Jan. 6, 1953 W. B. HARRELL ET AL 2,624,414

WELL BAILER

Filed March 13, 1948

Fig. 1.

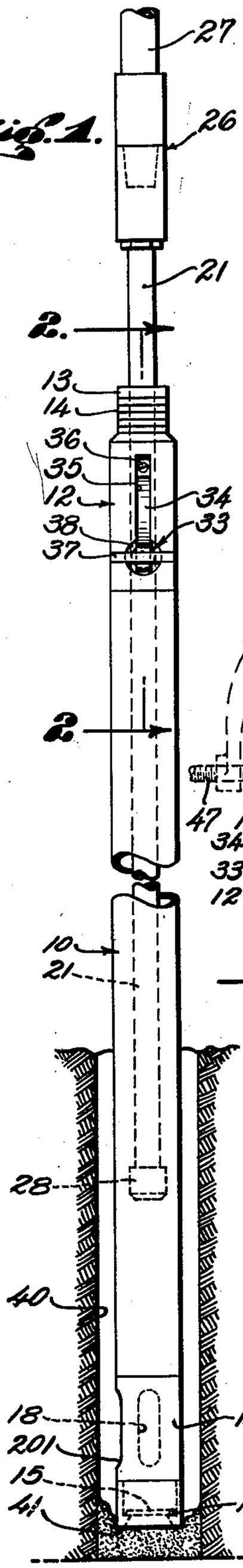



Fig. 2.

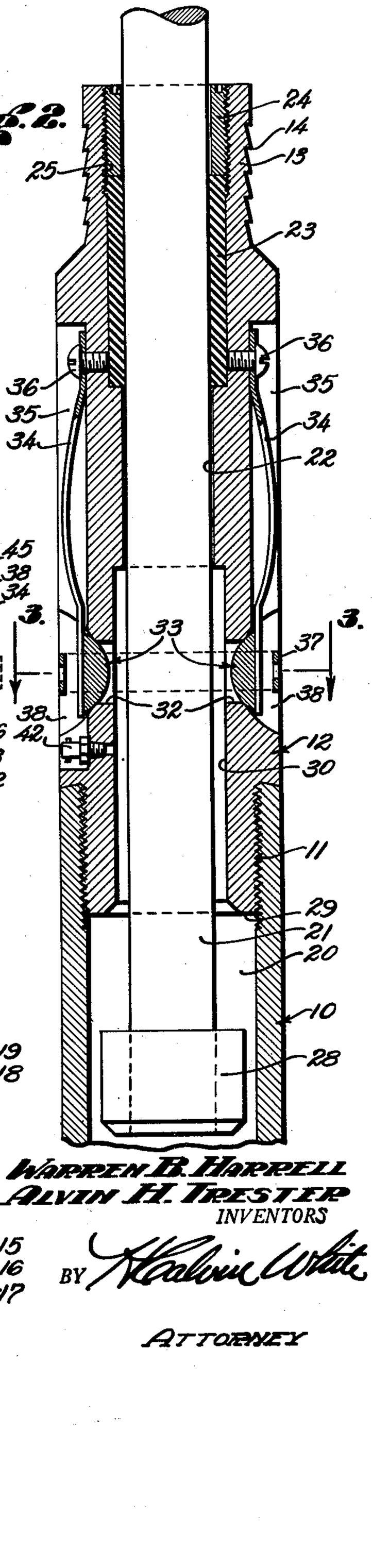



Fig. 3.

