No. 617,026. Patented Jan. 3, 1899.

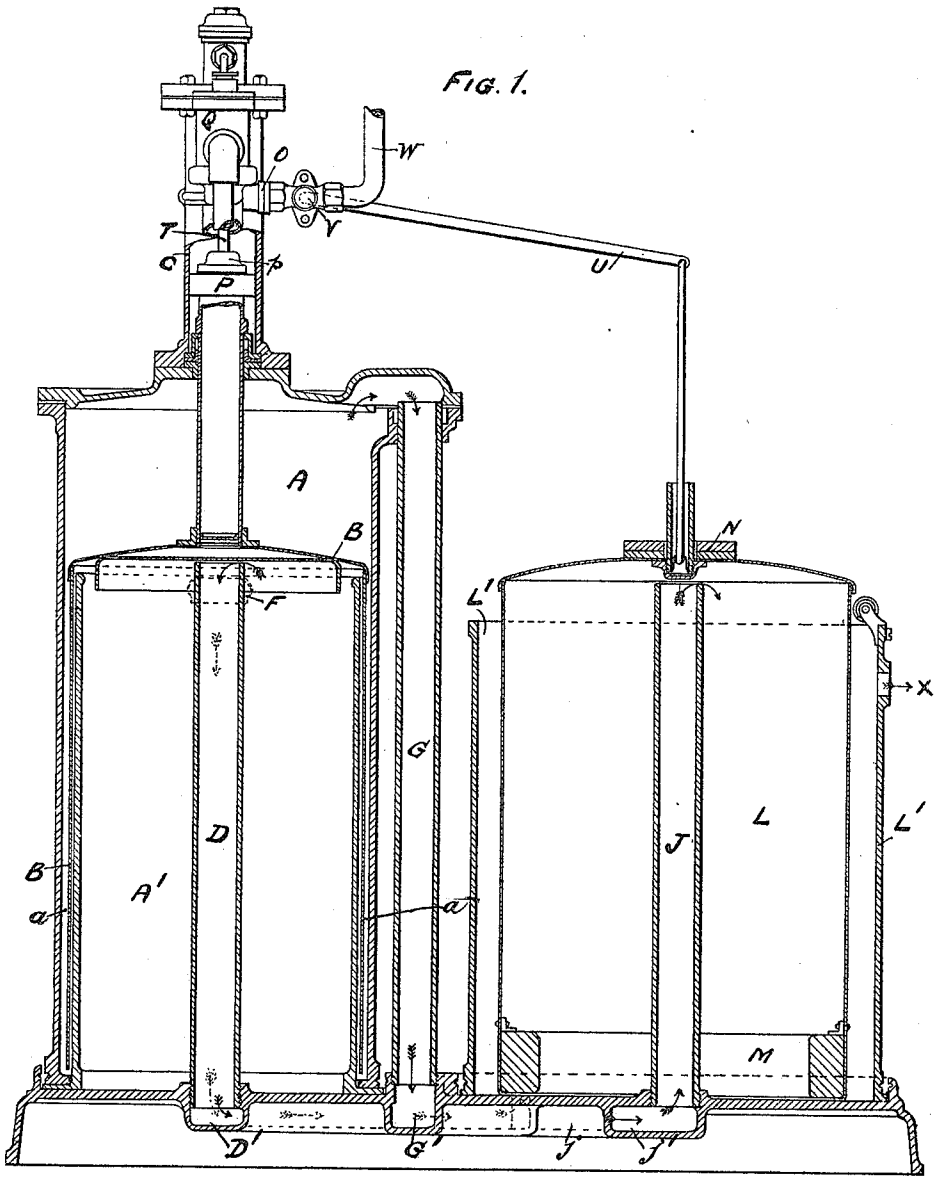
J. KEITH.

GAS PUMP OR COMPRESSOR.

(Application filed Apr. 12, 1898.)

(No Model.) 5 Sheets—Sheet 1.

FIG. 1.



Witnesses:
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A. D. Mink

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By Richards & Co.
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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 617,026.

