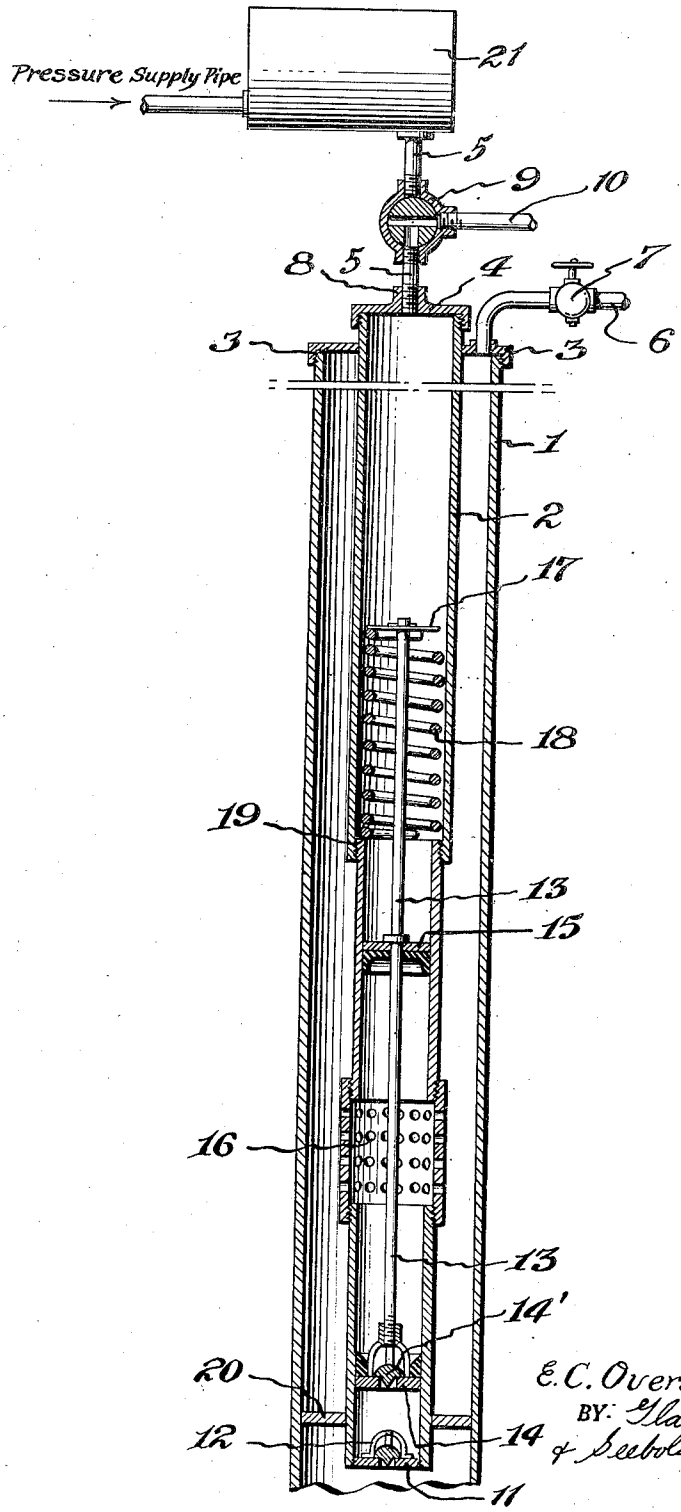
July 5, 1938. E. C. OVERALL 2,122,823

PUMP

Filed Jan. 4, 1937



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Patented July 5, 1938 2,122,823

UNITED STATES PATENT OFFICE

2,122,823

PUMP

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Application January 4, 1937, Serial No. 118,982

3 Claims. (Cl. 103—46)

This invention relates to new and useful improvements in pumps, especially those used in oil wells and the object thereof is to produce a pump of simple construction which is durable and is efficient in operation.

One object of the invention is to eliminate the use of long lifting rods which in wells of great depth are a great disadvantage.

Another object is to use pressure applied at the surface to force the fluid above the surface and at the same time compress a spring which on release of the pressure returns the apparatus to normal condition.

Other objects will appear from the following detailed description taken in connection with the accompanying drawing in which:

The figure is a vertical section through the device.

In the drawing, 1 represents an outer casing or tube in an oil well reaching from the surface to about the level of the oil in the well. A line of tubing 2 within said casing is secured thereto and extends from the surface to a level below the level of the oil. This inner tubing is preferably of metal while the outer casing may if desired be of concrete or similar material. The two cylinders are capped as shown at 3 and 4, the cap 4 making an air-tight joint with tubing 2 if arranged as shown. Cap 3 is not necessarily air-tight.

In the cap 3 is mounted a discharge pipe 6 which may be valved as shown at 7 if desired.

The pipe 5 extends from the cap 4 into which it is securely fastened in an air-tight manner as by screw threads at 8, to a source of fluid pressure 21.