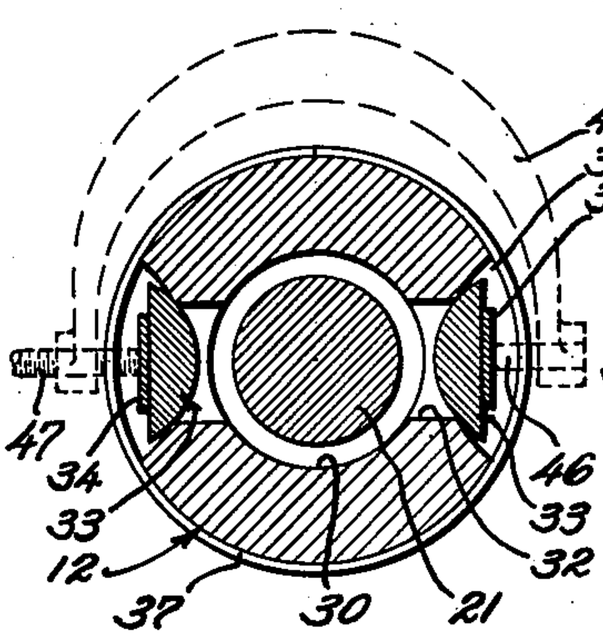
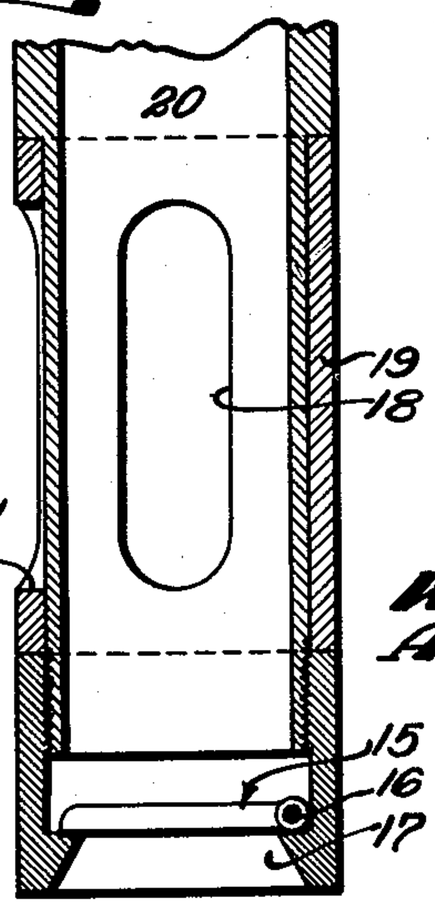



Fig. 4.

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## WELL BAILER

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3 Claims. (Cl. 166—19)

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This invention has to do with improvements in oil well bailers, particularly of the type by which displacement of sand into the barrel of the bailer results from movement of a vertically reciprocable plunger in the barrel.

The most common type of positive displacement bailer is that employing a piston having direct contact with the barrel wall and having capacity for fluid displacement across the full area of the barrel. During the piston down stroke, fluid ordinarily is displaced from the barrel upwardly through the piston or tubular rod thereof. This true piston type of bailer has certain objectionable characteristics, among which are frictional engagement of the piston head with the barrel wall frequently causing binding as a result of a sanded condition; also the tendency for restricted fluid escape passages to become sand clogged; and inadaptability of the tool to flushing out of the full chamber length of the barrel above as well as below the piston.

One of our major objects is to provide an improved bailer characterized by its capacity for effective fluid displacement that will cause the sand charge to enter the barrel, but without maintaining the working parts or escape passages in such form or condition that they are susceptible to sand binding or clogging. Pursuant to this object, we employ a form of fluid displacement plunger and related flushing fluid inlet, permitting the full working length of the barrel to be flushed out in the dumping operation.

Structurally the invention departs from the conventional practice by employing a plunger reciprocable within and so spaced from the wall of the barrel that sand binding of the plunger will not occur. Such condition is particularly prevented by providing one or more fluid escape openings communicating directly with the inter barrel-plunger space through the barrel itself, as distinguished from through the plunger, thus permitting less restriction of the fluid escape course and resultant freedom from sand clogging. This same arrangement permits more effective flushing out of the barrel in that air or liquid may be introduced into the upper part of the barrel chamber to flow about the full length of the plunger to the bottom of the barrel.

