(No Model.) 2 Sheets—Sheet 1.

J. C. & J. LORENZ.

PUMP FOR OIL WELLS.

No. 494,927. Patented Apr. 4, 1893.

Fig. 1.

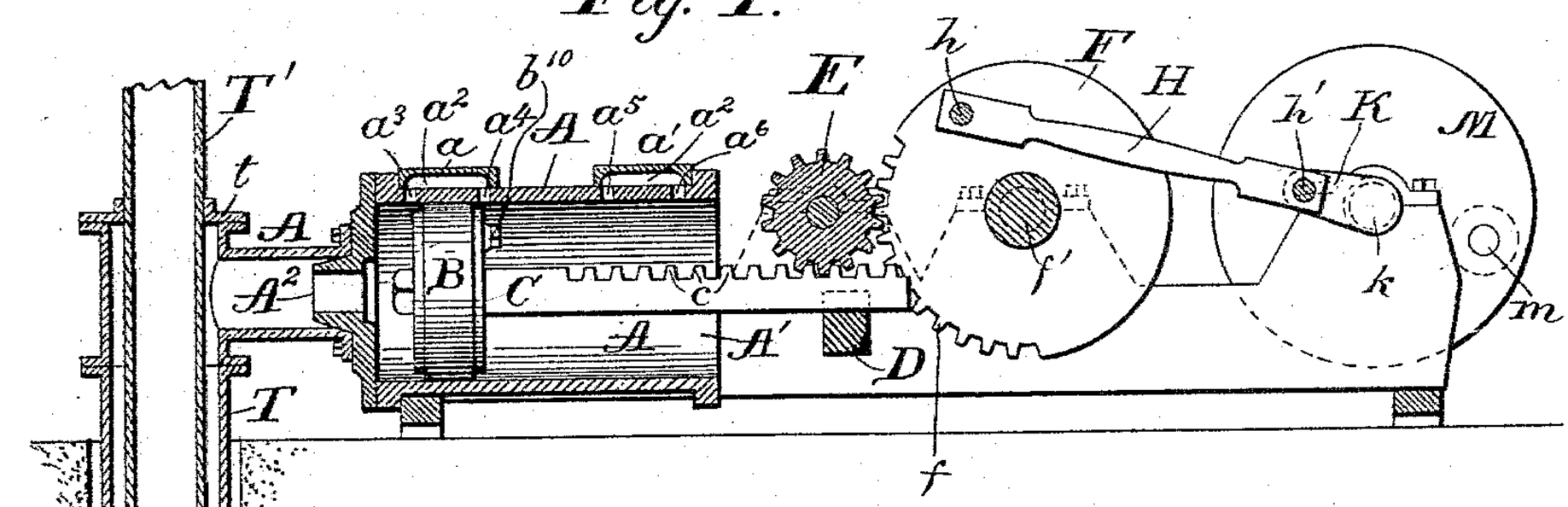

Fig. 2.

