Aug. 13, 1929. L. J. BLACK 1,723,993

OIL WELL PUMP

Filed April 17, 1928

Fig. 1.

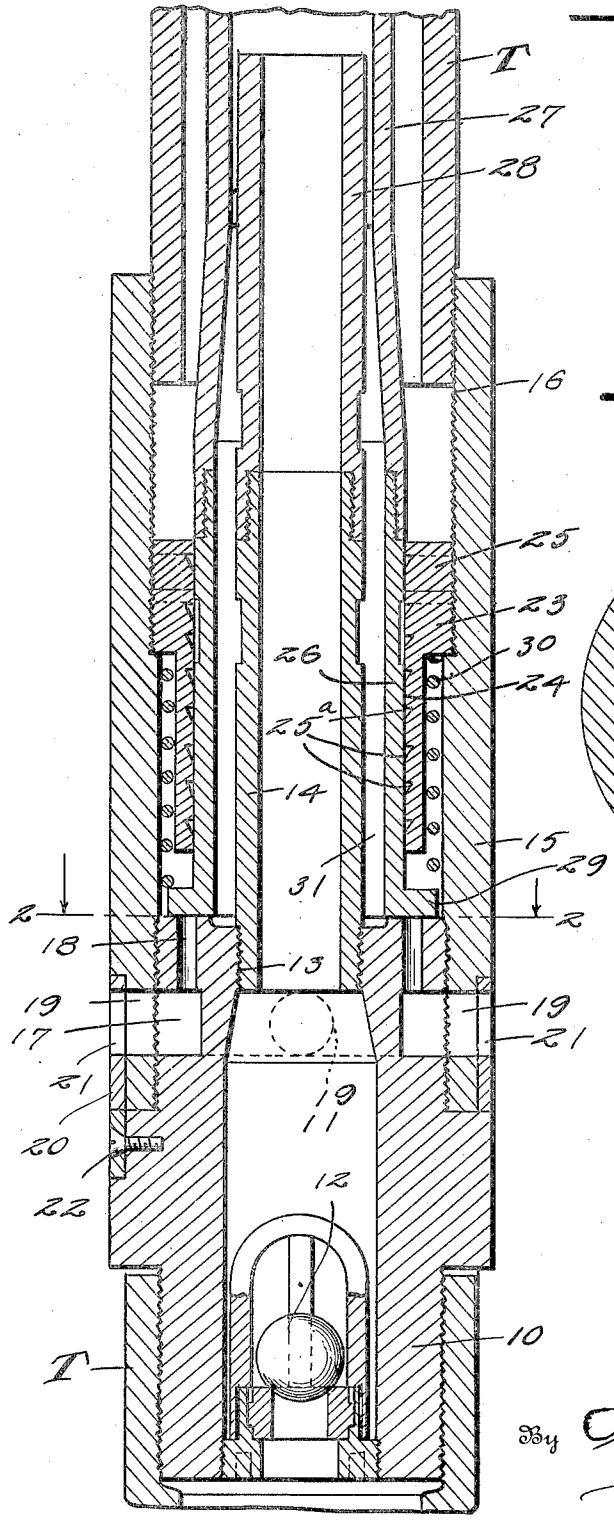
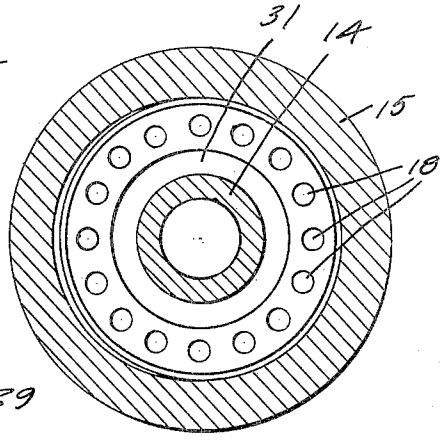


Fig. 2.



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UNITED STATES PATENT OFFICE.

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OIL-WELL PUMP.

