United States Patent [19]

Pagel

[11] **3,780,804**

[45] **Dec. 25, 1973**

[54] **CABLE MOUNTED BAILER FOR WELL DRILLING AND CLEANING**

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[52] **U.S. Cl.** **166/162**

[51] **Int. Cl.**..... **E21b 27/00,** E21b 33/132

[58] **Field of Search**..... 166/162, 69, 99, 166/107, 108, 111, 142, 145

[56] **References Cited**

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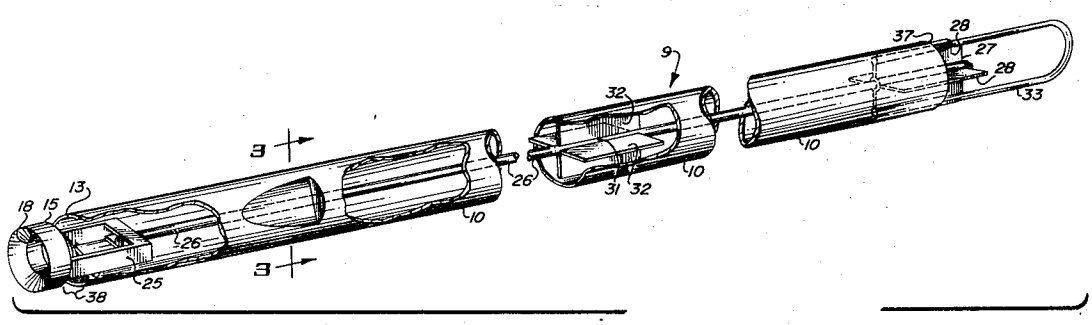
Primary Examiner—Geo. V. Larkin

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[57] **ABSTRACT**

A well bailer having a sleeve or barrel with a valve head reciprocably supported therewithin and a cooperative arrangement of notches on said barrel and a barrel holder to fit into said notches to facilitate the controlled dumping of the bailer.