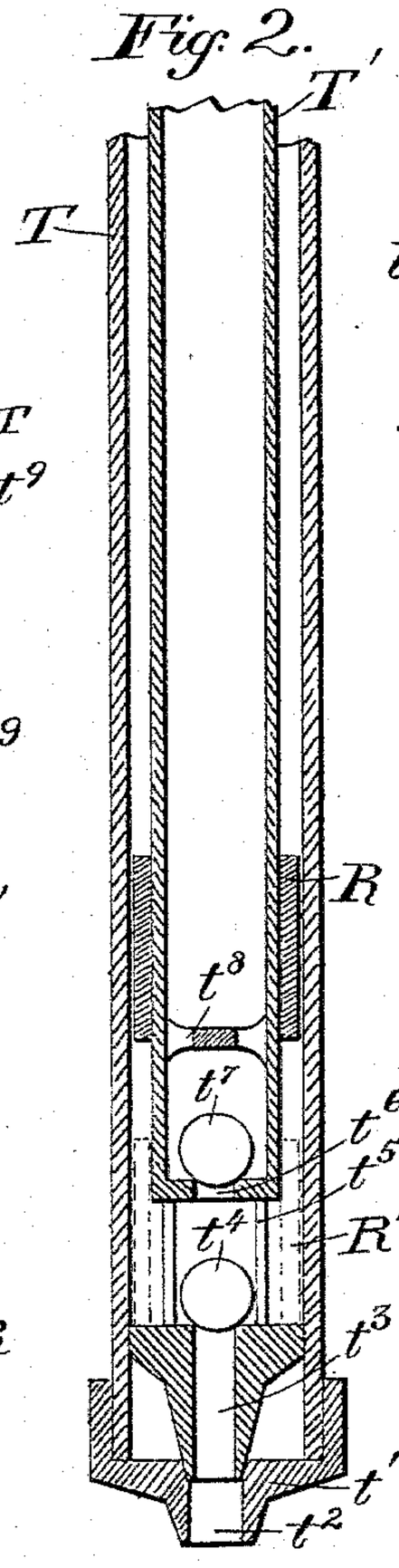

Fig. 3.

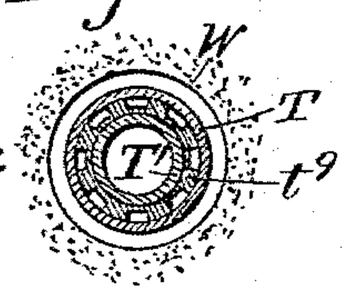

Fig. 4.

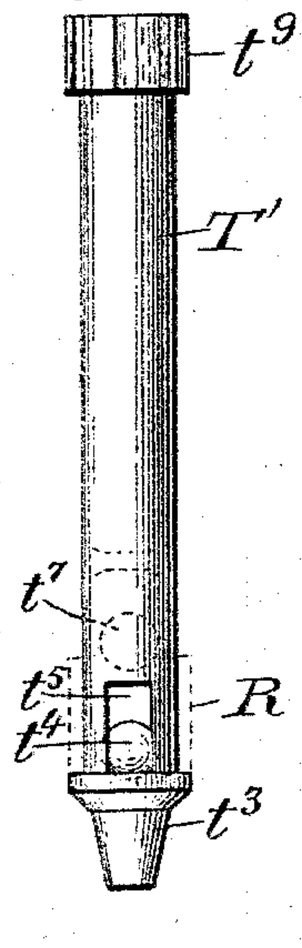

Fig. 5.

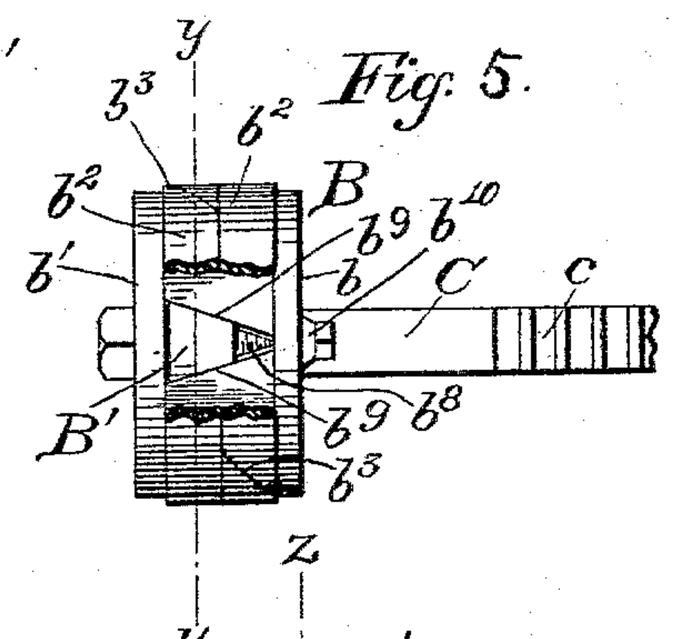

Fig. 6.

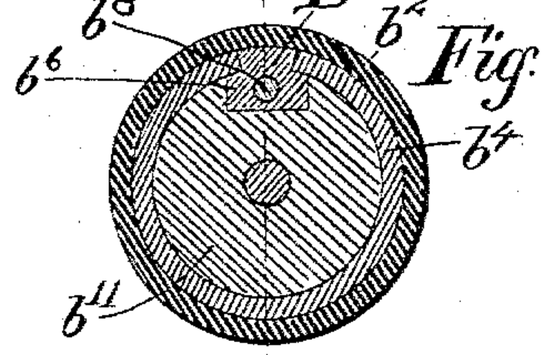

Fig. 7.

