

(No Model.)

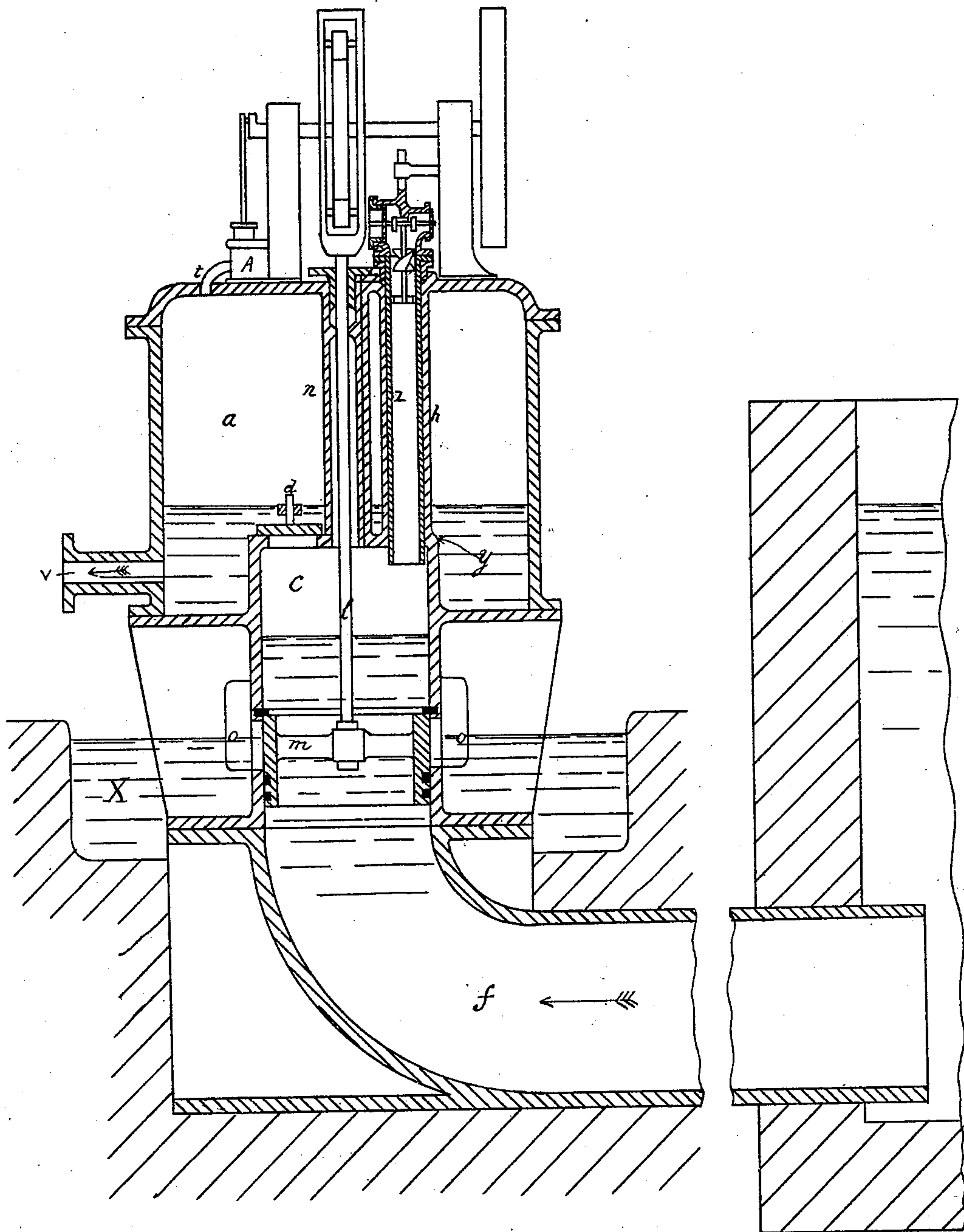
2 Sheets—Sheet 1.

H. D. PEARSALL.

HYDRAULIC APPARATUS FOR RAISING OR FORCING WATER, &c.

No. 587,063.

Patented July 27, 1897.