The invention further contemplates improved valve means for maintaining the charged barrel under substantial super atmospheric pressure as an aid in discharging its contents. As will appear, the barrel outlet through which fluid is displaced during the plunger down stroke is resisted by a spring urged valve, the latter preferably having floating or self-seating characteristics assuring the maintenance of an effective fluid tight closure.

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The invention has various additional features and objects all of which will be understood to best advantage from the following detailed description of an illustrative embodiment shown by the accompanying drawing, in which:

Fig. 1 is a general view showing the barrel assembly in elevation;

Fig. 2 is an enlarged fragmentary section taken on line 2—2 of Fig. 1;

Fig. 3 is a cross section on line 3—3 of Fig. 2; and

Fig. 4 is a fragmentary sectional enlargement of the bottom portion of the barrel.

The bailer comprises an elongated barrel 10 having a threaded connection at 11 (Fig. 2) with a tubular head 12, the top reduced end 13 of which is surface irregularized at 14 for engagement by a fishing tool should an occasion arise requiring recovery of the bailer by a fishing operation. The bottom end of the barrel contains suitable valve or other means for retaining a sand charge taken into the barrel, such means being shown typically as a flap or check valve 15 pivoted at 16 and closing the barrel mouth 17 against material escape from the barrel. When the barrel is removed to the ground surface, its contents are discharged through a dump port 18 normally closed by a rotatable sleeve 19 having an opening 201 registerable with the dump port 18.

Fluid displacement within the barrel chamber 20 is effected by a vertically reciprocable plunger 21, preferably of non-tubular formation, extending through the head bore 22 and suitable packing 23 axially confined by sleeve nut 24 screwed into the threaded head bore 25. The plunger 21 is vertically reciprocable from the ground surface as by a connection at 26 with the rod or pipe string 27. The plunger carries on its lower end an enlargement 28 adapted to be impacted upwardly against the bottom end 29 of the head, thus permitting the application to the barrel of an upwardly directed jarring blow, as for the purpose of dislodging the barrel from an impacted condition in the well sand. It is particularly observed that the plunger has free and open clearance within the chamber 20 from the wall of the barrel 10, as well as from the head 12 throughout the extent of counterbore 30 which opens into the barrel chamber.

Fluid displaced from the barrel during the

down stroke of the plunger, escapes through bore **30** and one or more lateral openings **32** which normally are closed by valves **33**. As a feature of particular importance, the valves are rendered freely displaceable to maintain full seating and sealing conformance with the outlets **32**, while being constantly spring-urged to seating positions. Preferably the valves **33** have segmental spherical seat engaging surfaces, and are held against their circular seats by leaf springs **34** contained and secured within the head recesses **35** by screws **36**, the springs bearing against but being unattached to the valves so that the latter are comformable to their seats. Outward displacement of the springs **34** to an extent permitting loss of the valves is prevented by a stop band **37** encircling the head about recesses **38** opposite the valves.

In considering the operation of the tool, assume the bailer assembly to be lowered in a well, with the barrel supported by the plunger end engagement with the head shoulder **29**. After the barrel end is rested on the bottom of the well **40**, as shown in Fig. 1, the plunger **21** may be vertically reciprocated to cause alternate displacement of the usual well liquid and sand **41** upwardly into the barrel past the check valve **15**, and fluid displacement out of the barrel through the valve control openings **32**. That is to say, during the up stroke of the plunger the well fluid enters the barrel, carrying with it sand or other solid material which becomes retained in the barrel by the seating of valve **15** after the in-surge. During downward movement of the plunger a volume of fluid corresponding to the plunger volume progressively entering the chamber, is forced out through openings **32** against the resistance of the spring seated valves. Ordinarily the sand charge taken into the barrel will, together with valve **15**, seal the barrel against fluid escape to a degree such that the charge may remain under substantial pressure in the barrel. Accordingly, the thrust of spring **34** preferably is sufficiently great that upon removal of the bailer to the ground surface, a substantial atmospheric pressure, say in the neighborhood of 40 pounds per square inch, will exist in the barrel. This pressure is utilized in facilitating dumping of the bailer charge, in that upon the rotation of sleeve **19** bringing openings **18** and **201** into registration, the internal barrel pressure will act to force out the charge.