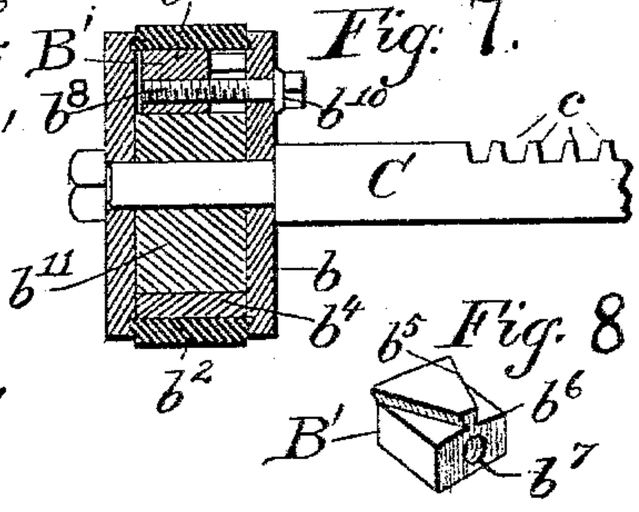

Fig. 8.

Witnesses;
Percy C. Bowen.
John C. Wilson.

Inventors;
John Charles Lorenz,
Joseph Lorenz,
By Whitman & Wilkinson
Attorneys.

(No Model.) 2 Sheets—Sheet 2.

J. C. & J. LORENZ.

PUMP FOR OIL WELLS.

No. 494,927. Patented Apr. 4, 1893.

