Dec. 1, 1931. W. P. DOLSON 1,834,052

AIR LIFT DEVICE FOR WELLS

Filed Aug. 25, 1930

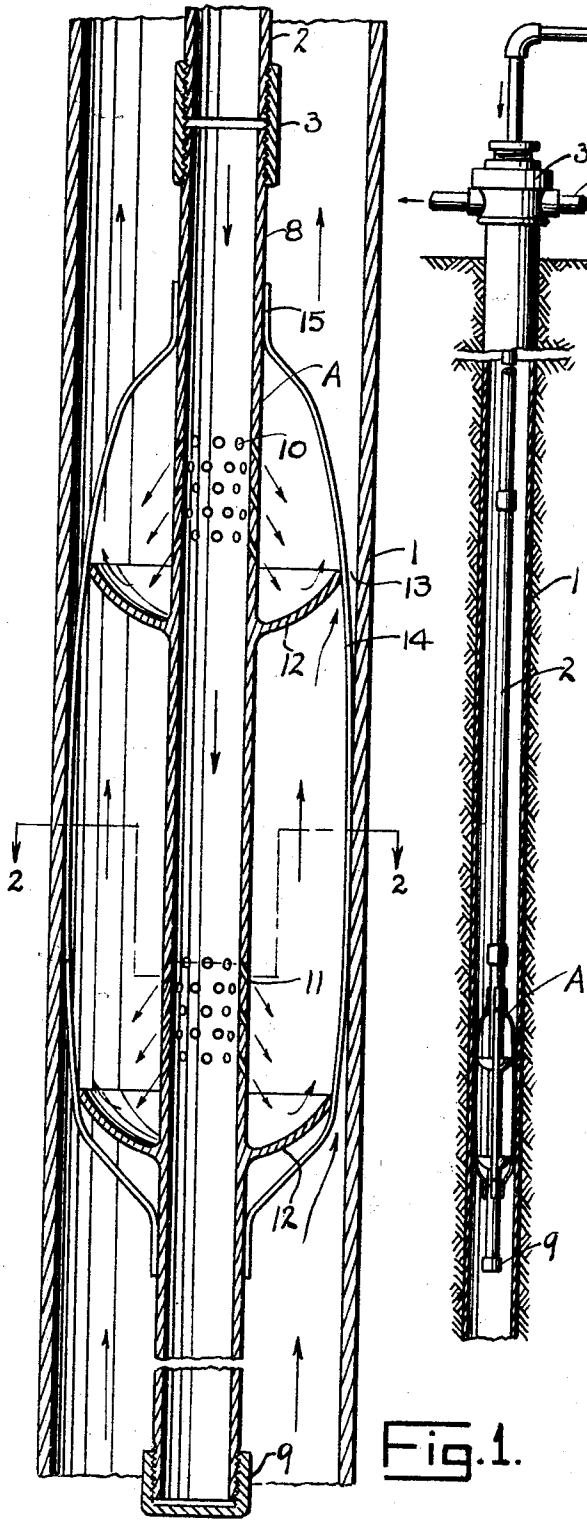


Fig. 1.

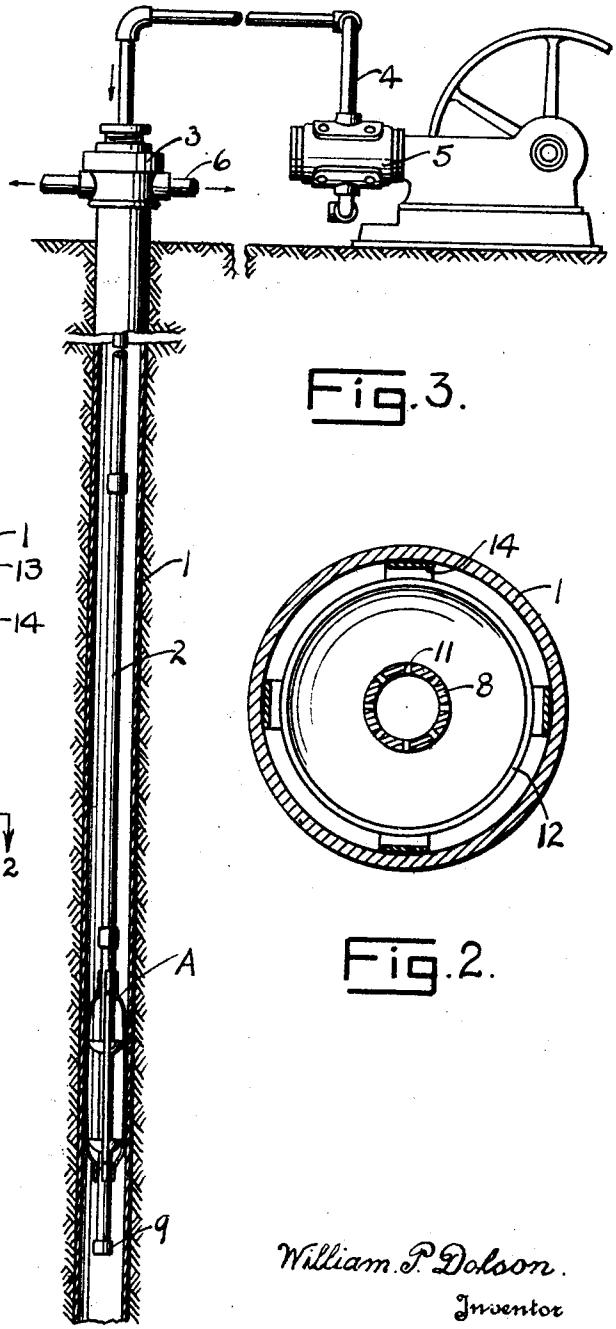


Fig. 3.

