the bailer becomes compressed and crowded into the top of air chamber 11. Fluid may enter the bailer past entrapping valve 14. If the entrapping chamber forming means should encounter any obstruction in the well or should be lifted relatively to the air chamber by sliding against the crooked sides of the well this will not prematurely set off or trip the bailer to prevent its desired operation at the bottom of the well, which is a disadvantage in many types of "explosion type" bailers. When the entrapping chamber reaches or lands at the bottom of the well the air chamber forming means descends relatively thereto, stem 24 first sliding downwardly through packing carrier 32, opening ports 36. This downward movement continues until the top of packing carrier 32 engages shoulder 34, after which the packing carrier or piston is carried downwardly with the stem, causing the entrapped fluid to pass upwardly through ports 36 into the stem. On pulling the air chamber upwardly the stem 24 is first left sliding through the packing carrier or piston 32 until the piston engages shoulder 31, in which position the ports 36 are closed. Continued upward movement of the air chamber lifts the packing carrier or piston and this causes an inward flow to be induced through port 15 past entrapping valve 14. By continued reciprocation of the air chamber in this manner fluid may be pumped out of the top of the entrapping chamber, thus inducing an inward flow into the bottom of the entrapping chamber, carrying with it debris, fish, or any other articles or material that it is desired to recover.

Reciprocation of the air chamber is continued until the entrapping chamber is fully loaded, after which the bailer is withdrawn from the well. As the air chamber is lifted the piston or packing carrier 32 is lifted until it engages shoulder 35, thus lifting the entrapping chamber with the air chamber. It will be noted that in this position ports 36 are closed, so that the top of the entrapping chamber is closed except for the communication afforded by tube 28 to the air chamber. The air that has been highly compressed in the air chamber by the hydrostatic pressure at the bottom of the well is kept confined but as the external pressure is reduced during the withdrawal of the bailer excess air pressure may be released by means of the escape valve 23. While the escape valve is preferably employed for this purpose there are instances when it need not be employed and cap 22 formed without such a release.

When the bailer is recovered from the well it is left suspended in the derrick and sleeve 16 is rotated to align ports 17 and 18 to unload or dump the bailer. The entrapped air pressure in the top of air chamber 11 is utilized to assist in expelling the material recovered in the entrapping chamber.

From the above described construction it will be appreciated that the improved bailer is so constructed that its entrapping chamber may be lowered to the bottom of a well and inflow be induced by pumping fluid out of the top of the entrapping chamber through ports 36, 37 and 38 to induce inflow into the entrapping chamber. This pumping operation may be continued indefinitely or as long as it is thought necessary to completely load the bailer. Therefore, the bailer is recovered and the entrapped and compressed air in the air chamber is utilized to facilitate dumping the bailer.

Various changes may be made in the details of construction without departing from the spirit or scope of the invention as defined in the appended claims.

I claim:

1. A pump type bailer comprising means providing an entrapping chamber having an entrapping means in its inlet, means reciprocable relative to the entrapping chamber adapted upon reciprocation to draw liquid into the entrapping chamber and cause it to be expelled therefrom to thereby induce inflow into the chamber past the entrapping means, there being provision made for retaining in the entrapping chamber at least a substantial portion of the pressure existing at the depth to which the bailer may be lowered to be subsequently utilized to facilitate unloading the entrapping chamber.

2. A pump type bailer comprising means providing an entrapping chamber having an entrapping means in its inlet, means reciprocable relative to the entrapping chamber adapted upon reciprocation to draw liquid into the entrapping chamber and cause it to be expelled therefrom to thereby induce inflow into the chamber past the entrapping means, there being provision made for retaining in the entrapping chamber at least a substantial portion of the pressure existing at the depth to which the bailer may be lowered may be retained therein to be subsequently utilized to facilitate unloading the entrapping chamber, and relief valve means for releasing part of the entrapped pressure when it becomes excessively greater than the external pressure.

3. A pump type bailer comprising means providing an entrapping chamber, means reciprocable relative to the entrapping chamber for inducing inflow of liquid therein and expelling the liquid from the top thereof, and means for closing the top of the entrapping chamber against egress so that at least a portion of the pressure existing at the depth to which the bailer may be lowered may be retained therein to be subsequently utilized to facilitate unloading the entrapping chamber.