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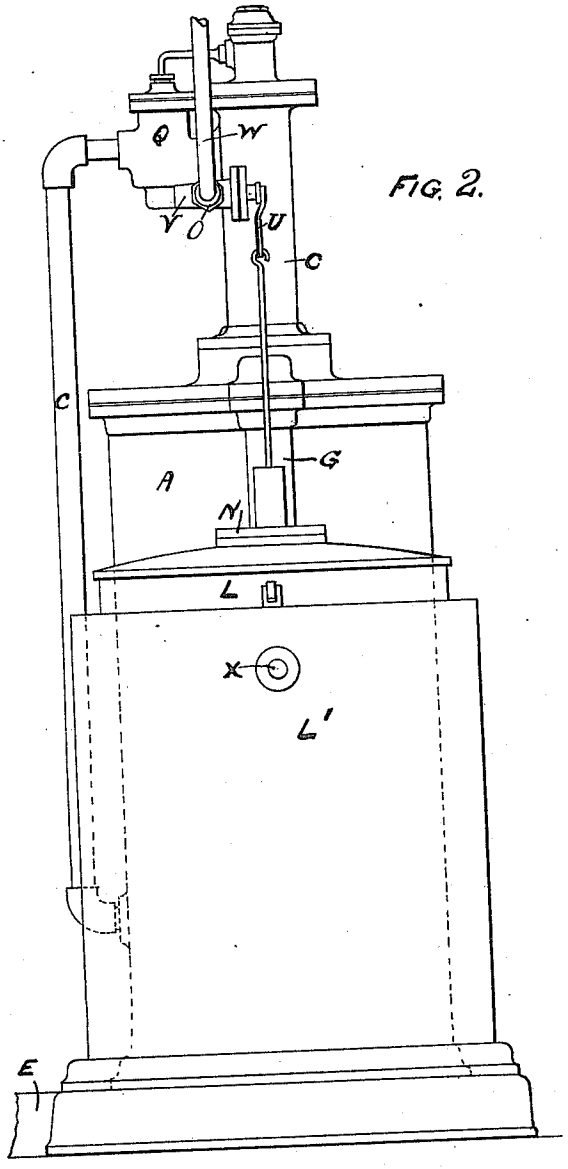
GAS PUMP OR COMPRESSOR.

(Application filed Apr. 12, 1898.)

(No Model.)

5 Sheets—Sheet 2.

FIG. 2.



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No. 617,026.

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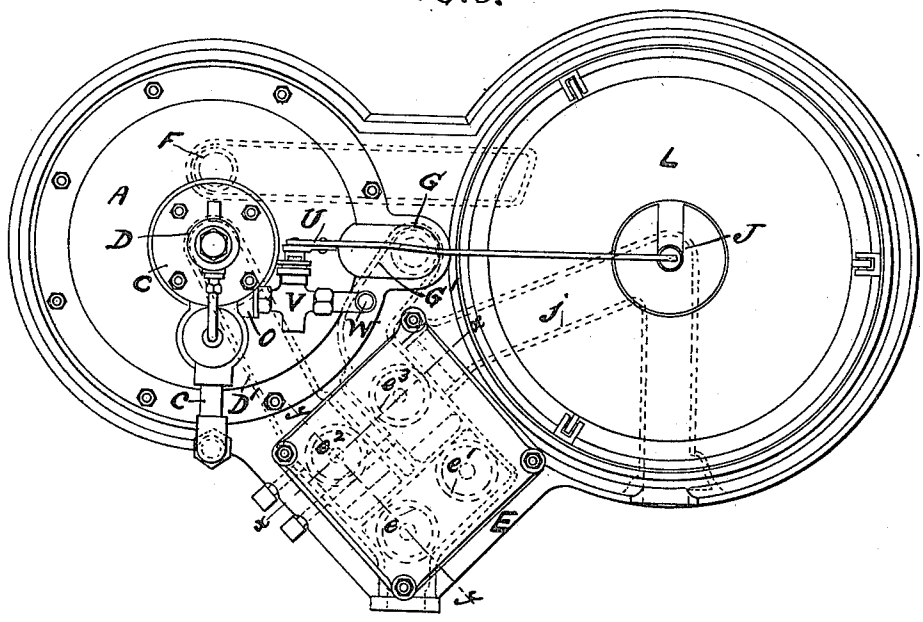
GAS PUMP OR COMPRESSOR.