Fig. 2.

William P. Dolson.
Inventor

Jesse P. Stone
&
Lester B. Clark

Attorneys

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UNITED STATES PATENT OFFICE

WILLIAM P. DOLSON, OF HOUSTON, TEXAS

AIR LIFT DEVICE FOR WELLS

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My invention relates to air lift devices for use in elevating liquids from wells. It is particularly adapted for use in deep wells for oil, water and the like and has particular application to the means by which the air or other gaseous fluid is delivered to the well.

It is an object of the invention to provide a device whereby the air may be delivered into the well in such manner as to exert a minimum of back pressure upon the liquid entering the well.

It is also an object to divert the pressure fluid from the sides of the well so that no wear upon the casing or the sides of the well may be experienced due to the impact thereon of the pressure fluid.

I desire to provide baffles against which the pressure fluid may be directed so that the said fluid may be diverted upwardly away from the bottom of the well and from contact with the casing.

In the drawings herewith Fig. 1 is an enlarged view of the well casing with my device shown therein in central longitudinal section.

Fig. 2 is a transverse section taken on the plane 2—2 of Fig. 1.

Fig. 3 is an assembly view showing the manner in which my device may be employed in deep well operations.

In employing my air lift in raising liquids from wells I contemplate inserting the same downwardly into the casing shown at 1 in Fig. 3. The lower end of the device will preferably be submerged somewhat below the level of the liquid in the well. Said device shown at A in Fig. 3 is secured adjacent the lower end of the tubing 2. The upper end of the tubing projects through the casing head 3 and is connected at some adjacent point to the outlet 4 from a compressor 5. The casing head has lateral outlets 6 through which the liquid may find an outlet.

The construction of my apparatus through which the pressure fluid finds an outlet to the well is shown particularly in Fig. 1. The lower end of the tubing or air inlet pipe 2 is connected by means of a coupling 3 to my discharge device A. This device comprises a tubular body 8, which is an extension upon the inlet pipe 2. It is closed at its lower end by means of a cap 9. Between its ends it is perforated at a plurality of points at 10 and 11 through openings which are inclined downwardly and outwardly so as to deliver the pressure fluid in a downwardly inclined direction. Below each set of openings 10 and 11 is a saucer-shaped baffle 12, which is of slightly smaller diameter than is the interior of the casing, leaving a passage indicated at 13 between the rim of the baffle and the interior wall of the casing. This annular passage 13 allows the passage of liquid upwardly from the well.

In order to center my device accurately in the well I prefer to employ spring members 14, which may be ordinary straps of resilient metal connected at each end, as shown at 15, to the outer wall of the inlet tube 8. These straps are resilient and allow the device to pass couplings in the casing during its movement in the well but serve to accurately position the device centrally of the casing.

In the operation of my device the apparatus will be assembled as shown in Fig. 3 and in the lifting of the liquid from the well air or other gaseous fluid will be forced downwardly through the tube 8 and through the outlet passages 10 and 11 to the interior of the casing. The pressure fluid will be directed downwardly as shown by the arrows in Fig. 1 and will impinge against the baffle member 12 and be directed upwardly along with the rising column of liquid in the well and will serve to effectively assist in aerating the column and lifting it upward to the surface where it may be discharged through the outlet 6. The air will be directed against the baffles and will not come in forcible contact with the casing so as to cause any material wear thereon. Furthermore, the deflecting of air upwardly from the baffle causes an effective distribution of the pressure fluid in the column of liquid and more effectively assists in its upward movement. The upward discharge of air along the rim of the baffle has a slight injector effect which assists materially in lifting the liquid. The air thus

deflected upwardly does not tend to resist the entrance of liquid to the well from the formation, but will rather assist in drawing the liquid into the well bore where it can be elevated to the surface.

What I claim as new is:

1. A device of the character described including a well casing, a tube extending downwardly therein, a closure for the lower end of said tube, said tube having downwardly inclined discharge openings, and a saucer-shaped baffle on said tube beneath said openings.

2. A device of the character described including a well casing, a tube extending downwardly therein, a closure for the lower end of said tube, baffles on said tube spaced apart, the outer margins of said baffles being spaced slightly from said casing, and downwardly inclined perforations in said tube above said baffles.

3. In a device of the character described, a well casing, a pressure fluid discharge tube in said casing, said tube having downwardly and outwardly inclined openings therein, and means below said openings to deflect said pressure fluid upwardly in said casing.

4. In a device of the character described, a well casing, a pressure fluid discharge tube in said casing, said tube having downwardly and outwardly inclined openings therein, and upwardly cupped plates on said tube below said openings, said plates being of smaller diameter than said casing.

5. In a device of the character described, a well casing, a pressure fluid discharge tube in said casing, said tube having downwardly and outwardly inclined openings therein, and upwardly cupped plates on said tube below said openings, said plates being of smaller diameter than said casing, and means to space the outer margins of said plates uniformly from said casing.

6. In an airlift device for wells, a discharge tube, means to space said tube from the wall of the well, said tube having downwardly inclined openings therein and means below said openings to deflect the pressure fluid from said openings away from the walls of the well.

In testimony whereof I hereunto affix my signature this 20th day of August, A. D. 1930.

WILLIAM P. DOLSON.