(No Model.) 2 Sheets—Sheet 1.

I. SHONE & E. AULT.

APPARATUS FOR RAISING AND FORCING WATER OR OTHER LIQUIDS.

No. 485,714. Patented Nov. 8, 1892.

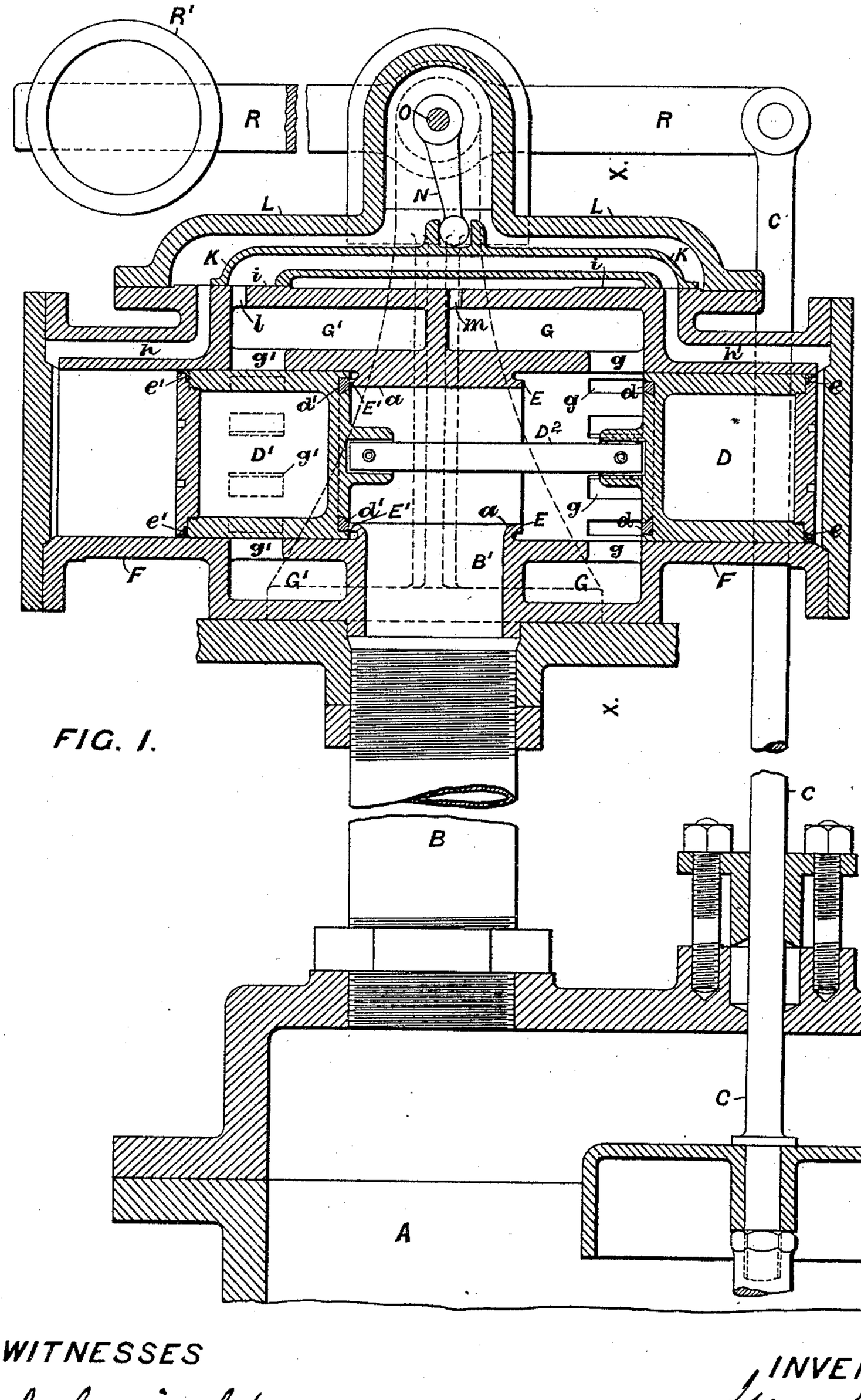

FIG. 1.