(Application filed Apr. 12, 1898.)

(No Model.)

5 Sheets—Sheet 3.

FIG. 3.



Witnesses:
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No. 617,026. Patented Jan. 3, 1899.

J. KEITH.

GAS PUMP OR COMPRESSOR.

(Application filed Apr. 12, 1898.)

(No Model.) 5 Sheets—Sheet 4.

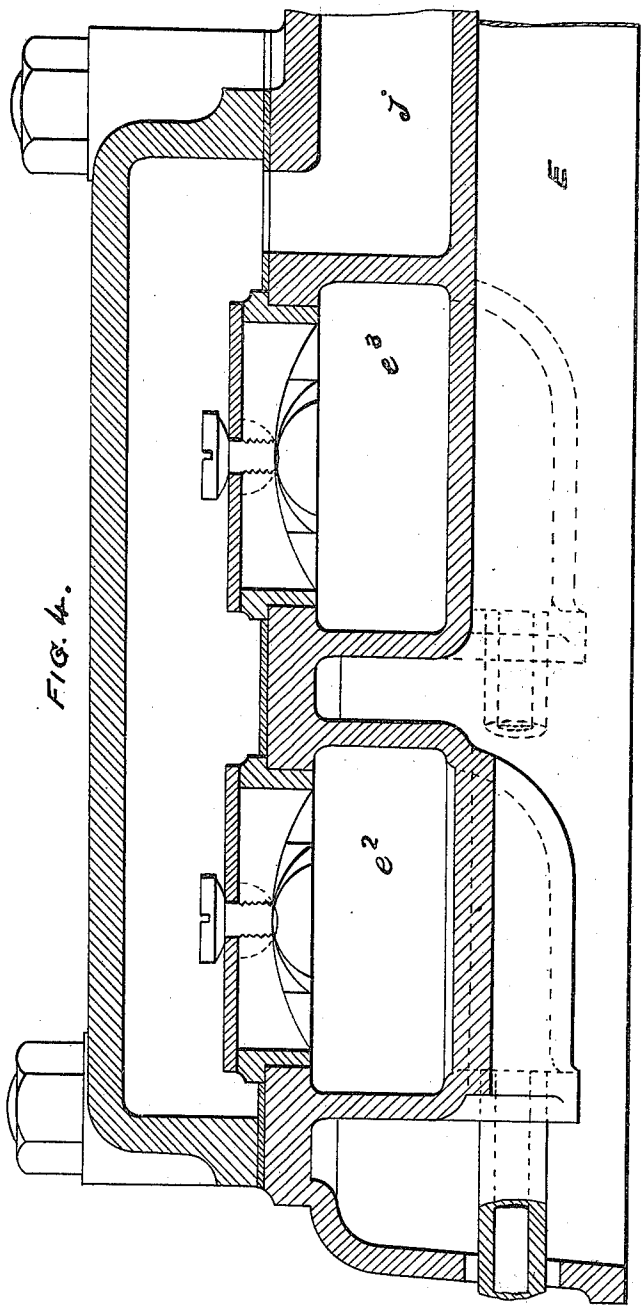


FIG. 4.

Witnesses:
E. B. Bolton
Otto Munn

Inventor:
James Keith
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No. 617,026. Patented Jan. 3, 1899.

J. KEITH.

GAS PUMP OR COMPRESSOR.

(Application filed Apr. 12, 1898.)

(No Model.) 5 Sheets—Sheet 5.

