

*J. Vial,
Steam Pump.*

N^o 36,431.

Patented Sep. 9, 1862.

Fig. 2.

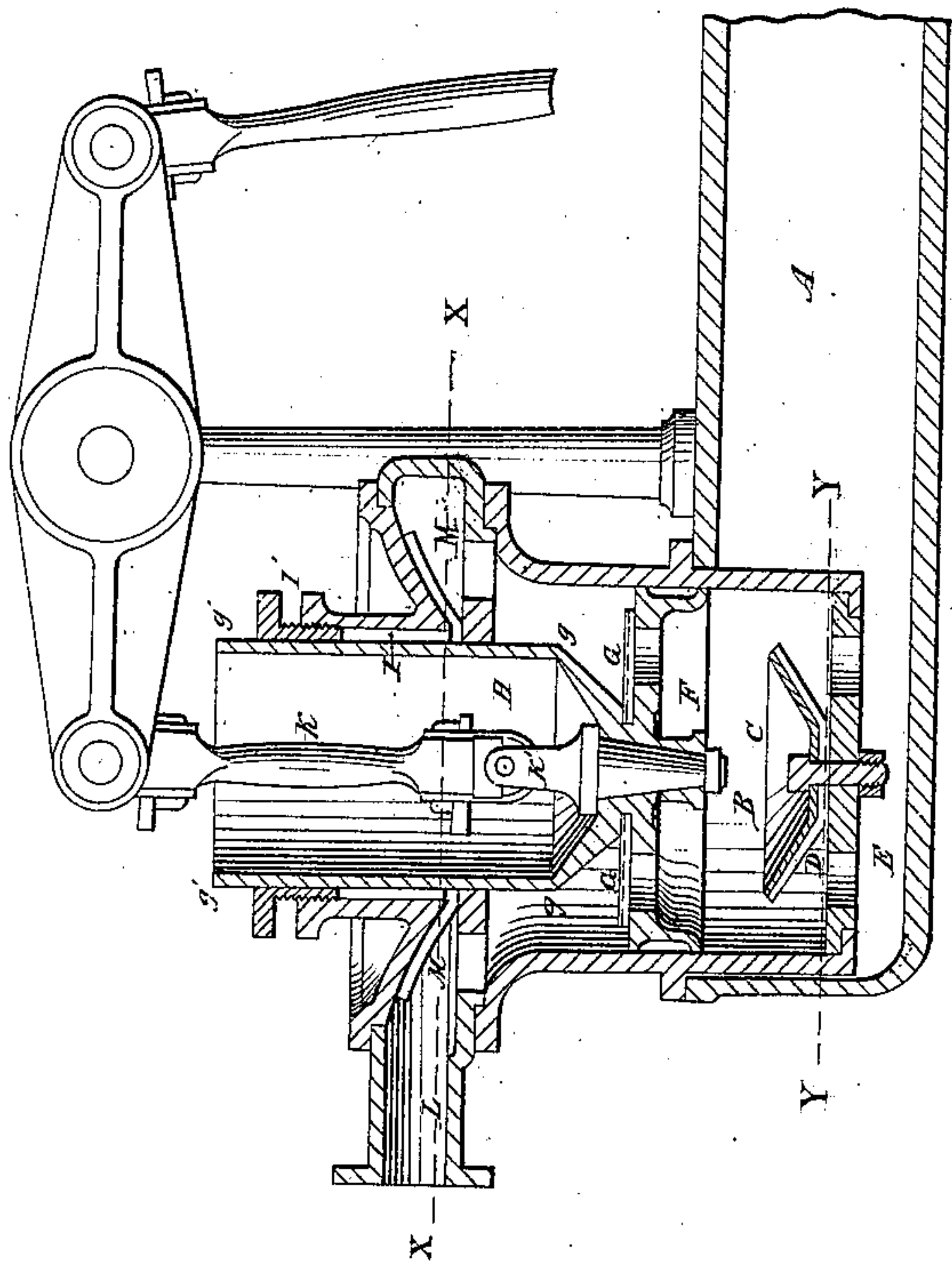


Fig. 4.