6 Claims, 7 Drawing Figures



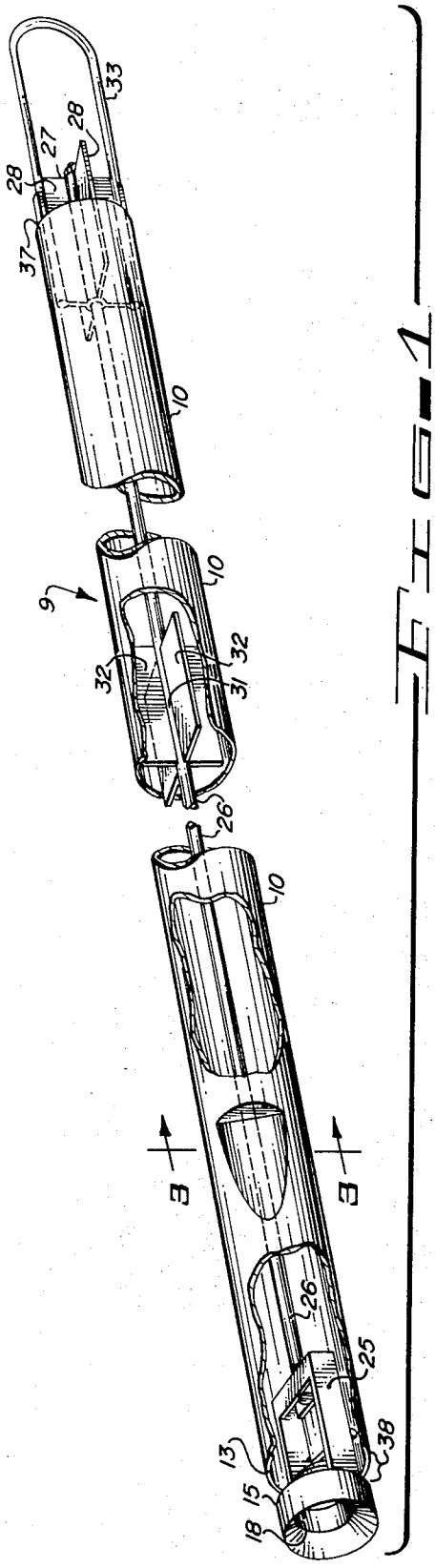


FIG-1

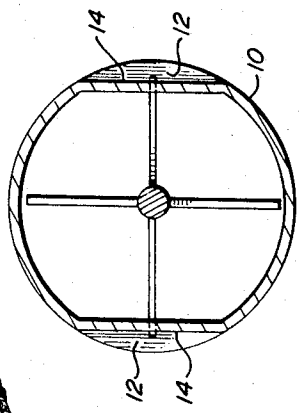


FIG-3

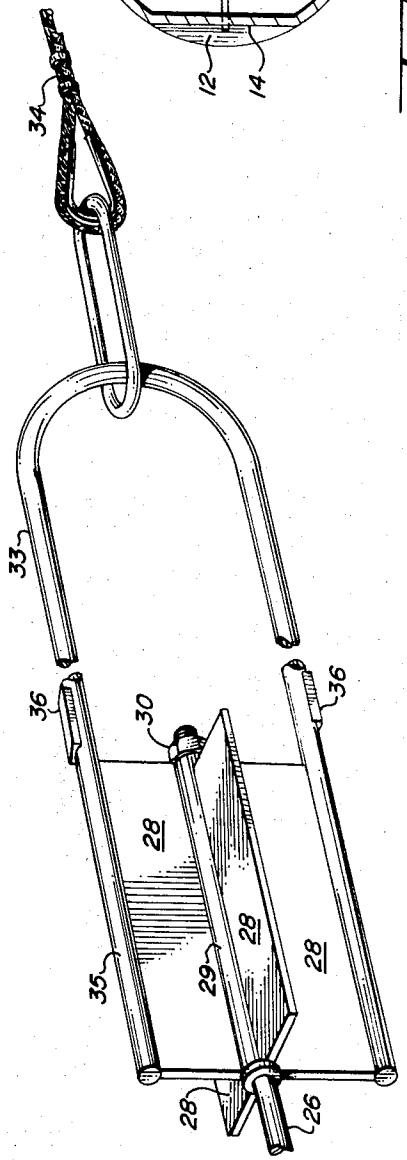


FIG-2

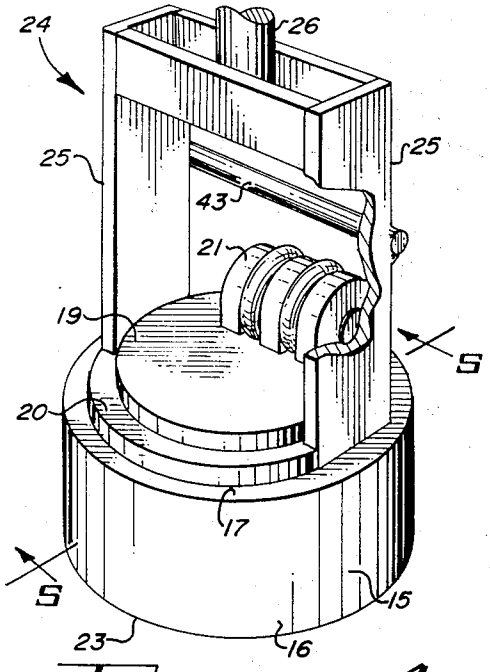


Fig-4

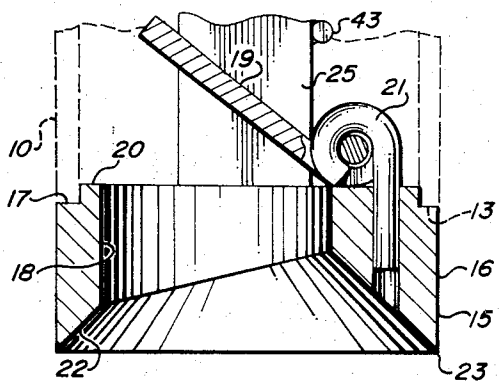


Fig-5

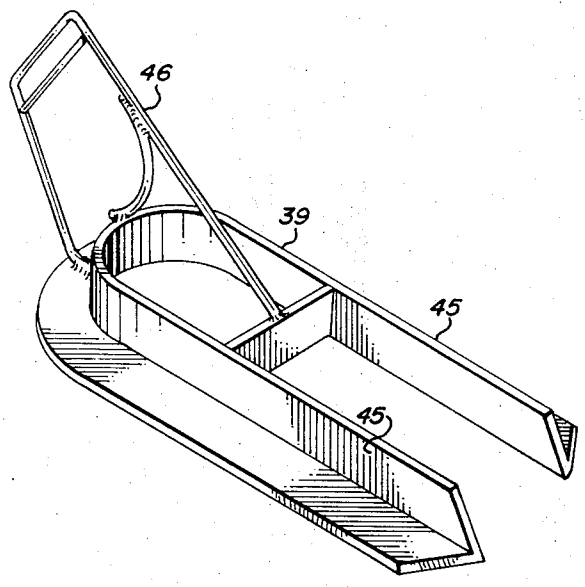


Fig-6

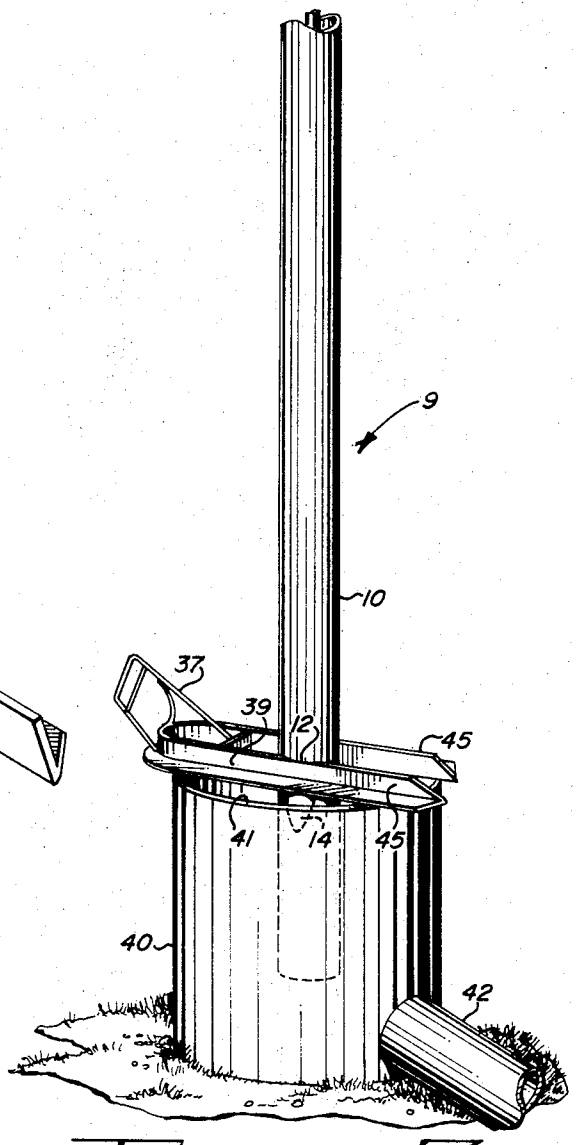


Fig-7

CABLE MOUNTED BAILER FOR WELL DRILLING AND CLEANING

BACKGROUND OF THE INVENTION

This invention relates to well bailers and has special reference to bailers used with cable tool drilling equipment, commonly known as churn drilling equipment. When drilling a well with this type of equipment it is necessary to bail mud and debris from the well as the well is drilled progressively deeper so that the drill can work on the virgin soil and rock. Heretofore many types of bailers have been used to clean out the mud, water, rock, sand, gravel and dirt as drilling progresses. Some of these devices have a hinged valve at the lower end to permit mud, water and debris to enter the barrel of the bailer, and various arrangements for dumping the contents of the barrel after the bailer is removed from the well casing.