WITNESSES

R. A. Corrigalde

Robert Bartlett

INVENTORS

Isaac Shone

Edwin Ault by

Broadhead & Bell

Attys.

(No Model.) 2 Sheets—Sheet 2.

I. SHONE & E. AULT.

APPARATUS FOR RAISING AND FORCING WATER OR OTHER LIQUIDS.

No. 485,714. Patented Nov. 8, 1892.

FIG. 2.

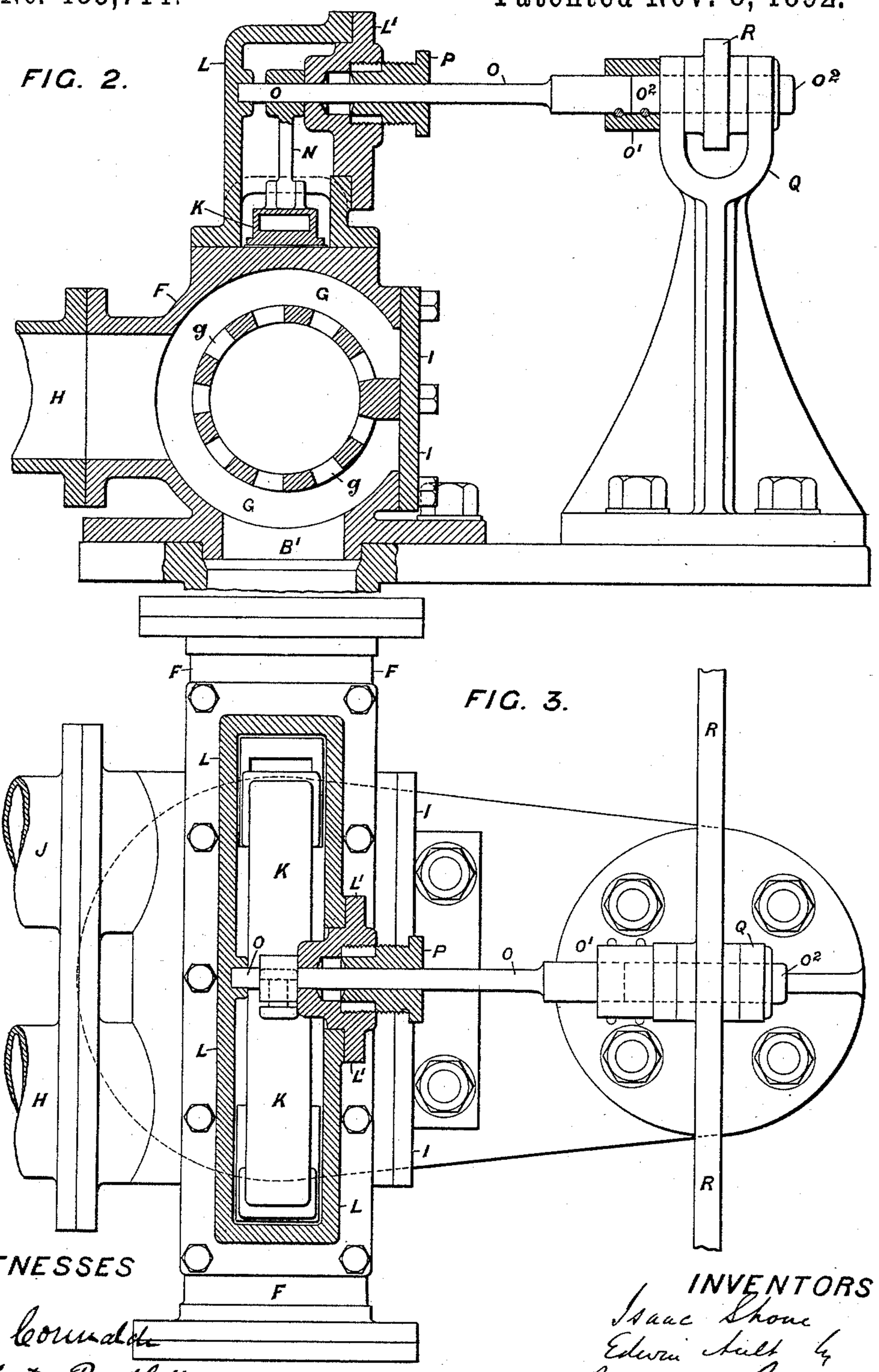

FIG. 3.