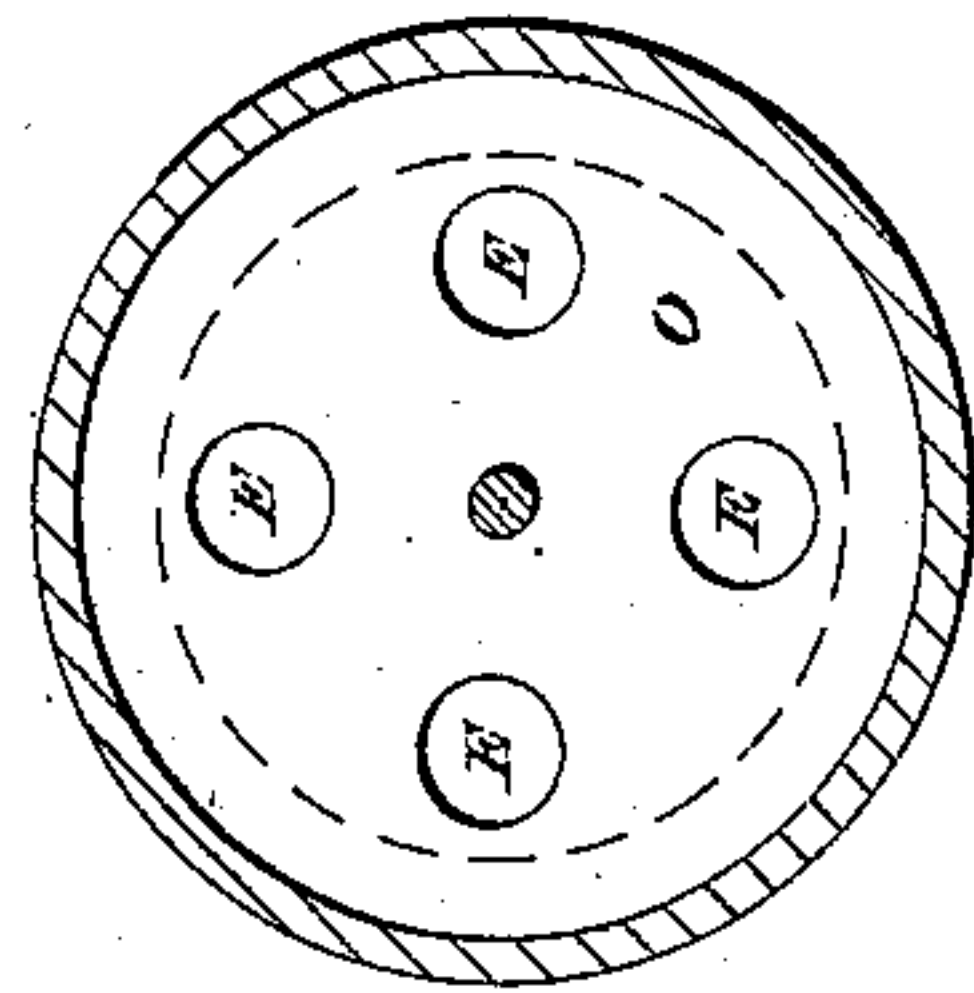


Fig. 1.