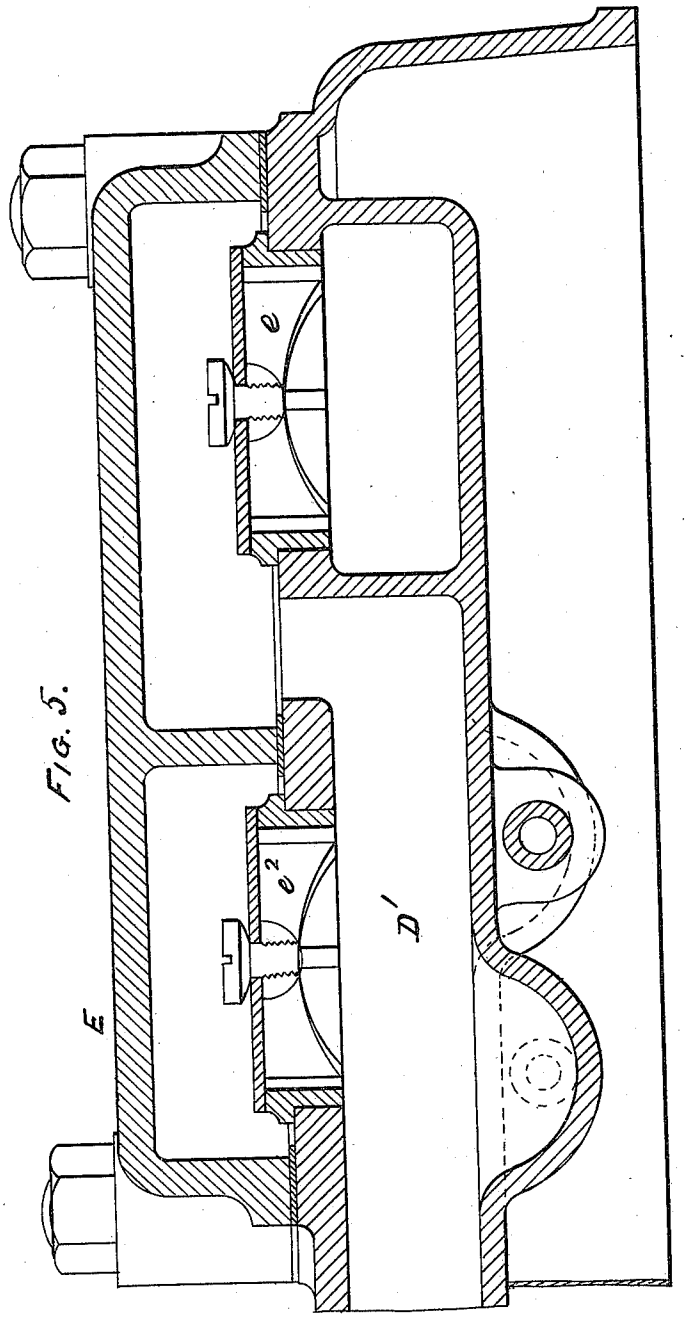


FIG. 5.

Witnesses:
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UNITED STATES PATENT OFFICE.

JAMES KEITH, OF LONDON, ENGLAND.

GAS PUMP OR COMPRESSOR.

SPECIFICATION forming part of Letters Patent No. 617,026, dated January 3, 1899.

Application filed April 12, 1898. Serial No. 677,365. (No model.)

To all whom it may concern:

Be it known that I, JAMES KEITH, of 27 Farringdon avenue, in the city of London, England, have invented new and useful Improvements in Gas Pumps or Compressors, of which the following is a specification.

This invention relates to apparatus for increasing the pressure of gas or for forcing air; and it has for its object the economy of the water used in working such apparatus.

The improved apparatus consists of a compressing-pump actuated by a water-motor, the pump part being made in the form of a gas holder or bell dipping in an annular water-space formed around a closed cylinder and serving by its reciprocation within the cylinder to alternately draw in and expel gas or air at either end, being thus double-acting, (but it might be single-acting,) the gas or air passing thence to a gas holder or receiver loaded to maintain the desired pressure. The gas holder or receiver, which rises and falls according as the gas is drawn off for consumption, is connected to a regulating cock or valve which controls the admission of water to the motor. When the holder rises on being filled with gas, the water is cut off from the motor, and as the holder falls the valve is more or less opened to admit water to actuate the motor, whereupon the compressor again charges the gas-holder. The pump is in this way actuated only to maintain the supply of gas in the holder at a pressure determined by the load upon it, and only the water passing into the motor while it is in operation is used.

