No. 671,209. Patented Apr. 2, 1901.

R. W. ELLIOTT.

COMPRESSED AIR PUMP.

(Application filed Dec. 17, 1900.)

(No Model.)

Fig. 1.

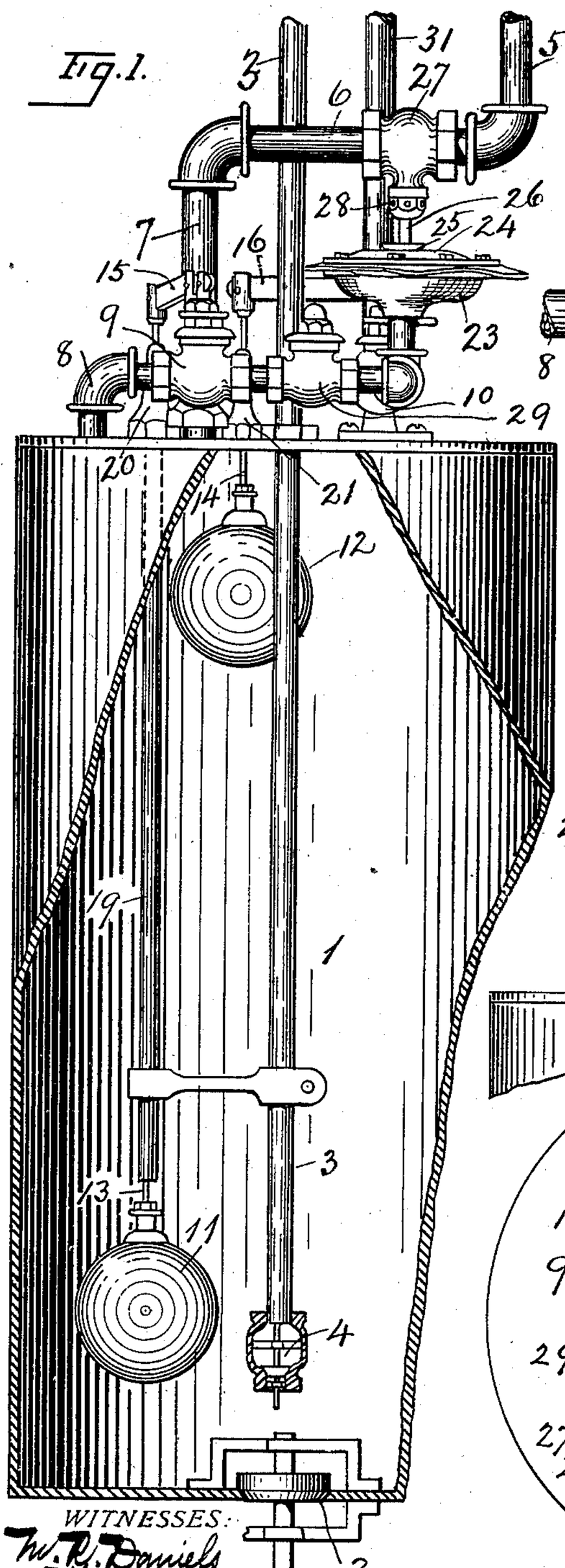


Fig. 4.

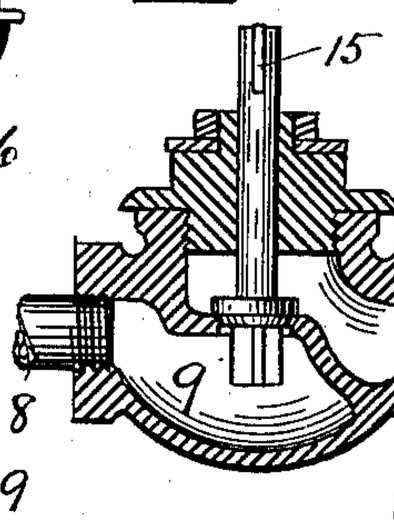


Fig. 5.