Witnesses.—

Ellen Pearsall.  
Louisa Williams.

Fig 1.

Howard D. Pearsall  
Inventor

(No Model.)

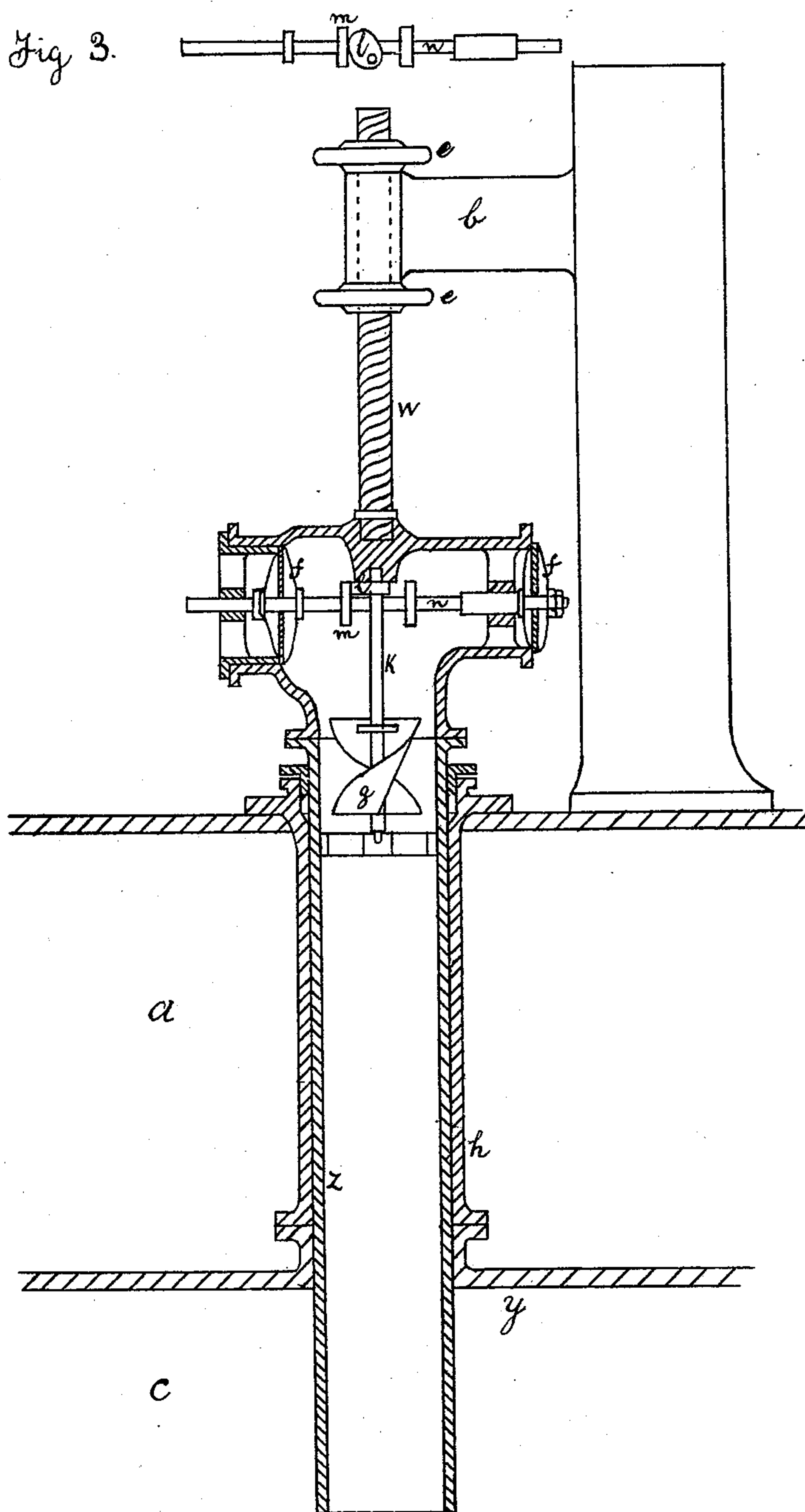
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Louisa Williams

Fig 2. Howard D. Pearsall  
Inventor



# UNITED STATES PATENT OFFICE.

HOWARD D. PEARSALL, OF LONDON, ENGLAND.

