

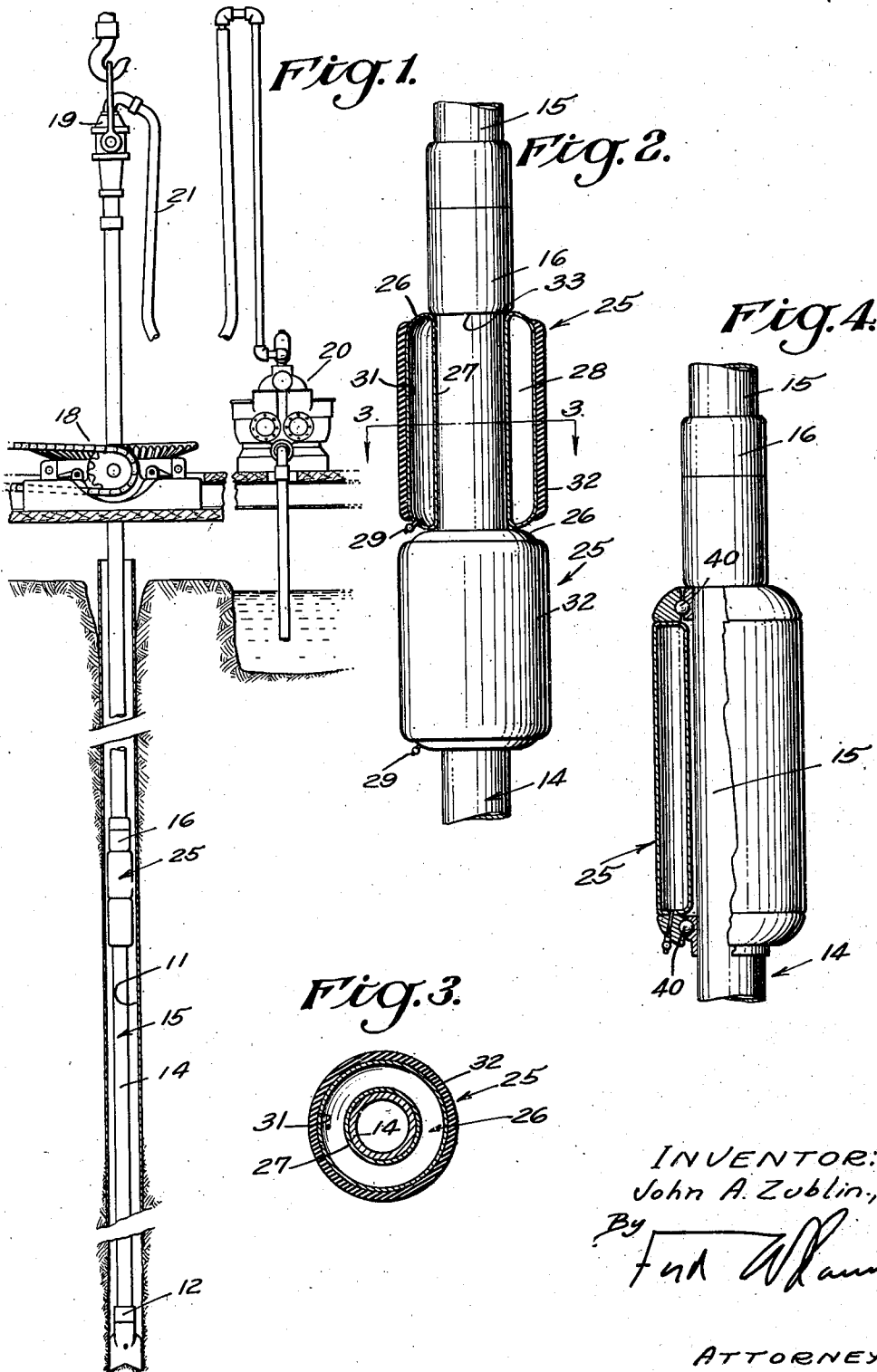
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FLOATING SUPPORTER FOR DRILL PIPE

Filed April 22, 1929



UNITED STATES PATENT OFFICE

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FLOATING SUPPORTER FOR DRILL PIPE

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My invention relates to a drill pipe which is rendered buoyant in order that the entire weight thereof need not be supported from the upper end of the drill pipe.

My invention has a particular utility in the oil-producing industry where a bit is attached to the lower end of a drill pipe, which drill pipe is rotated by a rotary machine in the derrick of the well. The drill pipe consists of stands of pipe approximately eighty feet in length, which are connected together by tool joints. It is common practice at the present time to support the drill pipe by means of a swivel head at the surface of the ground. It is not unusual at the present time to drill wells to a depth of five or six thousand feet. In view of the enormous weight of the drill pipe, there is a marked tendency for the tool joints to be pulled apart and the drill pipe to separate.

It is an object of my invention to provide the drill pipe with one or a plurality of floats or buoys attached thereto which support a portion or all of the weight of the drill pipe, thus reducing the liability of the drill pipe being separated at the tool joints.

My invention consists of a buoy which surrounds the drill pipe and which may be rigidly attached to the drill pipe or may be held in position by engagement with a shoulder of one of the tool joints on the drill pipe.

It is the usual practice in drilling a well by the rotary system to pump rotary mud downward through the drill pipe, this mud issuing from the bit and passing upward through the well around the drill pipe. This rotary mud at a depth of about six thousand feet is at a pressure around three thousand pounds per square inch. It is therefore necessary to construct the buoys so that they will not be collapsed by this high pressure.