Application filed April 17, 1928. Serial No. 270,744. REISSUED

This invention relates to oil well pumps and more particularly to that type of pump wherein the oil is lifted from the well by use of compressed air or gas or a mixture thereof.

An important object of this invention is the improvement of the structure shown in my prior application, No. 244,495, filed January 4, 1928, for oil well pumps, to permit elimination of certain of the elements employed in the structure described in said application while preserving the operative features thereof.

A further object of the invention is to provide a device of this character having means whereby the amount of air which is admitted as well as the pressure of such air may be controlled.

A still further object of the invention is to provide a novel and improved packing and guide element for use in such devices.

A still further object of the invention is to provide a nozzle element formed in two sections, one of which is movable and operates as a valve controlling the admission of the air or gas employed to lift the fluid from the well.

These and other objects I attain by the construction shown in the accompanying drawings, wherein for the purpose of illustration is shown a preferred embodiment of my invention and wherein:—

Figure 1 is a vertical sectional view through one of the nozzles of a pump constructed in accordance with my invention;

Figure 2 is a section on the line 2—2 of Figure 1.

Referring now more particularly to the drawings, the numeral 10 generally designates a fitting having a bore 11. Within this bore at the lower end thereof is disposed a check valve organization, generally designated at 12. The upper end of the bore is interiorly threaded, as at 13, for the reception of the lower end of the tube 14 and which, as illustrated, is preferably formed in sections. The lower end of the body is exteriorly threaded for engagement with tubing T which may lead to a similar nozzle arranged at a lower level. The upper end of this body is threaded for engagement with a sleeve 15, the upper end of which is in turn interiorly threaded at 16 for engagement with upwardly extending tubing T' which may connect to a nozzle arranged thereabove or to the discharge.

The exteriorly threaded portion of the upper end of the fitting 10 is provided with an annular groove 17 which communicates with vertically extending ports 18 opening through the upper end of the fitting and between the tube 14 and the inner wall of the sleeve. The lower end of the sleeve has radially extending ports 19 which communicate with the groove 17.

At its lower end, the exterior of the sleeve has rotatably mounted thereon a ring valve 20 having openings 21 which, by rotatably adjusting the ring, may be brought either into full register with the ports 19 of the sleeve or disposed to render available any desired portion of these ports. This valve may be secured in adjusted positions by any suitable means such as that indicated at 22.

The threaded portion 16 of the sleeve at its lower end has engaged therewith the exteriorly threaded flange 23 of a guide skirt 24, the outer face of which is in spaced relation to the wall of the sleeve. This guide sleeve is held in position by a lock nut 25 and the inner faces of both the skirt and nut are provided with annular grooves 25ª having horizontally extending upper walls and lower walls which incline inwardly and outwardly to meet said upper walls.

Slidable within the skirt is a nozzle element 26, the walls of the upper end of which converge to a point where they closely approximate the outer face of the tube 14, as indicated at 27, and then extend in parallel relation to this tube, so that a narrow annular space 28 is provided through which gas or air may pass. The lower end of this nozzle is formed as a valve 29, seating upon the upper end of the fitting 10 and closing the ports 18. A spring 30 surrounding the

skirt 24 and engaging against the flange 23 of this skirt at its upper end and against the valve 29 at its lower end holds the valve seated until a predetermined pressure of the air or gas is built up. The gas or air, when this pressure is attained, forces the valve 29 and nozzle 26 upwardly against the action of the spring and then passes into the space 31 between the tube 14 and nozzle 26. In its escape through the narrow annular passage 28 near the upper end of the tube, it is directed up along the walls of the nozzle.

In its passage beyond the end of the tube, it acts as an ejector, creating a vacuum within the tube 14 which lifts the oil. It also causes an intermingling of this oil with the air, so that the oil rises in the tube to a point where it may be picked up by a second nozzle.

In using the construction of my prior application, a plurality of the nozzles are inserted in the oil well tubing at points spaced apart a distance determined by the character of the fluid which is being handled and the pressure which is available.