WITNESSES

R. A. Connaldo

Robert Bartlett

INVENTORS

Isaac Shone

Edwin Ault by

Broadway & Bell

Attys.

UNITED STATES PATENT OFFICE.

ISAAC SHONE AND EDWIN AULT, OF LONDON, ENGLAND.

APPARATUS FOR RAISING AND FORCING WATER OR OTHER LIQUIDS.

SPECIFICATION forming part of Letters Patent No. 485,714, dated November 8, 1892.

Application filed May 11, 1887. Serial No. 237,801. (No model.) Patented in England December 15, 1884, No. 16,453.

To all whom it may concern:

Be it known that we, ISAAC SHONE and EDWIN AULT, civil and mining engineers, subjects of the Queen of Great Britain and residing at 3 Westminster Chambers, Victoria Street, London, in the county of Middlesex, in that part of the United Kingdom of Great Britain and Ireland called England, have jointly invented certain new and useful Improvements in Apparatus for Raising and Forcing Water or other Liquids, (for which we have obtained a patent in Great Britain, No. 16,453, dated December 15, 1884,) of which the following is a specification.

This invention has for its object certain improvements in apparatus for raising and forcing water or other liquids, being improvements upon apparatus set forth in the specification of Letters Patent of the United States, No. 235,910, dated December 28, 1880, granted to Isaac Shone for a method of and apparatus for removing sewage; and the following is a description of this present invention in such full, clear, and distinct terms as to enable any one skilled in the art to which it belongs to put the same into practice, reference being had to the accompanying two sheets of drawings, making a part of this specification, and to the letters of reference marked thereon, like letters being used to denote the same or corresponding parts throughout the various views.

In the drawings, Figure 1 is a side elevation of an apparatus constructed according to our invention. Fig. 2 is an end section of the apparatus through X X, Fig. 1. Fig. 3 is a plan of the apparatus shown at Fig. 2.

The part of the specification of the invention of Letters Patent No. 235,910, A. D. 1880, which these present improvements have particular reference to, is the valve apparatus for governing or regulating the admission to and exhaust from the ejectors of compressed air.

An apparatus constructed according to this present invention consists of the following construction and arrangement of parts, reference being had to the drawings.

A, Fig. 1, is the upper portion of the ejector or apparatus for raising and forcing sewage, as described in the specification of Letters Patent No. 235,910, A. D. 1880—namely, by the agency of compressed air, which is supplied to and discharged from the apparatus A through the pipe B by the agency of a valve operated by a rod C, and floats within the apparatus A.

According to our present invention the valve of the apparatus A is of the piston type, having a double piston D D′, the two pistons D D′ being connected together by a rod or bar D^2, loosely fitting in its bosses on the ends of the pistons D D′, and fastened thereto by loosely-fitting pins, which allow each of the pistons D D′ to work freely on their individual seats E E′. This coupling D permits each piston to work freely and independently upon its own seat, so that both may move with the greatest possible ease and make perfect contacts with their respective seats. These pistons do not fit too snugly in their cylinders to prevent such operation. The valve—namely, the pistons D D′—work in a cylinder F, provided with two annular passages G G′ and ports *g g′*. The annular passage G and ports *g* being the passage and ports for the admission of compressed air and the passage G′ and ports *g′* being the passage and ports for exhausting the compressed air. The compressed air is led to the passage G (from any suitable air-compressing machinery) through the pipe H and the exhaust-air is led from the passage G′ and escapes through the pipe J. These pipes H and J are connected at one side of the cylinder F, as shown at Figs. 2 and 3, and on the opposite side of the cylinder F there is a cover I, so that access can be had to the valve and ports for any desired object. The space between the pistons D D′ is in connection with the interior of the ejector A through a passage B′ and the pipe B, leading to and from the ejector A. An annular ring *a* is formed in the cylinder F and between the two pistons D D′, the ends of the ring *a* projecting and serving as seats E E′ for the inner ends of the pistons D D′ to bear against. Rings *d d′*, of soft metal or wood or other suitable material are formed or let in the inner ends of the pistons D D′ to serve as seats in them. The outer ends of the pistons D D′ are provided with "cup-leathers" *e e′*, to form joints between the pistons and the sides of the cylinder F. The valve—namely, the pistons D D′—is propelled forward and backward by the