FIELD OF THE INVENTION

This invention relates to an improved bailer which includes a barrel, a hinged valve, and a special construction of the bailer which provides for easy and controlled dumping of the contents of the barrel with a minimum of time and effort and ensures the positive discharge of the contents into a prescribed dumping area.

DESCRIPTION OF THE PRIOR ART

It is well known in the well drilling art that the bailing operation sometimes can be awkward and particularly messy because flat valve bailers are difficult to dump in a controlled manner. Many bailers require that a second man, in addition to the drill rig operator, be present during the bailing operation to assist the operator in dumping the bailer. The controlled dumping of the bailer can minimize the clean-up work required after the well is drilled, as well as speed up the overall completion of the well drilling, as much time is wasted in trying to dump conventional flat valve bailers into the proper discharge area.

SUMMARY OF THE INVENTION

In accordance with the invention claimed, the bailer disclosed is designed to overcome the disadvantages of presently used flat valve well bailers by providing a simple, positive opening of the bailer for discharge of the contents thereof into a controlled area and to ensure a good seal of the bailer during the time it is being lifted from the well and placed for discharging.

It is, therefore, one of the principal objects of this invention to provide a well bailer which is simple in construction, simple to operate, and positive in the discharge of its contents.

Another object of this invention is to provide such a bailer capable of picking up rocks, sand, gravel and the other materials in the well along with the mud so that the well hole clean-out is accomplished as quickly as possible.

Another object of this invention is to provide a bailer which may be easily handled and operated by the drill rig operator without the need of an assistant.

Another object of this invention is to provide a well bailer which can be transported from job to job without damage during transport.

A more specific object of this invention is to provide a well bailer including a barrel, a hinged valve carried

adjacent the lower end of the barrel and movable into and out of engagement with the barrel to close and open the barrel to hold or release the contents thereof in a predetermined, controlled manner.

These and other objects and advantages of the present invention will become more apparent as the description proceeds, and the features of novelty which characterize this invention will be pointed out with particularity in the claims annexed hereto and forming a part of this specification.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of a well bailer embodying my invention with parts broken away to show the construction features;

FIG. 2 is a fragmental perspective view of the upper end of the hanger for the bailer;

FIG. 3 is a sectional view on the line 3—3 of FIG. 1;

FIG. 4 is a perspective view showing the valve head for the bailer;

FIG. 5 is a central sectional view of the valve head;

FIG. 6 is a perspective view of the holder for the barrel to permit controlled dumping; and

FIG. 7 is a fragmental perspective view of the bailer in dumping position.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring more particularly to the drawings by characters of reference, FIGS. 1–3 disclose a bailer 9 comprising a barrel 10 having a pair of opposed notches 12—12 in its outer periphery which are used to hold the barrel during a bailer dumping operation. These notches 12—12 are preferably formed by cutting slots through opposite surfaces of the barrel adjacent its lower end 13 and bending the portions of the barrel wall immediately below the slots inwardly to form opposed, substantially parallel walls 14—14 immediately below the slots. The spaces or openings formed from cutting the slots and bending the walls 14—14 are then welded closed to prevent any leakage from the barrel in this area.

The barrel 10 has a squared-off lower end 13 and, as shown, the barrel is essentially a piece of pipe having the two parallel notches 12—12 formed therein. The barrel is maintained in its cylindrical form with no protrusions so that it can be moved into and out of the well casing without catching on the periphery of the well hole.

In constructing bailer 9 using this notched pipe, a valve head 15, as shown in FIGS. 4 and 5, is arranged in cooperating arrangement with the lower end of barrel 10. This valve head comprises a cylindrical body portion 16 of relatively heavy construction having an annular groove 17 around its upper edge to receive the squared-off lower edge 13 of barrel 10, as shown in dotted lines in FIG. 5, to form a closure for the lower end of barrel 10 in order to hold fluid such as, for example, water, mud and debris in the barrel when the body portion 16 is engaged against the lower edge 13 of the bailer barrel 10.

