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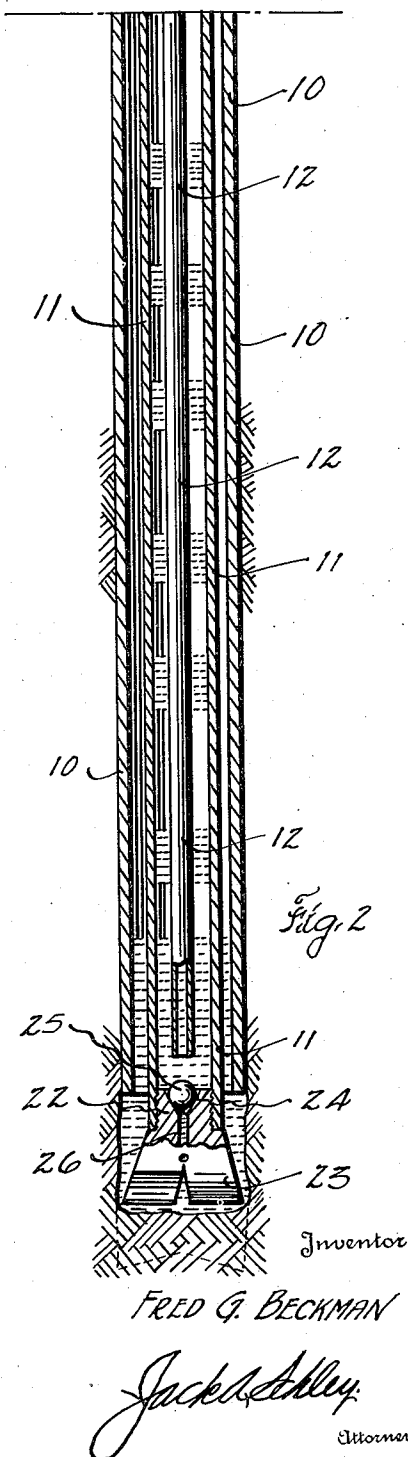
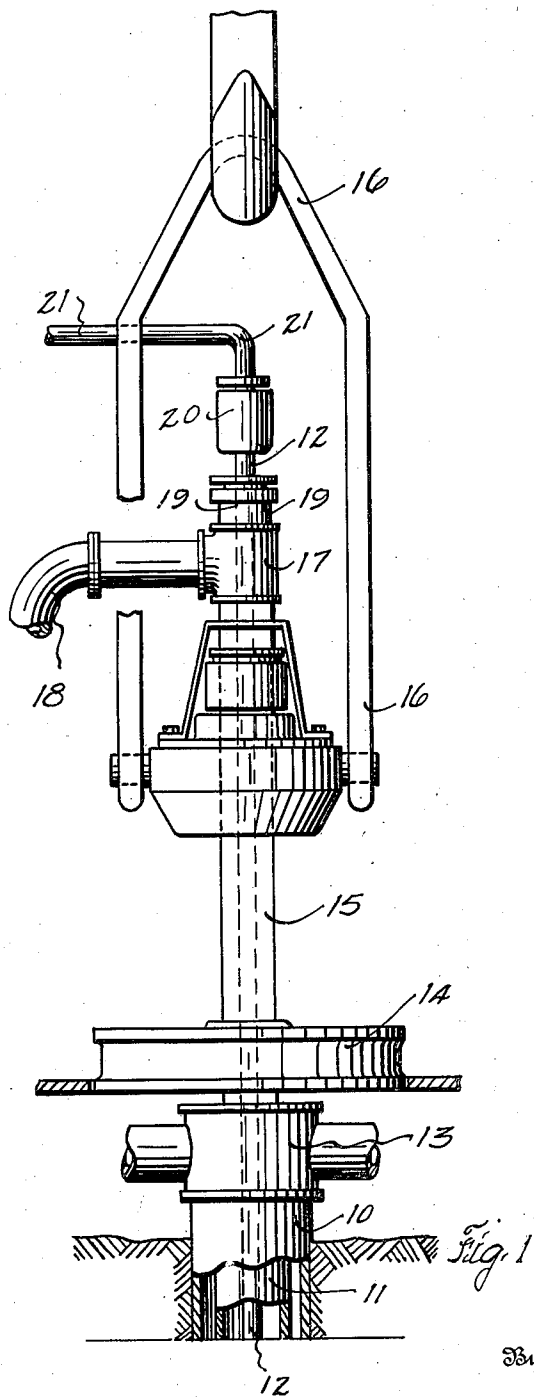
F. G. BECKMAN

