Dec. 13, 1938. W. C. DOYLE 2,140,419

FLUID LIFT PUMP

Filed Jan. 3, 1938

Fig. 1.

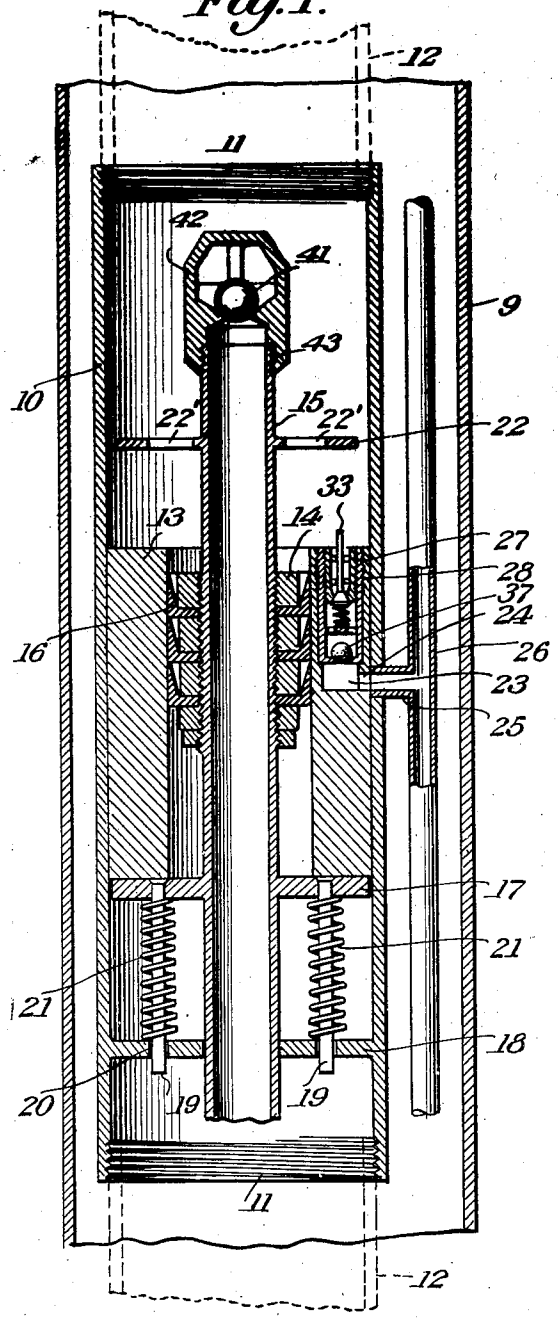


Fig. 2.

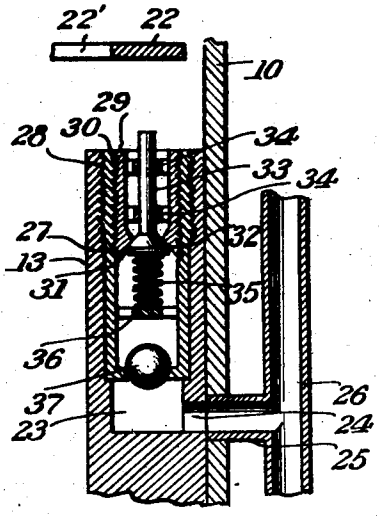


Fig. 3.

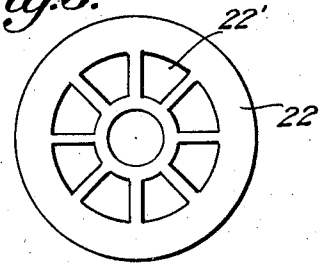
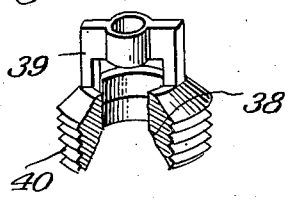


Fig. 4.



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FLUID LIFT PUMP

William C. Doyle, Vernon, Tex.

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3 Claims. (Cl. 103—240)

This invention relates to a fluid lift pump and has for an object to provide a novel compressed air valve mechanism for controlling admission of air under high pressure to the oil pipe to continuously elevate the oil.

A further object is to provide apparatus of this character which will be formed of a few strong simple and durable parts, and which will not easily get out of order.

With the above and other objects in view the invention consists of certain novel details of construction and combinations of parts hereinafter fully described and claimed, it being understood that various modifications may be resorted to within the scope of the appended claims without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawing forming part of this specification,

Figure 1 is a vertical sectional view through a portion of an oil well casing and showing fluid pressure lift apparatus constructed in accordance with the invention.

Figure 2 is a vertical sectional view drawn to enlarged scale, showing the high pressure air valve.

Figure 3 is a plan view of the air valve trip disc.

Figure 4 is a detail perspective view, with a portion broken away, showing a modified form of seat and guide for the air valve.