The valve head 15 has an opening 18 extending substantially axially therethrough and has a hinged valve 19 on the upper end 20 thereof, the hinge being indicated by the numeral 21. The lower end of the valve head is beveled at 22 and extends axially from the lower edge 23 inwardly and upwardly to meet the open-

ing 18. This structure causes the valve head to penetrate into mud, sand, gravel, rock and dirt to force them upwardly and into the barrel along with water or other fluid as the head is dropped to the well bottom during operation. The hinged cover 19 operates in the normal manner of flat valve bailer valves, that is, it is forced open as the bailer enters fluid, such as water and debris to permit same to be moved upwardly into the barrel of the bailer, and it automatically closes as the bailer is lifted or at rest. A stop 43 is provided to limit the degree of opening of the valve so that it cannot swing to a stuck open position.

The bevel 22 of the valve head is preferably about a 45 degree angle for maximum utility. If the angle is too sharp the lower edge 23 would be too thin and sharp and would wear or be dulled too quickly by its constant contact with the coarse, rough materials in the well bottom. If the angle is too flat, the valve head would have difficulty in removing or pulling itself up from sticky clay or the like, if it is encountered in the well bottom, since such material creates a substantial suction.

The valve head is carried by means of a valve head support and operating unit 24. As shown, unit 24 may include a frame 25 welded to the top face 20 of the valve head 15 to ensure the proper stable support of the valve head and to ensure the proper seating of the valve head groove 17 on the squared edge 13 of barrel 10 during operation. This structure provides proper clearance for hinge cover 19.

An operating rod 26 is fastened to the valve head support frame 25 as by welding or the like and extends the full length of barrel 10, as shown. At the upper end of the operating rod 26 is a guide member 27. The guide member comprises a plurality of radial vanes 28—28 welded to a tubular mount 29 which is carried axially of the operating rod 26 and is held in place on the rod by means of a threaded nut 30. This arrangement permits disassembly of the valve head support and operating unit 24 if maintenance should be required. The vanes 28—28 extend outwardly toward and adjacent barrel 10 to serve to guide unit 24 in operation by maintaining the rod substantially axially disposed within the barrel at all times.

A second guide 31 for unit 24 within the barrel comprises a plurality of vanes 32—32 welded to rod 26 substantially half way between the head 15 and the guide member 27. Vanes 32—32 extend radially from the rod 26 to a point adjacent the inner walls of barrel 10. The central guide 31 also serves to support the operating rod 26 during transportation in a horizontal position from job to job to prevent the rod from becoming bent, which would interfere with its proper operation and function during well bailing operations.

The valve head support and operating unit 24 also includes a bail or hanger member 33 to which the well bailer cable 34 of the drilling rig is attached by suitable means. In the drawings, the bail or hanger member is shown as being a rod bent to an elongated U-shaped configuration having its U-shaped legs 35—35 welded securely to opposed vanes 28—28. Thus, a very strong bail is provided to support the entire bailer during its normal use.

It can be seen that the entire valve head support and guide unit 24 is loosely carried in barrel 10, that is, it is movable longitudinally in barrel 10. It may be moved upwardly until the valve head 15 has the annular groove 17 seated against the edge of the barrel, whereby the valve head 15 provides a closure for the bottom of barrel 10 to prevent leakage of mud and other material carried in the barrel.

The unit 24 may also move downwardly so that the valve head moves away from the lower end 13 of the barrel and leaves an opening 38 between the valve head and the barrel, as is clearly shown in FIG. 1.