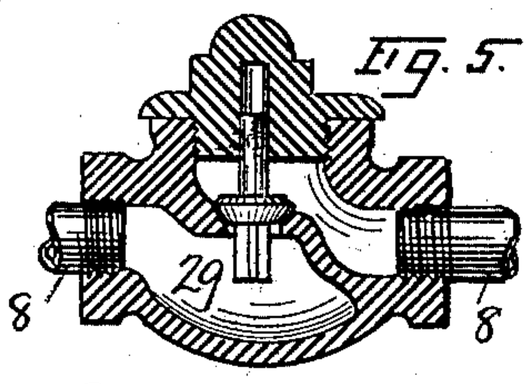
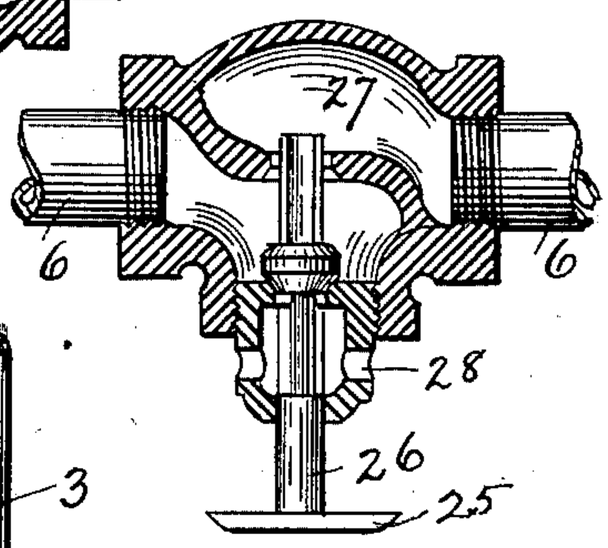


Fig. 6.



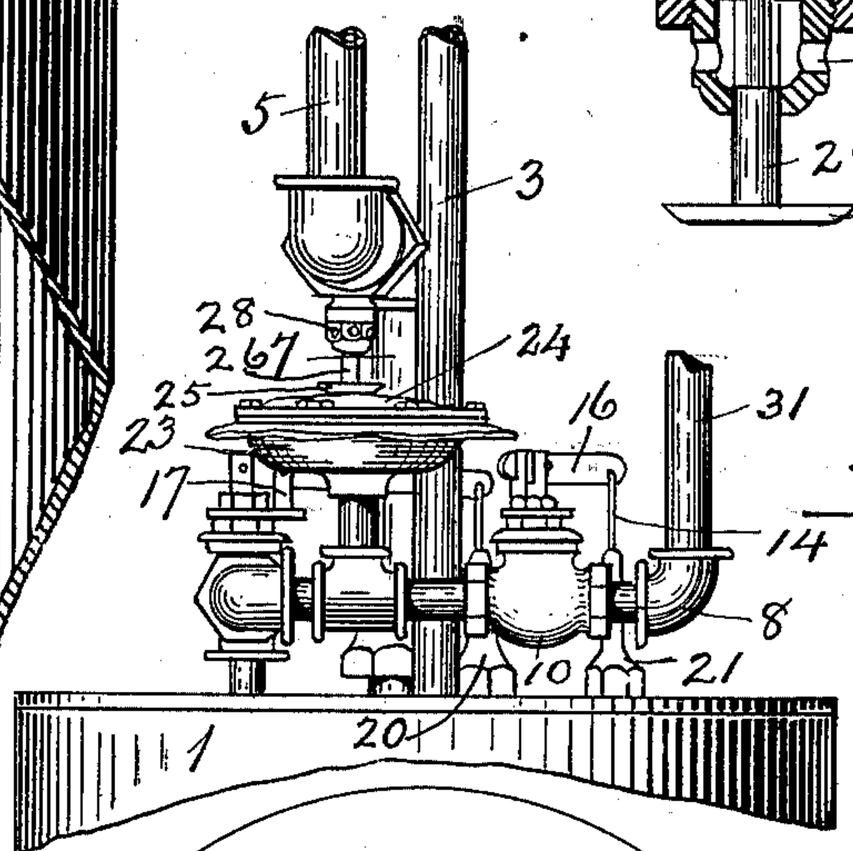
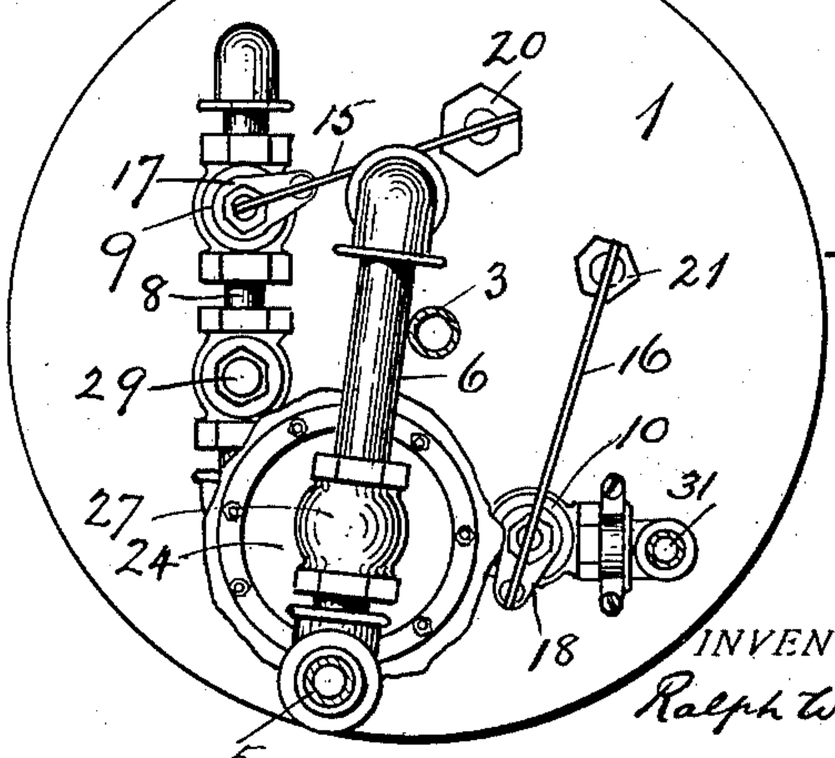