Referring now to the drawing in which like characters of reference designate similar parts in the various views, 10 designates a casing which is interiorly threaded at the top and at the bottom as shown at 11 to receive the oil pipe 12 in the conventional oil well casing 9. The casing is provided interiorly with a short barrel 13 in which a piston 14 is mounted to slide, the piston being threaded on to a fluid or oil flow pipe 15. The piston is preferably formed of a plurality of sections each equipped with a rubber cup ring 16 for forming a tight seal with the wall of the barrel.

A pair of plates 17 and 18 are arranged in the casing 10, the lower plate 18 being fixed stationary in the casing and the upper plate being stationary on the oil flow pipe 15 and moving as a unit with the latter toward and away from the stationary plate. The upper plate 17 is provided with depending pins 19 which slidably fit in openings 20 in the lower plate. Helical springs 21 are seated on the pins and these pins tend to hold the upper plate 17 against the barrel 13 and prevent too high movement of the oil flow pipe 15.

The oil flow pipe is equipped with a trip disc 22 which is of smaller diameter than the diameter of the cylinder 10 and is provided with openings 22' as shown in Figure 3, so that air pressure may escape around the edge and through the openings of the disc as will be later described.

An air chamber 23 is formed in the barrel 13 and has communication through a port 24 with an outlet pipe 25 extending from a compressed air pipe 26.

A cylindrical valve casing 27 is mounted in the upper end of the air chamber and is screw threadedly engaged with the wall of the air chamber as shown at 28. A cylindrical valve seat 29 is screw threadedly engaged in the valve casing as shown at 30 and is provided at the lower end with a conical seat 31.

A valve 32 is positioned to move upwardly into closed position against the seat 31 and is provided with a stem 33 which is slidably mounted in guides 34 carried by the cylindrical wall of the valve seat 29. A helical spring 35 bears with its upper end against the valve and is supported at its lower end upon a cage 36. A ball check valve 37 is disposed in the bottom of the valve casing 27 and closes downwardly to prevent oil entering the air pipe 26 when the pressure in the oil flow pipe is greater than when in the air pipe.

A modified form of seat for the valve 32 is shown in Figure 4 is which the valve seat 38 is provided with a single guide 39 for the valve stem 33 and is provided with external screw threads 40 for engagement with the internal screw threads of the valve casing 27.

In operation when pressure builds up in the cylinder 10 it will force the piston 14, oil flow pipe 15, and plate 17 downward against the tension of the springs 21 until the trip disc 22 impinges against the valve stem 33. Thereupon the valve is opened and air under high pressure escapes into the cylinder 10 around the oil emerging from the oil flow pipe 15 and lifts the latter in the well pipe 12.

For preventing reverse flow of oil and thus enabling the columns to build up and exert a downward pressure on the piston 14 a ball check valve 41 is mounted in a cage 42 which is screw threadedly engaged with the top of the oil flow pipe as shown at 43.

From the above description it is thought that the construction and operation of the invention will be fully understood without further explanation.

What is claimed is:

1. A fluid lift pump comprising a well pipe, a tubular barrel forming a closure in the pipe, a

fluid pipe slidably fitted in the barrel, a piston carried by the fluid pipe and slidably fitting the cylindrical wall of the barrel, a trip disc carried by the fluid pipe and movable as a unit with the fluid pipe and piston, a compressed air supply pipe entering the barrel, a compressed air chamber in the barrel opening through the top of the barrel, a spring pressed valve controlling the chamber and having a stem projecting above the top of the barrel to be struck by said trip disc to open the valve when pressure builds up in the fluid pipe above the piston to depress the piston, and means connected to the well pipe and to the fluid pipe for limiting movement of the fluid pipe in either direction.

2. A fluid lift pump comprising a casing threaded at the ends to receive a well pipe, a cylindrical barrel forming a closure in the casing, a piston mounted to slide in the barrel, a fluid pipe forming a rod for the piston, a pair of plates arranged in the casing, one of the plates being stationary and being connected to the casing and the other being movable and being connected to the fluid pipe, springs yieldably holding the last named plate against the barrel to prevent too high movement of the fluid pipe, a trip means carried by the fluid pipe, a compressed air chamber in the top of the barrel, and a valve controlling the compressed air chamber and adapted to be opened by downward movement of the trip disc to supply compressed air to the casing above the piston, and a check valve in the fluid pipe preventing retrograde movement of the fluid in the pipe.

3. A fluid lift pump comprising a well casing, a cylindrical barrel in the casing, a fluid pipe movable longitudinally in the barrel, a piston carried by the fluid pipe and slidably fitted in the barrel, a trip means on the fluid pipe, a compressed air chamber in the barrel, a valve controlling the chamber and adapted to be opened by downward movement of the trip means to supply compressed air above the piston in the barrel, an upper plate carried by and movable as a unit with the fluid pipe, a lower plate carried by the casing and having guide openings, pins extending downward from the upper plate and slidably fitted in the guide openings, helical springs sleeved on the pins and bearing against both plates for normally holding the upper plate against the bottom of the barrel to limit upward movement of the fluid pipe, and a check valve in the fluid pipe preventing retrograde movement of fluid in the fluid pipe.

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