To limit the amount of movement of unit 24 downwardly, stops 36—36 are provided on bail 33 which engage the upper end 37 of the barrel to limit downward movement thereof and thus control the size of the opening 38 between the valve head 15 and the lower edge 13 of the barrel. This opening 38 must be large enough so that all the material picked up by the bailer can be discharged without hanging up and so the bailer will be clean. Valve 19 thus can operate without interference and the lower edge 13 of the barrel can be properly seated in the annular notch 17 around the valve head each time the bailer is lifted.

OPERATION

In operation, the bailer is lifted by means of the cable 34 and lowered into the wall casing. When the valve head hits fluid, such as water, valve 19 is opened and water enters the barrel.

When the valve head hits the drilled material at the bottom of the well, the valve head penetrates the drilled material and the beveled opening 22 permits the drilled material to be forced upwardly through the valve and into barrel 10 in the conventional manner.

When the operator feels he has sufficient material in the barrel from his manipulation of the bailer, he lifts the barrel from the well casing by means of cable 34. As the bailer is lifted free of the well, the barrel holder 39 is slid into place in the opposed parallel notches 12—12, as shown in FIG. 7, and the barrel 10 is swung over and dropped downwardly into the discharge container 40 until the barrel holder 39 engages the upper edges 41 of the container to stop the barrel 10 from further downward movement. The barrel holder 39 holds the barrel 10 in place on the discharge container.

Further lowering by cable 34 causes the valve head 15 to move downwardly out of engagement with the lower edge 13 of the barrel to the limit of stops 36—36, thereby forming the opening 38 and causing material within the barrel to be discharged into container 40. Container 40 preferably has a discharge pipe 42 to direct the water and material discharged from the barrel into a disposal area.

After barrel 10 is emptied, the bailer is lifted free of container 40 and the barrel holder 39 is removed from the barrel. The bailer is now ready for another bailing operation. All this is accomplished with a single drill operator in a clean and efficient manner.

As shown in the drawing, the barrel holder 39 is preferably a fork device of a substantially U shape having its opposed legs 45-45 parallel and spaced apart so as to fit into the notches 12-12 in the barrel and engaged against the straight upper edges of the notches to securely hold the barrel during the dumping procedure. A suitable handle 46 is provided on the barrel holder to facilitate its installation and removal from barrel 10 by the drill rig operator.

Although the bailer has been described for use in water well, it is equally effective for use in any fluid well, such as oil, etc.

It will be apparent to those skilled in the art that changes and other modifications may be made to the apparatus shown and described herein without departing from the spirit of the invention or from the scope of the appended claims.

What is claimed is:

1. A well bailer comprising:
an elongated hollow barrel having a lower end for placement in a well,
a valve head,
a support and guide unit for said head reciprocably carried in said barrel and movable to permit said head to engage said lower end of said barrel to form a closure for said barrel,
one-way valve means on said head to permit material to enter said barrel when said head is in engagement with said end of said barrel,
and means for moving said head out of engagement with said end of said barrel to discharge material from within said barrel.

2. The well bailer set forth in claim 1 wherein said means for moving said head out of engagement with said end of said barrel comprises:
a pair of notches formed in the outside surface of said barrel,
a fork member for engagement in said notches to support said barrel against movement,
and means for lowering said support and guide unit to move said head relative to said barrel out of engagement with said end of said barrel.

3. The well bailer set forth in claim 2 wherein said guide and support unit comprises:
a rod member fastened to said head and extending the length of said barrel,
and a plurality of vanes carried on said rod member to guide same substantially axially of said barrel.

4. The well bailer set forth in claim 3 wherein said means for lowering said support and guide unit comprises:
a bail at the end of said unit opposite said head for attachment to a bailer operating device.

5. The well bailer set forth in claim 1 wherein said valve head comprises:
a cylindrical body portion having an upper and a lower end and a substantially axial opening therethrough,
said one-way valve means being mounted on said upper end of said head,
and said lower end of said head having a bevel from its outer edge toward said opening in said head to guide material into said opening and through said valve means.

6. The well bailer set forth in claim 5 wherein:
said upper end of said head has an annular groove to receive said lower end of said barrel to form said closure.

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