Fig. 2.

Fig. 3.



WITNESSES:
W. R. Daniels
Z. A. Daniels

INVENTOR.
Ralph W. Elliott
BY
Francis M. Wright
ATTORNEY.

UNITED STATES PATENT OFFICE.

RALPH W. ELLIOTT, OF OAKLEY, CALIFORNIA, ASSIGNOR OF ONE-HALF TO FRANK P. BAKER, OF SAME PLACE.

COMPRESSED-AIR PUMP.

SPECIFICATION forming part of Letters Patent No. 671,209, dated April 2, 1901.

Application filed December 17, 1900. Serial No. 40,183. (No model.)

To all whom it may concern:

Be it known that I, RALPH W. ELLIOTT, a citizen of the United States, residing at Oakley, in the county of Contra Costa and State of California, have invented certain new and useful Improvements in Compressed-Air Pumps, of which the following is a specification.

My invention relates to improvements in compressed-air pumps, the object of my invention being to provide a device by means of which compressed air may be utilized to pump water or other liquids and which will operate with as little friction as possible and require no lubrication.

My invention therefore resides in the novel construction, combination, and arrangement of parts for the above ends hereinafter fully specified, and particularly pointed out in the claim.

In the accompanying drawings, Figure 1 is a side elevation of my improved pump, the cylinder-casing being broken away to show the interior. Fig. 2 is a side elevation of the top of the pump from a different point of view to that of Fig. 1. Fig. 3 is a plan view of the top of the cylinder, and Figs. 4, 5, and 6 are details of the valves.

Referring to the drawings, 1 represents the cylinder into which the water to be raised by means of the compressed air is first introduced, said water being admitted into said cylinder by means of a check-valve 2 in the bottom of the cylinder, 3 representing the pipe leading upward from a point near the bottom of the cylinder, through which pipe the water is forced by the compressed air and delivered to a distant point. In the lower end of said pipe 3 is a check-valve 4, which holds up the water which has already been forced along said pipe 3 and prevents its return when the compressed air is withdrawn from the cylinder to refill it with a fresh body of water.

The compressed air is conveyed to the cylinder by a pipe 5, connected by a horizontal member 6 with a vertical pipe 7, erected upon the top of the cylinder, through which pipe 7 it is admitted directly into the cylinder. The pressure of the compressed air so admitted upon the surface of the water will force the water upward through the pipe 3 and will continue to do so so long as the compressed air is admitted and the level of the water in said cylinder is above the open lower end of said pipe 3.