In the accompanying drawings, which illustrate the invention, Figure 1 is a vertical section of the improved apparatus. Fig. 2 is an elevation at right angles to Fig. 1, and Fig. 3 is a plan of the same. Figs. 4 and 5 are sectional views on the lines $x\ x$ and $y\ y$, respectively, of valve arrangements hereinafter referred to.

As represented in the drawings, the improved apparatus comprises a pump, which consists of a cylinder A, provided with an annular water-space a, which is formed between the cylinder proper and an inner open-ended cylinder A′ and into which water-space a small gas-holder B dips. The water in a acts as a seal, and when the holder B is moved up and down by means of the water-motor C, forming part of the apparatus and hereinafter described the gas or air to be compressed is alternately drawn in and expelled both above and below the holder or float B, the gas being drawn through inlet-pipes D G into the cylinder A and expelled through the same pipes. The spaces above and below the float B are connected to a valve-chamber E, having suitable inlet-valves $e\ e'$ and discharge-valves $e^2\ e^3$ for each space. The upper side of the cylinder A is connected by a pipe G and port G′ to the part of valve-box E containing the suction and delivery valves e' and e^3, respectively. Similarly, the under side of the cylinder is connected by a stand-pipe D and port D′, cast in the base, to a separate compartment of the valve-box containing the suction and delivery valves $e\ e^2$. The annular water-space a is kept charged with water from the exhaust-pipe c of the motor, which is led into the cylinder near the bottom of this space and overflows into the center of the cylinder A. This water fills up the interior of the cylinder A′ to the height of an overflow-pipe F, situated in the cylinder and forming a deep trap to prevent the gas from being blown out, and the overflow-water passing in the direction shown by the dotted arrows, Fig. 1, through the pipe F, as shown in dotted lines, Figs. 1 and 3, is or may be discharged from the trap at about the level of the overflow in the cylinder. The water in the annular space a rises and falls alternately on the inside and outside of the holder to a height equal to the difference in pressure on the inside and outside of the holder. The gas-supply is connected to the two suction-valves $e\ e'$, and the two delivery-valves $e^2\ e^3$ discharge by a port j and stand-pipe J into a gas-holder L, placed alongside the cylinder and loaded to the desired pressure by a ring M on the bottom and supplementary weights N on the top, these top weights serving to adjust the pressure. The pump part is operated by the water-motor C, fixed directly on the top of cylinder A.

The water-motor C is of the double-acting differential type described in the specification of my United States Patent No. 584,266, and its action is regulated by means of the small weighted gas-holder L, into which the com-

pressed gas is pumped. As the holder L rises it is arranged to act on the lever U of a regulating valve or cock V, which is fixed on the water-pipe W, leading to the motor, the cock V being closed when the holder L rises and being opened when the holder falls, according to consumption of the gas. The waste water which passes from the overflow-pipe F of the pump-cylinder A is made to run into the tank L′, in which the holder L floats, and overflows finally at X, so as to keep it properly charged with water and keep it pure.

Having now described the invention, what I claim, and desire to secure by Letters Patent, is—

In combination the water-motor, the pump comprising the cylinder and bell, a gas-holder L with its bell, a pipe D extending from the upper part of the pump but below the top of the bell and connecting with the gas-holder L, a second pipe G extending from the pump at a point above the bell thereof and connecting with the said gas-holder L, an inner cylinder A′ between which and the pump-cylinder the bell of the pump dips, a valve-casing E in the pipe connections between the pump and gas-holder and the two sets of suction and delivery valves in said valve-casing one set being for the pipe D and the other set being for the pipe G, substantially as described.

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

JAMES KEITH.

Witnesses:
WALLACE FAIRWEATHER,
JNO. ARMSTRONG, Junr.