compressed air, which is led by the ports and passages *h h'* to each end of the cylinder F, these ports *h h'* being alternately opened and closed to each end of the cylinder F by a slide-valve K of the "trick" type. This valve K works at each end on a face *i* on the upper portion of the cylinder F and is inclosed by a casing L, bolted to the cylinder F. In the valve-face *i* there are at the exhaust end of the cylinder two ports—namely, the port *h* and the port *l*, the port *h* being for supplying and exhausting one end of the cylinder F, and the port *l* leading to the annular passage G' of the main exhaust and serving as an exhaust-port for both ends of the cylinder through the trick passage of the valve K. The port *h'* at the opposite end of the cylinder serves to supply that end of the cylinder and to exhaust into the trick passage of the valve K. Compressed air is supplied to the slide-valve casing L by a passage or port *m*, which communicates between the annular casing G of the main air-supply and the interior of the valve-casing L, and the compressed air is supplied to the opposite ends of the cylinder F by the ports *h h'*, above specified, alternately by the working of the slide-valve K and exhausted therefrom through the trick passage of the slide-valve K, which is always in communication with the exhaust annular passage G'. The slide-valve K is worked by a rocking arm or lever N, placed inside the slide-valve casing L. This arm N is mounted upon the horizontal shaft O, which passes through a stuffing-box P in the valve-casing L to the outside, where it is connected by a coupling O' to a shaft O^2, which bears in a bracket Q and carries a lever R, by which it is worked—namely, rocked—through the lever R, being connected to the cup and float-rod C of the ejector A. The lever R is provided with a weight R', which counterpoises the cup and float of the ejector and the rod C. The bracket Q is supported by and bolted to the support of the cylinder F, or when the cylinder F is on or close to the ejector A the bracket may be supported by the ejector A. Access is had to the interior of the slide-valve casing L by means of a removable cover L', in which is formed the stuffing-box P for the valve spindle or shaft O before spoken of.

By the improved construction of the apparatus as above specified and the arrangement of its parts we obtain several advantages, among which are the following: The counterpoise-weight R', being placed away from the apparatus, all undue or unequal pressure upon the pistons that might be acting upon such pistons due to such weight, thereby tending to imperil their certainty of operation, is obviated; also, accessibility of parts for various purposes is obtained. By the particular construction of the piston-valve and arrangement of slide-valve spindle a minimum of friction has to be overcome. At the same time good joints are obtained and without loss of air, and the pistons, though coupled, work freely and independently upon their seats.

Having now described our invention, what we claim is—

1. In an apparatus for raising liquids automatically by compressed air, the combination of a working chamber, two pistons that admit air to and from said working chamber, seats for said pistons, and a coupling-rod connecting said pistons together, loosely attached to each of them, so that they may work independently and without restraint in any direction to adapt themselves to their respective seats.

2. In an apparatus for raising liquids automatically by compressed air, the combination of a working chamber, a valve-casing, a float, a rocking lever, a rod connecting said lever projecting into the valve-casing, a valve within said casing worked by said lever, a connecting-arm rigidly attached to said lever and loosely attached to said valve, two pistons for admitting air to and from the working chamber, seats for said pistons, and a coupling-rod connecting said pistons together, loosely attached to each of them, so that they may work independently and without restraint in any direction to adapt themselves to their respective seats.

ISAAC SHONE.
EDWIN AULT.

Witnesses:
GEO. C. DOWNING,
8 *Quality Court, London, W. C.*
WALTER J. SKERTEN,
17 *Gracechurch Street, London, E. C.*