2,163,115

APPARATUS FOR CLEANING AND PUMPING OIL WELLS

Filed April 3, 1937

2 Sheets-Sheet 1



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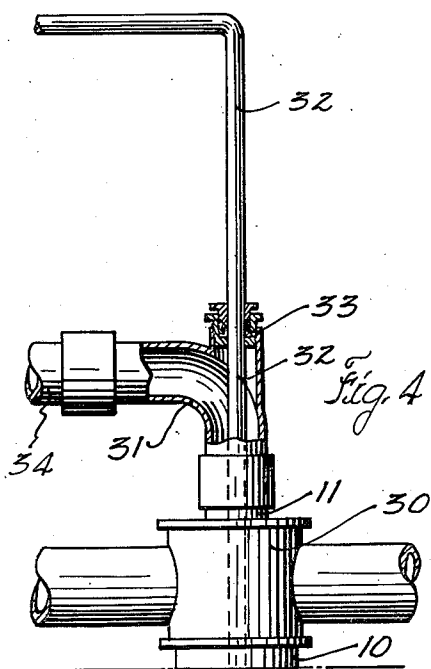
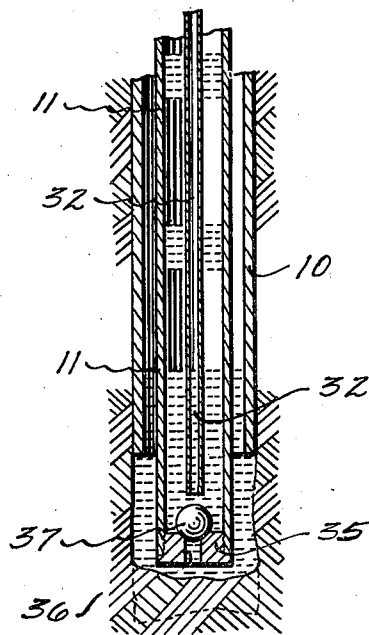
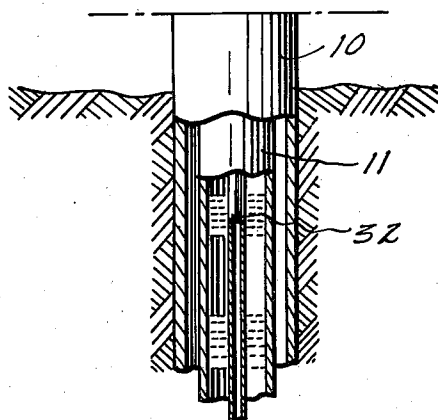
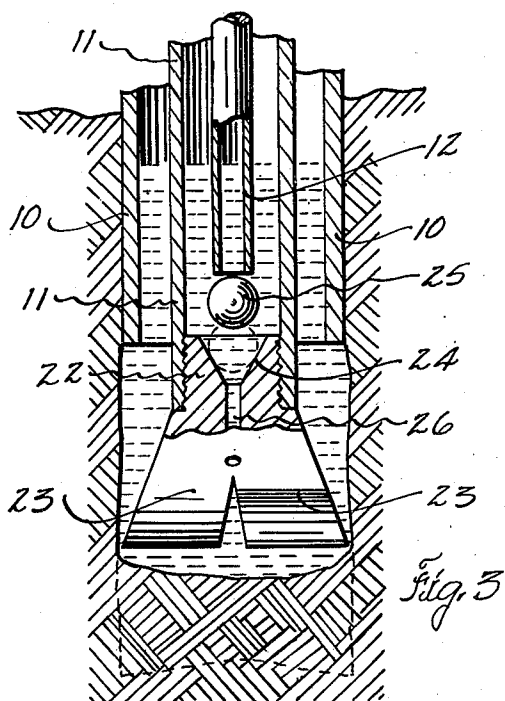
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APPARATUS FOR CLEANING AND PUMPING OIL WELLS

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APPARATUS FOR CLEANING AND PUMPING
OIL WELLS

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Application April 3, 1937, Serial No. 134,794

2 Claims. (Cl. 255—24)

This invention relates to new and useful improvements in apparatus for cleaning and pumping oil wells.

One object of the invention is to provide an apparatus whereby a well may be cleaned out with greater economy, and deepened if desired, without imposing additional pressure on the producing structure or exposing such formations to air or gas, used in elevating the fluids or liquids.

A further object of the invention is to provide an improved apparatus for lifting fluids and liquids in oil wells having comparatively low pressures, but in which the oil rises to some height therein; and so to do without imposing additional pressure on the producing structure.

Another object of the invention is to provide an improved apparatus for cleaning out oil wells wherein a column of liquid is standing which includes drilling up the accumulations in the bottom of the hole, trapping the cuttings and liquid in a tubing, and lifting the trapped cuttings and liquid out of the tubing by means of air or gas pressure, and at the same time closing off the formation to such pressure.