## HYDRAULIC APPARATUS FOR RAISING OR FORCING WATER, &c.

SPECIFICATION forming part of Letters Patent No. 587,063, dated July 27, 1897.

Application filed October 31, 1892. Serial No. 450,598. (No model.) Patented in England January 4, 1889, No. 183.

*To all whom it may concern:*

Be it known that I, HOWARD DEVENISH PEARSALL, a subject of the Queen of Great Britain, residing in London, England, have invented a new and useful Improvement in Hydraulic Apparatus for Raising or Forcing Water and other Liquids or for Forcing or Exhausting Air and other Gases, (for which substantially I have obtained, in conjunction with J. W. Gordon, of London, a patent in Great Britain, No. 183, bearing date January 4, 1889,) of which the following is a specification.

My invention relates to improvements in hydraulic engines such as are described in the specification of United States Patent No. 382,380, dated May 8, 1888, granted to me; and the object of this improvement is to more easily regulate the quantity of air to be compressed during one stroke of the engine.

Figure 1 shows so much of the old structure as is necessary to illustrate the connection of this invention therewith. In this figure, *h* is a tube or passage by which air is admitted at each stroke to fill the receiver or ante-chamber *c*, a part of such air afterward escaping again through the same tube *h*, the part which does not escape being then compressed and forced into the air vessel *a* through the valve *d*. The object desired is to exactly regulate the quantity of air thus retained.

According to this improvement I attain that object by the mechanism shown in Figs. 2 and 3. The tube *h* corresponds with the tube *h* in Fig. 1, and *y* is the roof of the receiver *c*, as in Fig. 1. Inside the tube *h* there is another tube *z*, sliding in it, and attached to the tube *z* is a screwed rod *w*, passing through a bracket *b* and having two nuts *e e*, (in the form of hand-wheels.) By means of these hand-wheels the tube *z* can be raised or lowered and fixed at any desired height. When the tube *z* has the position shown in Fig. 2—viz., projecting below the roof *y* of the chamber *c*—it is evident that so much air as is above the lower edge of the tube *z* is trapped and cannot escape. Hence by adjusting the position of the tube *z* by means of the hand-wheels *e e* the quantity of air so retained is regulated. There is, however, another necessary part of this apparatus—viz., a valve—

as without this although the air cannot escape the water will. In Fig. 2 this is an equilibrium-valve, consisting of two parts *f f*, one of which is slightly larger than the other. It is closed by the action of the water, which flows up the tube *z* and passes a helix *g*, attached to a spindle *k*. The water pressing on this helix causes the spindle *k* to revolve through part of a turn. Near the top of this spindle is a cam *l*, which presses on a projection *m* on the stem *n*, which carries and guides the valve, so that when the spindle turns to the left it closes the valve. To make this clearer, the stem *n* and the cam *l* are also shown in plan, Fig. 3.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a hydraulic ram, the combination with the main supply-pipe, the receiving-chamber, the superposed air-chamber, the valve between these two chambers, the valve-controlled port establishing communication between said receiving-chamber and the outer air, and the main valve in said receiving-chamber, of a vertically-movable tube depending from and adjustable through the top wall of said receiving-chamber, and valves adapted to close the outlet from said movable tube, and means for operating said valves, substantially as described.

2. In a hydraulic ram, the combination with the main supply-pipe, the receiving-chamber, the superposed air-chamber, the valve between these two chambers, the valve-controlled port establishing communication between said receiving-chamber and the outer air, the main valve in said receiving-chamber, and a vertically-movable tube depending from and adjustable through the top wall of said receiving-chamber, and valves adapted to close the outlet from said movable tube, of the means for operating said valves consisting of a helix, a spindle, a cam, and a projection on the stem of aforesaid valves, substantially as described.

London, the 31st day of July, 1891.

HOWARD D. PEARSALL.

Witnesses:

E. COURTNEY WALKER,  
HERBERT SELLEY.