It is an object of my invention to provide a buoy having a closed chamber which may be filled with a gas under pressure. By approximating the depth at which the buoy is to operate, the pressure at which the gas should be compressed can be determined. Gas is then compressed to this certain pressure in the chamber of the buoy and lowered into place. The pressure of the rotary mud

is therefore opposed by the gas pressure within the buoy, and the tendency for the buoy to collapse is reduced so that collapsing is not liable to occur. These results may also be accomplished by filling the float with a non-compressible fluid having a lesser specific gravity than the rotary mud.

It is the present practice to provide a drill pipe with wear preventers in order to prevent the drill pipe from engaging the walls of the hole and wearing away the pipe or tool joints or the well casing which has been installed in the well.

It is an object of my invention to provide a buoy for the purpose hereinbefore mentioned, which is useful also in the capacity of a wear preventer.

A still further object of my invention is to provide a buoy for supporting at least a part of the weight of the drill pipe, this buoy being rotatable on the drill pipe.

Referring to the drawing in which my invention is illustrated:

Fig. 1 is a utility view.

Fig. 2 is an enlarged view showing the buoy of my invention in section.

Fig. 3 is a section taken on the line 3—3 of Fig. 2.

Fig. 4 is a view illustrating another form of my invention.

Referring to the drawing in detail, the numeral 11 represents a well which is being drilled by a bit 12 secured to the lower end of a drill pipe 14. This drill pipe 14 consists of stands of pipe 15 connected together by tool joints 16. The drill pipe is rotated by a rotary machine 18. The upper end of the drill pipe 14 is connected to a swivel head 19 by which a portion of the weight of the drill pipe may be supported. Rotary mud is supplied to the drill pipe by a pump 20 connected to the swivel by a conduit 21.

In this view (Fig. 1) the numeral 25 designates a buoy incorporating the features of my invention. The details of the buoy are shown in Figs. 2 and 3. Referring to these figures, the buoy 25 consists of a shell 26 having a central cylindrical opening 27 through which the drill pipe 14 extends. The shell 26 provides an annular fluid chamber

28. Fluid or gas under pressure may be introduced into the chamber 28 through a valve-closed pipe 29. The outer cylindrical wall 31 of the shell 26 is enclosed by a resilient wall 32. As shown in the drawings it is possible to place the buoy on a stand of pipe 15 so that the upper portion thereof engages a lower shoulder 33 of one of the tool joints 16. One or more buoys 25 may be placed on each stand of pipe 15, and the buoys may be placed at different intervals, as desired. If the well is quite deep and the drill pipe quite heavy, more buoys will be provided than would be provided in shallow wells.

15 In the operation of the invention, the buoys being filled with the gas are of a less specific gravity than the rotary mud which fills the well. For this reason the buoys tend to support the drill pipe. Sufficient buoys are provided so that the weight which must be supported by the swivel head 19 is not great enough to create the danger of the drill pipe separating at any of the tool joints 16. The rubber wall 32 reduces the friction between 25 the buoy and the wall of the well, and any wear which occurs will be on this rubber wall 32. The outer diameter of the buoy is greater than the outer diameter of the tool joints; therefore, the buoys act as wear preventers, preventing the tool joints or any portion of 30 the tool joints from engaging the side of the well.

It is possible to determine at approximately what level the buoys will operate, and this 35 being known, it is possible to determine the pressure of the rotary mud at that level. Let us assume that a buoy is intended to operate at a level of six thousand feet. The rotary mud pressure at this point is three thousand 40 pounds per square inch. If there were only atmospheric pressure in the chamber 28, the collapsing forces on the buoy would be very great and the buoy might collapse. By placing the gas in the chamber 28 under a 45 pressure so as to reduce the difference in pressure of the interior and exterior, the pressure of the rotary mud is opposed and there is no danger of the buoy collapsing.

The collapsing forces on the buoy are in 50 proportion to the difference in pressure in the chamber and around the buoy; therefore the collapsing forces may be reduced to a safe margin by placing a pressure in the chamber 28 which is below that of the pressure of the rotary mud.

55 In Fig. 4 I illustrate a buoy 25 of substantially the same construction as that shown in Figs. 1, 2, and 3. This buoy, however, is rotatably supported at each end by a bearing 60 40, so that the buoy is rotatable on the drill pipe. In this form of the invention, when the buoy engages the wall of the well, the buoy remains stationary and the drill pipe rotates, the friction being consumed in the bearings 40.

From the foregoing description it will be seen that by using my invention the liability of the drill pipe separating due to its own weight will be eliminated. My invention is designed so that it is not necessary to reconstruct the drill pipe, but on the other hand, it may be applied to any drill pipe now in use. The buoy not only acts as a flotation means for the drill pipe but also acts as a wear preventer and will protect the drill pipe and well casing from being worn to any appreciable extent.

I claim as my invention:

1. In apparatus for use in a well, the combination of: a column for extension into the well; and a buoy rotatable on said column for supporting said column.

2. In apparatus for use in a well, the combination of: a column for extension into the well; and a plurality of buoys rotatable on said column for supporting said column at different places.

3. In apparatus for use in a well, the combination of: a column for extension into the well; and a buoy rotatable on said column for supporting said column, the interior of said buoy being filled with a fluid under pressure.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 16th day of April, 1929.

JOHN A. ZUBLIN

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