Between the cap 4 and the source of pressure a three-way valve 9 is interposed in the pressure pipe 5. This valve may be operated in any known manner, manually or automatically to turn on or off the pressure passing from the source of pressure to the tubing. When the pressure is shut off from the source by the valve 9, the same movement opens the pipe 5 below the valve to the exhaust at 10. At the lower end of the casing is a closure 20 forming a seal for the lower end of the annular space between the casing and the tubing.

At the lowermost portion of the tubing 10 is a closure 11 therefor having a caged check valve 12 opening upwardly.

A rod 13 extends vertically within the lower portion of the tubing and terminates in a valved piston 14, slidable in the lower portion of said tubing 2.

At a distance above the valve piston 14, a plunger piston 15 is attached to said rod 13. Between the piston 14 and the plunger 15 a section of the tubing is perforated as shown at 16. As described hereinafter the rod 13 with its piston 14 and plunger 15 is reciprocated in the tubing and the perforated section is so situated as to be below the lowermost position of the plunger 15 and above the uppermost position of the piston 14.

On the rod 13 some length above the piston 15 a washer 17 is secured and against the underside of the washer bears the upper end of a spring surrounding the rod 13. A lower bearing for the spring is formed by a projecting annulus on the interior of the tubing or by making the next lower section of the tubing smaller and securing it to the upper length of tubing. The end of the lower section then forms a convenient bearing for the spring 18.

In operation the pump is primed if found necessary and the pressure fluid is admitted to the tube 2 through the valve 5, piston 15 is moved downward by the pressure and piston 14 moves therewith. Check valve 12 is closed by the pressure and check valve 14' opens upwardly. The fluid to be pumped being confined between closure 11 and plunger 15, is forced by the downward movement of the plunger 15 through the perforations 16 into the space between the tubing 2 and the outer casing 1. That space being filled to the surface the fluid is discharged through the discharge pipe 6. It is to be noted that during this phase of the operation the washer 17 in its downward movement compresses the spring 18. Also the piston 14 merely moves through the fluid as valve 14' is open.

The pressure is then relieved by turning the valve 9 so as to bring the tube 2 into communication with the atmosphere.

The spring 18 being compressed raises rod 13 and with it plunger 15 and piston 14. Valve 14' will now be closed and as the upward movement of piston 14 tends to create a vacuum, valve 12 will open and the fluid, oil in the case of an oil well, fills that portion of the tubing below the piston 14.

When the spring 18 has returned to its former position the operation is repeated.

The apparatus is of simple construction. The pressure operates directly on the plunger 15 to raise and discharge the fluid. At the same time it compresses the spring the reaction of which restores the parts to their former position and

causes the oil to be drawn in at the bottom of the tubing.

Having thus clearly described the apparatus and its mode of operation, I claim:

1. In a pump for oil wells, an outer casing extending from the surface to about the normal level of the oil in the well, an inner tubing within said casing extending below the normal level of the oil, a source of pressure, an air-tight cap secured to the upper end of said inner tubing, a conduit leading from the inner side of said cap to said source of pressure, a three-way valve in said conduit for opening and closing communication alternately from the inside of said tubing to said source of pressure, and from the inside of said tubing to the atmosphere, a rod within the lower portion of said tubing extending for a short portion of the length of said tubing, a fluid-tight plunger fixed on said rod, a piston fixed to the lower end of said rod and having an opening and an upward opening check valve therein, a closure for said tubing approximately at its lower end and having an opening and an upwardly opening check valve therein, said tubing having a perforated section between said plunger and said piston, a spring surrounding a portion of said rod, bearings for said spring the upper bearing being rigid with said rod and the lower bearing being rigid with said tubing and a fluid-tight packing between said inner tubing and said casing below said perforated section.

2. In a pump for oil wells, an outer casing, an inner tubing within said casing, means near the bottom of said casing sealing the annular space between the casing and the inner tubing, a rod in the lower portion of said tubing, a rigid washer attached to the upper end of said rod, an apertured piston having an upwardly opening check valve in the aperture thereof, secured to the lower end of said rod, a plunger secured to said rod intermediate its ends, a spring surrounding said rod and bearing upon said washer at its upper end, a lower bearing for said spring rigid with said tubing, and means for imparting downward movement to said rod, there being perforations in said tubing between the lowest position of the plunger and the highest position of said piston, whereby when downward movement is imparted to the rod, oil is forced up in the annular space between the casing and the inner tubing and said spring is compressed for returning the rod to its former position.

3. In a pump for oil wells, an outer casing, an inner tubing of smaller diameter than said outer casing forming an annular space therewith, a seal at the bottom of said space, a rod in the lower portion of said tubing, a spring surrounding said rod, a bearing for the upper end of said spring rigid with said rod and a bearing at the lower end of said spring rigid with said tubing, a plunger on said rod intermediate its length, a valved piston mounted on said rod at its lower end, a valved closure at the bottom of said tubing, and means for applying and releasing pressure on the upper side of said plunger to reciprocate said plunger, said inner tubing having a perforated section between the lowest position of the plunger and the highest position of the piston whereby on pressure being applied to the plunger the rod moves downward the oil is forced up in said annular space, and the spring is compressed and on release of the pressure the spring restores the rod to its former position and draws oil into the tubing below the piston.

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