8 is an auxiliary pipe or conduit for utilizing a portion of the compressed air in the cylinder after the water has been forced out therefrom to shut off the further supply of compressed air and maintain it so shut off while the water is refilling the cylinder and also to insure the escape of the compressed air from the cylinder. In said pipe 8 are two valves 9 10, actuated by floats 11 12 at the lower end of rods 13 14, attached at their upper ends to levers 15 16, pivoted on brackets 17 18, mounted on the valve-casings. The float 11 rises and falls near the bottom of the cylinder, being supported by the long rod 13, sliding in the tube 19 within the cylinder and in the guide 20 on the top of the cylinder, while the float 12 rises and falls near the top of the cylinder, being supported by the short rod 14, sliding in the guide 21 on the top of the cylinder. The lever 15 is a lever of the first order, while the lever 16 is a lever of the second order, and thus while the fall of the float 11 opens the valve 9 the fall of the float 12 closes the valve 10. When now the level of the water in the cylinder falls below the float 11 and said float falls, the valve 9 is thereby opened and a portion of the compressed air in the cylinder escapes along the pipe 8 through the valve 9. The valve 10 was closed by the fall of the float 12, and thus the compressed air admitted into said pipe 8 finds no outlet therefrom, and when it enters a chamber 23, connected to said pipe 8 and having a flexible diaphragm 24, it inflates said diaphragm, thereby raising the head 25 of the valve-stem 26 in a valve 27 in the horizontal member 6 of the compressed-air-supply pipe. When said valve-stem 26 is so raised, it cuts off the supply of compressed air to the cylinder, but permits compressed air to flow back from the cylinder through small apertures 28 in the casing of said valve. In passing into the chamber 23 the compressed air passes through a check-valve 29

in the pipe 8, which permits its forward movement, but prevents return movement. The compressed air is therefore completely trapped between the valve 29 and the valve 10 and maintains the valve 26 in its raised position, thereby insuring the escape of the compressed air through the apertures 28 until the level of the water rises to the float 12. As the compressed air escapes from the cylinder it is displaced by water admitted through the check-valve 2 and the level of the water begins to rise. A small rise in said level closes the valve 9, and when the water comes to the top of the cylinder it actuates the float 12 to open the valve 10, thereby permitting the air which was confined between the two valves 10 and 29 to escape through the upturned end 31 of the pipe 8, so that the diaphragm 24 collapses and the valve-stem 26 drops, thereby reopening the cylinder 1 to the entrance of the compressed air through the pipes 5 6 7. The compressed air thus admitted now proceeds to do its work in elevating the water in the cylinder through the pipe 3 to a distant point, it being remarked that as soon as the level of the water has fallen a short distance the valve 10 is again closed, in which position it is required to be for the next operation of inflating the diaphragm 24 to actuate the valve-stem 26, and by reason of the valve 9 having been closed and remaining so closed until the water falls to the bottom of the cylinder the compressed air cannot again actuate the diaphragm until said level has fallen to the bottom.

I claim—

In a compressed-air pump, the combination of a liquid-receptacle, a check-valve for admitting liquid thereto, a pipe for conducting liquid from said vessel, said pipe opening near the bottom thereof, a compressed-air induction-pipe leading to said vessel and opening thereinto at the upper end thereof, an auxiliary compressed-air conduit supported on the top of, and wholly outside, the liquid-receptacle, said auxiliary conduit discharging directly into the surrounding medium outside the liquid-receptacle, a valve in said auxiliary conduit preventing such discharge, a float in the upper portion of the receptacle, connected through the top thereof with said valve to operate the same to release the compressed air, a valve in said auxiliary conduit for admitting air thereinto from the liquid-receptacle, a float in the lower portion of the receptacle, connected through the top thereof with the latter valve to operate the same to admit said air thereinto, a valve in the induction-pipe for controlling the passage of the compressed air therealong, a chamber connected with the auxiliary conduit, and a flexible diaphragm forming a wall of said chamber and operating said valve, substantially as described.

In witness whereof I have hereunto set my hand in the presence of two subscribing witnesses.

R. W. ELLIOTT.

Witnesses:

FRANCIS M. WRIGHT,

Z. A. DANIELS.