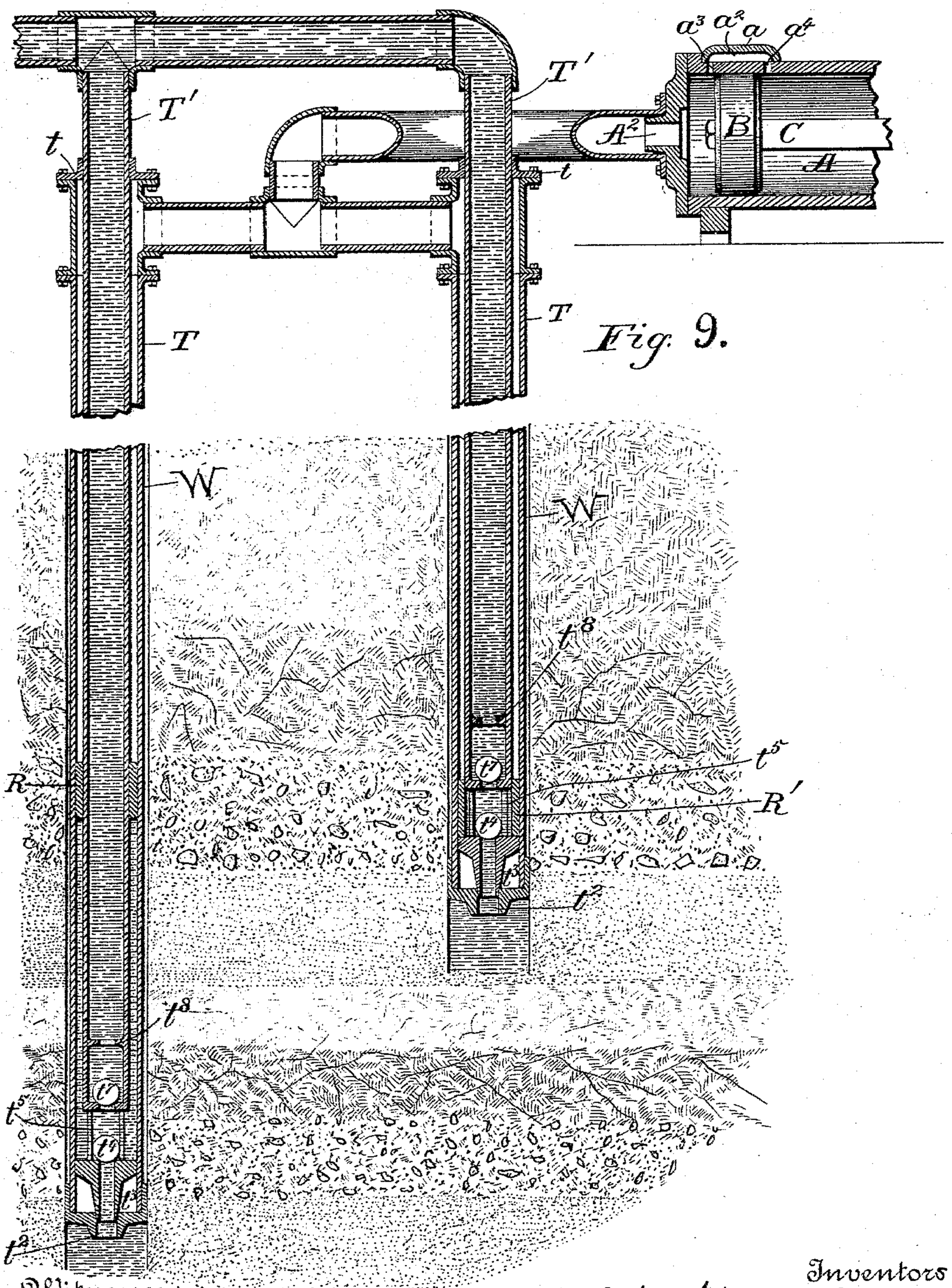

Fig. 9.

Witnesses
Percy C. Bowen
John Q. Wilson.

Inventors
John Charles Lorenz, Jr.
Joseph Lorenz
By Whitman & Wilkinson
Attorneys.

UNITED STATES PATENT OFFICE.

JOHN CHARLS LORENZ AND JOSEPH LORENZ, OF TITUSVILLE, PENNSYLVANIA.

PUMP FOR OIL-WELLS.

SPECIFICATION forming part of Letters Patent No. 494,927, dated April 4, 1893.

Application filed May 9, 1892. Serial No. 432,366. (No model.)

To all whom it may concern:

Be it known that we, JOHN CHARLS LORENZ and JOSEPH LORENZ, citizens of the United States, residing at Titusville, in the county of Crawford and State of Pennsylvania, have invented certain new and useful Improvements in Pumps for Oil-Wells; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to pumps for use in oil-wells, and it consists of certain novel features hereinafter described and claimed.

Reference is had to the accompanying drawings, wherein the same parts are indicated by the same letters.

Figure 1 represents a vertical longitudinal section through the oil well and the pumping device attached thereto. Fig. 2 represents a similar section of the working barrel at the lower end of the well tubes, as adapted for use when several wells are connected together to one pumping cylinder. Fig. 3 represents a section of the device shown in Fig. 1, along the line $x\ x$. Fig. 4 represents a side elevation of the lower end of the inner well tube shown in Fig. 2. Fig. 5 represents a plan view of the piston for the air-cylinder, the upper portion thereof being broken away to show the method of tightening the packing ring. Fig. 6 represents a section of the said piston along the line $y\ y$ of Fig. 7, and Fig. 7 represents a section of the said piston along the line $z\ z$ of Fig. 8. Fig. 8 represents a perspective view of the block for expanding the piston packing rings. Fig. 9 represents a sectional view of two oil wells connected to one pump, and illustrates the function of the buoyant ring H′.

The said cylinder A is provided with two chambers a and a', one at each end thereof, with ports a^3, a^4, a^5 and a^6, opening from the said chambers into the said cylinder. The piston B is made somewhat shorter than the distance between the said ports a^3 and a^4, or a^5 and a^6. In order that the said piston may be made air-tight, and to prevent leakage due to the wear, we provide a block B′ having wedged faces b^5 above the shoulder b^6, and a screw hole b^7 adapted to engage the screw b^8, which screw is turned by the nut b^{10}. By these wedge faces b^5 the corresponding wedge faces b^9 in the ring b^4 are spread apart, and this ring forces out the packing rings b^2 cut at b^3, which is held between the follower plates b and b', as with the usual form of cylinder.

The piston rod C is preferably rectangular in section, and passes through the open end A′ of the cylinder. On one side of this piston rod, the rack teeth c are provided, engaging the pinion E. This pinion E is turned by the rack sectors f of the wheels F, to which wheels the connecting rod H is attached at one end. These wheels are journaled at F′, and are connected together by the pin h which serves as a pivot for the connection rod H; the other end of the connecting rod is attached to the pin h' on the crank K keyed on the shaft k of the fly wheel M. This fly wheel is driven by any suitable power, which we have indicated by the handle m, though steam, water-power or electricity would be preferable to hand power.