It will be obvious that the sleeve 15 and tube 14 might be formed integrally with the fitting 10, the present construction having been merely adopted as providing for more convenient construction and assembly of the device. The structure, as illustrated, may be very readily and cheaply manufactured and is of such character that it will not readily get out of adjustment.

Since the construction hereinbefore set forth is capable of a certain range of change and modification without materially departing from the spirit of the invention, I do not limit myself to such specific structure except as hereinafter claimed.

I claim:—

1. A nozzle for oil well pumps comprising a body having a bore, a tube threaded in the upper end of the bore, a nozzle element surrounding the tube, ports for admitting air between the nozzle element and the tube, the lower end of the nozzle element comprising a valve for sealing said ports, and a spring for seating said valve.

2. A nozzle for oil well pumps comprising a body having a bore, a tube threaded in the upper end of the bore, a nozzle element surrounding the tube, ports for admitting air between the nozzle element and the tube, the lower end of the nozzle element comprising a valve for sealing said ports, a spring for seating said valve, and means guiding the nozzle element and limiting the movement thereof.

3. A nozzle for oil well pumps comprising a body having a bore, a tube threaded in the upper end of the bore, a nozzle element surrounding the tube, ports for admitting air between the nozzle element and the tube, the lower end of the nozzle element comprising a valve for sealing said ports, a spring for seating said valve, and means controllably regulating the admission of air to said ports.

4. In a nozzle for oil well pumps, a fitting, a sleeve arising therefrom, the sleeve and fitting being adapted at opposite ends for connection with tubing, the fitting having a bore, a tube forming a continuation of the bore and extending upwardly through the sleeve, ports placing the exterior of the sleeve in communication with the lower end of the space between the tube and sleeve, a spring-pressed valve normally closing said ports and disposed within said space and a nozzle carried by said valve and surrounding the tube.

5. In a nozzle for oil well pumps, a fitting, a sleeve arising therefrom, the sleeve and fitting being adapted at opposite ends for connection with tubing, the fitting having a bore, a tube forming a continuation of the bore and extending upwardly through the sleeve, ports placing the exterior of the sleeve in communication with the lower end of the space between the tube and sleeve, a spring-pressed valve normally closing said ports and disposed within said space, a nozzle carried by said valve and surrounding the tube, and means for adjustably regulating the effective area of said ports.

6. In a nozzle for oil well pumps, a fitting, a sleeve arising therefrom, the sleeve and fitting being adapted at opposite ends for connection with tubing, the fitting having a bore, a tube forming a continuation of the bore and extending upwardly through the sleeve, ports placing the exterior of the sleeve in communication with the lower end of the space between the tube and sleeve, a spring-pressed valve normally closing said ports and disposed within said space, a nozzle carried by said valve and surrounding the tube, and a guide carried by the sleeve and engaging the nozzle.

7. In a nozzle for oil well pumps, a fitting, a sleeve arising therefrom, the sleeve and fitting being adapted at opposite ends for connection with tubing, the fitting having a bore, a tube forming a continuation of the bore and extending upwardly through the sleeve, ports placing the exterior of the sleeve in communication with the lower end of the space between the tube and sleeve, a spring-pressed valve normally closing said ports and disposed within said space, a nozzle carried by said valve and surrounding the tube, and a guide carried by the sleeve and engaging the nozzle, the valve engaging said guide to limit upward movement of the nozzle.

8. In a nozzle for oil well pumps, a fitting, a sleeve arising therefrom, the sleeve and fitting being adapted at opposite ends for connection with tubing, the fitting hav-

ing a bore, a tube forming a continuation of the bore and extending upwardly through the sleeve, ports placing the exterior of the sleeve in communication with the lower end of the space between the tube and sleeve, a spring-pressed valve normally closing said ports and disposed within said space and a nozzle carried by said valve and surrounding the tube, a guide having at its upper end a flange engaging the wall of the sleeve, said guide engaging the nozzle to guide the same, the spring of the valve engaging the flange of the guide.

In testimony whereof I affix my signature.

LEE J. BLACK.