4. A pump type bailer comprising means providing an entrapping chamber, means reciprocable relative to the entrapping chamber for inducing inflow of liquid therein and expelling the liquid from the top thereof, and means for closing the top of the entrapping chamber against egress so that at least a portion of the pressure existing at the depth to which the bailer may

be lowered may be retained therein to be subsequently utilized to facilitate unloading the entrapping chamber, and relief valve means for releasing part of the entrapped pressure when it becomes excessively greater than external pressure.

5. A pump type bailer comprising means providing an entrapping chamber, means providing a second chamber reciprocally extending into the entrapping chamber, means associated with the second chamber for causing liquid to enter the entrapping chamber near the bottom thereof, and to be expelled therefrom above the bottom when the second chamber is reciprocated, there being provision made for closing the entrapping chamber against egress so that at least a portion of the pressure existing at the depth to which the bailer may be lowered may be retained therein to be subsequently utilized to facilitate unloading the entrapping chamber.

6. A pump type bailer comprising means providing an entrapping chamber, means providing a second chamber reciprocally extending into the entrapping chamber, means associated with the second chamber for causing liquid to enter the entrapping chamber near the bottom thereof, and to be expelled therefrom above the bottom when the second chamber is reciprocated, there being provision made for closing the entrapping chamber against egress so that at least a portion of the pressure existing at the depth to which the bailer may be lowered may be retained therein to be subsequently utilized to facilitate unloading the entrapping chamber, and relief valve means on the second chamber for releasing part of the entrapped pressure when it becomes excessively greater than external pressure.

7. A pump type bailer comprising means providing an entrapping chamber, means providing a plunger reciprocable therein adapted to induce flow of liquid through the entrapping chamber from bottom to top thereof, there being provision made for retaining in the entrapping chamber at least a portion of the pressure existing at the depth to which the bailer may be lowered may be retained therein upon recovery of the bailer to be subsequently utilized to facilitate unloading the entrapping chamber.

8. A pump type bailer comprising means providing an entrapping chamber, means providing a plunger reciprocable therein adapted to induce flow of liquid through the entrapping chamber from bottom to top thereof, there being provision made for retaining in the entrapping chamber when the plunger is in its uppermost position at least a portion of the pressure existing at the depth to which the bailer may be lowered may be retained therein upon recovery of the bailer to be subsequently utilized to facilitate unloading the entrapping chamber.

9. A pump type bailer comprising means providing an entrapping chamber, means providing a plunger reciprocable therein adapted to induce flow of liquid through the entrapping chamber from bottom to top thereof, there being provision made for closing the entrapping chamber against egress when the plunger is in its uppermost position so that at least a portion of the pressure existing at the depth to which the bailer may be lowered may be retained therein to be subsequently utilized to facilitate unloading the entrapping chamber, and relief valve means for releasing part of the entrapped pressure when the entrapped pressure becomes excessively great as compared with the external pressure.

10. A pump type bailer comprising means providing an entrapping chamber, means providing a second chamber reciprocable in the top of the entrapping chamber having its interior in constant communication with the entrapping chamber, means providing a plunger on the second chamber forming means adapted upon reciprocation to cause fluid flow to be induced into the entrapping chamber near the bottom thereof and to cause it to be expelled from the entrapping chamber thereabove, there being provision made for closing the entrapping chamber against egress when the plunger is in its uppermost position so that at least a portion of the pressure existing at the depth to which the bailer may be lowered may be retained therein upon recovery of the bailer to be subsequently utilized to facilitate unloading the entrapping chamber.

11. A pump type bailer comprising means providing an entrapping chamber, a stem reciprocally extending through the top of the entrapping chamber, means on the stem engageable with the walls of the entrapping chamber providing a plunger, said means being movable relatively to the stem and adapted upon downward strokes to permit liquid to flow upwardly therepast, but upon upward strokes to induce inflow into the bottom of the entrapping chamber and to expel liquid thereabove from the top of the entrapping chamber, there being provision made for closing the entrapping chamber against egress so that at least a portion of the pressure existing at the depth to which the bailer may be lowered may be retained therein upon recovery of the bailer to be subsequently utilized to facilitate unloading the entrapping chamber.