A construction designed to carry out the invention will be hereinafter described, together with other features of the invention.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawings, in which an example of the invention is shown, and wherein:

Figure 1 is a more or less diagrammatical view of the surface equipment,

Figure 2 is a similar view of the underground equipment,

Figure 3 is a detail of the drill and valve structures,

Figure 4 is a view partly in section and partly in elevation of a modified apparatus for lifting fluids from the well, and

Figure 5 is a similar view of the underground equipment.

In the drawings the numeral 10 designates a well casing, 11 a string of tubing therein, and 12 a pressure line extending down through the tubing. The usual casing head 13 is mounted on the casing and the tubing string passes therethrough. The usual grip stem 15 is attached to the tubing and passes through the rotary table 14. The stem and string are suspended by an elevator 16 hung in the derrick in the ordinary manner.

A swivel 17 is connected to the upper end of the stem 15 and a hose connection 18 extends

from the swivel. The pressure line 12 extends through a stuffing box 19 in the top of the swivel and is connected to a swivel 20, whereby said line may rotate with the tubing. A stationary pressure line 21 carries the swivel 20. Air or gas under pressure is supplied to the line 12 while the tubing and said line are being rotated.

It is not necessary that the well be cased, but where casing 10 is used the tubing 11 extends below the casing. The shank 22 of a fish tail or other bit 23 is screwed into the lower end of the tubing. A valve seat 24 is provided in the upper end of the shank (Figure 3) for receiving a valve ball 25. A duct 26 leads from the seat down through the bit. The pressure line 12 terminates just above the ball 25 which is of such diameter that it cannot pass upward between the line 12 and the tubing, thus the lower end of said line limits the upward travel of said valve. This apparatus has been found to carry out the method, but any apparatus suitable for the purpose may, of course, be used.

It will be observed that the bit 23 may have a cutting diameter slightly less than the diameter of the well, so as to cut only the accumulations at the bottom of the hole; or it may have the same diameter so that it may be used to deepen the hole. Any type of bit suitable for the formation to be cut may be used.

In operation the string of tubing 11 is rotated by the rotary 14, whereby the bit 23 is rotated to agitate and break up accumulations or debris which have caved or otherwise collected at the bottom of the well hole. As the apparatus is used where liquid is standing in the well, a column of liquid will rise in the casing 10, and liquid and cuttings will flow up through the duct 26, unseat the valve 25 and rise to the same level in said tubing as in the casing. When this occurs the pressure will be balanced above the valve 25, thus permitting it to drop to its seat 24.

Air or gas under pressure is delivered to the lines 21 and 12. The valve 25 being closed this pressure fluid will act on the liquid and cuttings trapped in the tubing and lift them and discharge said liquids and cuttings from the tubing 11 through the swivel 17 to the hose 18. When the liquids and cuttings are discharged the air or gas will be released to atmosphere. The pressure of the column of liquid in the casing will again load the tubing as described and the discharging operation will be repeated. The string of tubing will be lowered in the usual way as the operation progresses.

Where merely the lifting phase of the method

is employed, a casing head 30 is mounted in the casing 10 and the tubing 11 is hung therein in the usual manner. A discharge elbow 31 is connected to the upper end of the tubing and a discharge pipe 34 extends therefrom. A pressure line 32 extends through a stuffing box 33 in the top of elbow down through the tubing 11 as is shown in Figures 4 and 5. The line 32 terminates above a ball valve 37 similar to the line 12. A plug 35 is screwed into the lower end of the tubing and the valve seats at the upper end of a duct 36 extending up through said plug. The operation, except for the drilling, is the same as has been described.

What I claim and desire to secure by Letters Patent is:

1. An apparatus for cleaning a well and lifting the liquid therein to the surface including, a rotatable well tubing having its lower end immersed in the liquid standing in the well, said tubing having a liquid inlet in its lower end, a gravity operated check valve adapted to close said inlet and arranged to be unseated by the liquid in the well, a conductor mounted within the tubing in a fixed position with relation thereto and having its lower end disposed above the check valve whereby the upward movement of

the check valve is limited by said conductor, said lower end of the conductor having outlet openings therein, and means for delivering a pressure fluid into the conductor so that said pressure fluid may enter the tubing to close the check valve and lift the liquid in said tubing.

2. An apparatus for cleaning a well and lifting the liquid therein to the surface including, a rotatable well tubing having its lower end immersed in the liquid standing in the well, said tubing having a liquid inlet in its lower end, a gravity operated check valve adapted to close said inlet and arranged to be unseated by the liquid in the well, a conductor mounted within the tubing in a fixed position with relation thereto and having its lower end disposed above the check valve whereby the upward movement of the check valve is limited by said conductor, said lower end of the conductor having outlet openings therein, means for delivering a pressure fluid into the conductor so that said pressure fluid may enter the tubing to close the check valve and lift the liquid in said tubing, a drill bit carried by the tubing, and means for rotating said tubing to cut the accumulation and formation at the bottom of the hole.

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