Further provision is made to facilitate complete dumping of the charge and flushing out of the barrel, by providing in the upper portion of the barrel, as at a suitable location in the head **12**, a normally closed fitting **42** through which air or water may be introduced to completely cleanse the barrel.

By reason of the open clearance between the plunger and the barrel wall, and also between the plunger and head throughout the extent of counterbore **30**, effective assurance is had against sand clogging of the barrel and fluid escape passages to interfere with proper plunger travel and fluid displacement to the outlets. The clearances are sufficiently great that any entering sand particles, particularly in the presence of surging liquid, will settle or become carried out before clogging quantities can accumulate. The same clearances facilitate complete flushing of the barrel during or following the dumping operation, in view of the free flow permitted fluid introduced through the connection **42** downwardly past the full length of the plunger below.



It is contemplated that dumping of the bailer may be facilitated by charging the barrel with a fluid at a pressure greater than that normally maintained by the valves **33**. Accordingly during the dumping operation at the ground surface, the valves may be held seated against whatever pressure that may be built up in the barrel by introduction of fluid through the connection **42**. As illustrative, in Fig. 3, the valves **33** are shown to be held seated by suitable means such as a clamp **45**, one end of which carries a pin **46** extending through an opening in the stop band **37** to engage and bear against the spring **34**, the opposite arm of the clamp carrying screw **47** which similarly engages and may be tightened against the opposite valve spring.

I claim:

1. A well bailer comprising a vertically extending barrel to be lowered into a well and having a bottom inlet, a check valve permitting upward flow through said inlet but preventing reverse fluid flow downwardly therethrough, a plunger extending downwardly through an opening in said upper end of the barrel and vertically reciprocable in said opening and into and out of the barrel to vary the effective volume thereof, the surfaces of said plunger extending into said barrel being imperforate to prevent passage of fluid through said plunger, means forming a seal preventing substantial fluid flow through said barrel opening about the plunger, said barrel having an outlet at a location spaced aboye said inlet and spaced from said upper plunger passing opening, said plunger being spaced a substantial distance from the inner wall of the barrel so that on its down stroke fluid is displaced upwardly in the barrel about the plunger and through said outlet, and check valve means permitting fluid flow from the barrel through said outlet but preventing reverse fluid flow into the barrel through said outlet.

2. A well bailer comprising a vertically extending barrel to be lowered into a well and having a bottom inlet, a check valve permitting upward flow through said inlet but preventing reverse fluid flow downwardly therethrough, a solid plunger extending downwardly through an opening in said upper end of the barrel and vertically reciprocable in said opening and into and out of the barrel to vary the effective volume thereof, packing means preventing fluid flow through said barrel opening about the plunger, said barrel having an outlet in its side wall at a location spaced above said inlet and beneath said packing means, said plunger being spaced a substantial distance from the inner wall of the barrel so that on its down stroke fluid is displaced upwardly in the barrel about the plunger and through said outlet, and check valve means permitting fluid flow from the barrel through said outlet but preventing reverse fluid flow into the barrel through said outlet.

3. A well bailer comprising a vertically extending barrel to be lowered into a well and having a bottom inlet, a check valve permitting upward flow through said inlet but preventing reverse fluid flow downwardly therethrough, a solid plunger extending downwardly through an opening in said upper end of the barrel and vertically reciprocable in said opening and into and out of the barrel to vary the effective volume thereof, packing means preventing fluid flow through said barrel opening about the plunger, said barrel having an outlet in its side wall at a location spaced above said inlet and beneath said packing means,

said plunger being annularly spaced a substantial distance from the inner wall of the barrel so that on its down stroke fluid is displaced upwardly in the barrel about the plunger and through said outlet, an outlet valve at the outside of the barrel bodily movable to conform to and close said outlet against reverse flow, and a leaf spring fastened at one end to the barrel and bearing against but separable from said outlet valve.

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