12. A pump type bailer comprising means providing an entrapping chamber, a stem reciprocally extending through the top of the entrapping chamber, means on the stem engageable with the walls of the entrapping chamber providing a plunger, said means being movable relatively to the stem and adapted upon downward strokes to permit liquid to flow upwardly therepast, but upon upward strokes to induce inflow into the bottom of the entrapping chamber and to expel liquid thereabove from the top of the entrapping chamber, there being provision made for closing the entrapping chamber against egress when the plunger is at the top of its stroke so that at least a portion of the pressure existing at the depth to which the bailer may be lowered may be retained therein to be subsequently utilized to facilitate unloading the entrapping chamber.

13. A pump type bailer comprising means providing an entrapping chamber having an entrapping valve, means reciprocable relative to the entrapping chamber to induce inflow into the entrapping chamber past the entrapping valve and outflow from the chamber thereabove so as to thereby load the entrapping chamber, there being provision made for entrapping in the entrapping chamber a sufficient portion of the pressure existing at the depth to which the bailer may be lowered so as to enable its being utilized to assist in unloading the bailer when the bailer is recovered.

14. A pump type bailer comprising means providing an entrapping chamber having an entrapping valve, means reciprocally extending into the entrapping chamber, means acting as a swab movably mounted upon said means and adapted upon upward strokes to elevate fluid in the entrapping chamber and upon downward strokes to permit fluid in the entrapping chamber to pass

thereby whereby on reciprocation of said means fluid may be induced to enter the entrapping chamber at the bottom and to be expelled therefrom adjacent the top to effect a loading of the entrapping chamber, a seat on the reciprocable means engageable by the swab acting means to cause a substantial portion of the pressure existing at the depth to which the bailer is lowered to be retained in the entrapping chamber to be utilized to assist in unloading the bailer, there being provision made for holding the swab acting means against said seat when the bailer is lifted.

15 15. A sand pump comprising a barrel adapted to be lowered into a well to take a charge therefrom, and to remove the charge from the well, said barrel having a charge-taking inlet adjacent the lower end thereof, a charge-retaining valve above said inlet, a piston operating downwardly and upwardly in said barrel and forming a seal with the inner wall thereof during its upward movement to draw by suction a charge into the barrel through said inlet past said charge-retaining valve, and means for positively closing off the upper end of said barrel at the termination of said upward stroke of the piston to retain the charge in the barrel at high well pressure.

20 16. A pump type bailer comprising means providing an entrapping chamber, an element reciprocable in the top of the entrapping chamber, there being an outlet from the top of the entrapping chamber, a plunger on the element disposed within the entrapping chamber, said plunger being so constructed that on downward strokes fluid in the entrapping chamber may pass from

below the plunger to above the plunger into the space around the element and upon upward strokes the fluid above the plunger may be expelled through the outlet and additional fluid drawn into the entrapping chamber, and means for closing said outlet against egress from the entrapping chamber.

10 17. A pump type bailer comprising means providing an entrapping chamber having an entrapping valve, means reciprocably extending into the entrapping chamber, means acting as a swab movably mounted between limits upon said means and adapted upon upward strokes to elevate fluid in the entrapping chamber and upon downward strokes to permit fluid in the entrapping chamber to pass thereby whereby upon reciprocation of said means fluid may be induced to enter the entrapping chamber at the bottom and to be expelled therefrom adjacent the top to effect a loading of the entrapping chamber, a seat on the reciprocable means engageable by the swab acting means to close the swab acting means against fluid flow therethrough during upward strokes of the reciprocable means, and means limiting the upward movement of the swab acting means to a position wherein when the reciprocable means is in its uppermost position the seat will be engaged by the swab acting means to cause a substantial portion of the pressure existing at the depth to which the bailer is lowered to be retained in the entrapping chamber to assist in unloading the bailer.

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