The well W is provided with two tubes T and T′, the outer tube T being adapted to fit tightly in the well, and the inner tube T′ sliding freely in the said outer tube with a small annular space between the two tubes as shown. The upper end of the outer tube is closed by an air-tight cap t fitting snugly against the tube T′. The lower end of this outer tube is provided with a packing device t' having the holes t^2 for the inflow of the oil. This hole may be kept clear of the bottom of the well by any of the devices now in use. Inside of the tube T, a nozzle t^3 is attached to the inner tube T′ so as to allow the oil to flow in but not around said nozzle. Over this nozzle the ball t^4 is placed and at either side of the ball the tube T′ is cut away, as at t^5. Above this ball t^4 a transverse partition is placed in the tube having a hole t^6 over which the second ball t^7, or valve, is placed. The ribs t^8 prevent this ball from being drawn up too far. Fluted rings t^9 may be slipped over the inner tube at any portion of its length, so as to make the two tubes nearly concentric; and packing rings, or other packing devices, t^{10} may also be provided exterior to the outer tube if desired. Also a light ring R made of wood or

other material that would float on oil, may be placed over the tube T′ as shown in Figs. 2, 4, and 9 for the purposes hereinafter specified.

The operation of the device is as follows:— Assuming the piston to be in the position shown in Fig. 1, and the rack bar C to be moved to the right. As soon as the piston covers the hole a^4 a partial vacuum will be created in the annular space between the well tubes, and this vacuum will increase, until the piston passes the port a^5 at the same time the ball t^4 will be lifted by the suction, and oil will flow in through the nozzle t^2 and t^3. As soon as the piston entirely passes the ports a^5, which will happen when it has reached the end of the stroke, (this is done by making the distance between the centers h and f', and h' and k, bear such relation to each other and to the sector f, that the said sector will vibrate while the wheel M revolves) the air will rush through the open end of the cylinder, the port a^6, the chamber a^2, and port a^5, filling the partial vacuum in the cylinder, and between the tubes in the oil-well; and the ball t^4 will at once fall by its own weight on the valve seat, and prevent any liquid in the space between the two tubes from running out through the nozzle t^3. Now on the return stroke, the piston B will compress this air in the cylinder into the space between the well tubes, and will force any liquid at the bottom of the said space to lift up the ball t^7 and to flow into the interior of the inner tube T′. This operation is repeated at every alternate stroke of the piston, and the oil is forced higher and higher in the inner tube of the well, until it goes out at the top.

In order that the device might be efficient in deep wells, the cubical contents of the cylinder A must be very much greater than the cubical contents of the annular space between the inner and outer tubes of the oil well.

In the drawings, in order to show the connections clearly, the cylinder is shown on a smaller scale than the oil-well.

In order that two or more wells may be connected to one cylinder, a buoyant ring R may be provided to fit snugly over the tube T′, and at the same time slide freely thereon. As the oil rises in the same tube, this ring will float on the surface thereof, and as it falls the ring will fall again, closing the aperture t^5, and preventing any air from being forced in after the oil has fallen below the valve seat t^6. This operation is illustrated in Figs. 2 and 9, where R represents the ring as floating upon the oil, and R′ represents it as covering the apertures t^5.

Having thus described our invention, what we claim, and desire to secure by Letters Patent of the United States, is—

In a device for forcing or pumping liquids out of wells, the combination with a plurality of wells each having two well tubes arranged the one within the other and having an approximately annular and airtight space between the said tubes, of a lifting valve at the bottom of said annular space connecting it with the well, a lifting valve and side passages connecting said annular space with the inner tube, and a buoyant ring fitting snugly over said inner tube and adapted to rise when liquid is forced from below into said annular space, and to fall and cover said passages when air is forced from above into said annular space, with means for alternately forcing air into and exhausting air from said annular space, substantially as and for the purposes described.

In testimony whereof we affix our signatures in presence of two witnesses.

JOHN CHARLS LORENZ.
JOSEPH LORENZ.

Witnesses:
GEO. B. CARR,
C. W. BENEDICT.