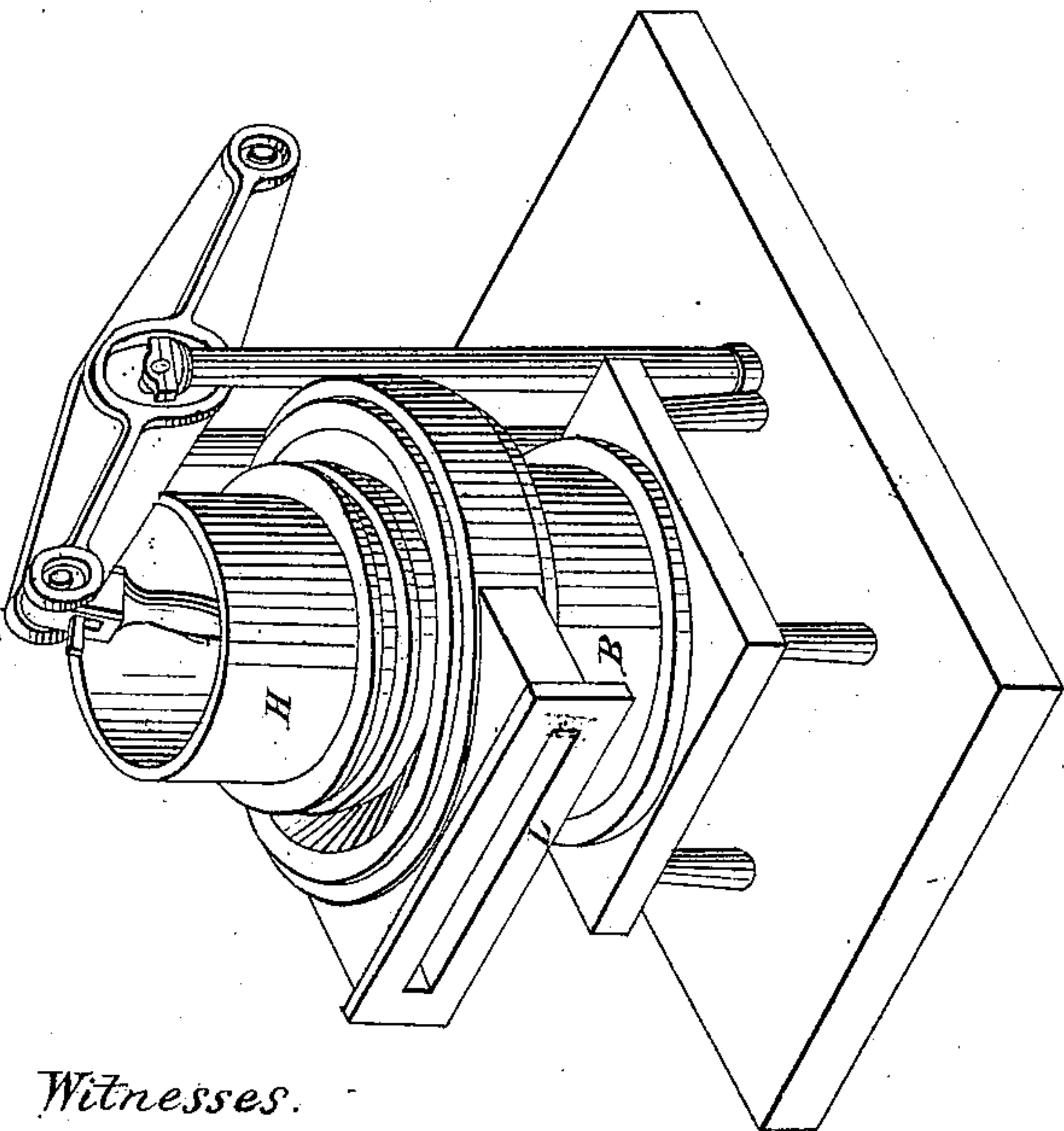
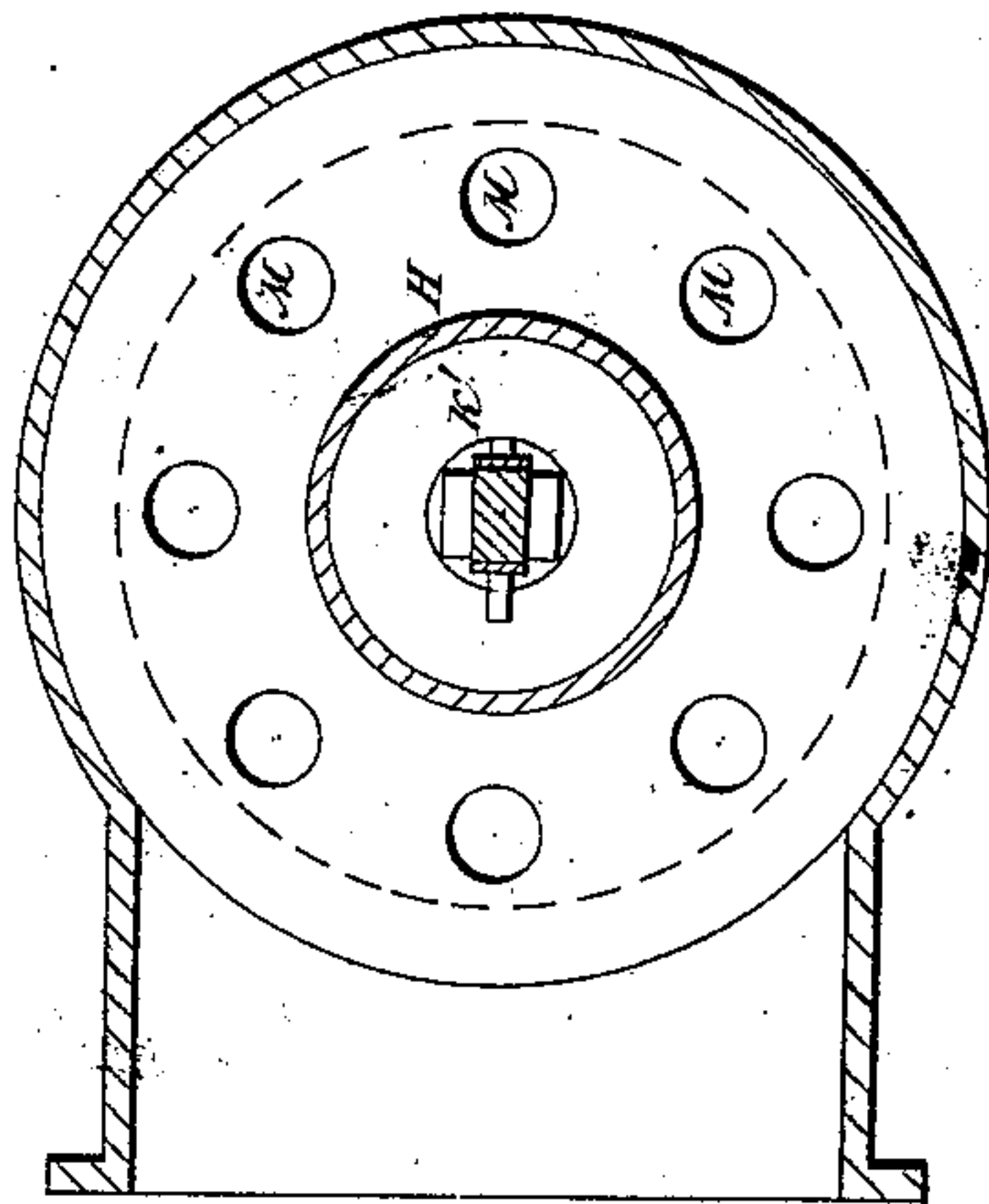


Fig. 3.



Witnesses.

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UNITED STATES PATENT OFFICE.

JOHN VIAL, OF CLEVELAND, OHIO.

IMPROVED PUMP FOR LOW-PRESSURE STEAM-ENGINES.

Specification forming part of Letters Patent No. 36,431, dated September 9, 1862.

To all whom it may concern:

Be it known that I, JOHN VIAL, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented new and useful Improvements in Low-Pressure Steam-Engine Pumps; and I do hereby declare that the following is a full and complete description of the construction and operation of the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a perspective view. Fig. 2 is a vertical section. Fig. 3 is a horizontal section in the direction of the line *x x* in Fig. 2. Fig. 4 is a horizontal section in the direction of the line *y y* in Fig. 2.

The nature of this improvement consists in such a construction of the piston that a continuous flow of water is produced during the ascent of the piston-head.

The necessity for an improvement in the construction of the "air-pump" (so called) for low-pressure steam-engines has long been felt by every practical engineer, and the difficulties which have existed and do exist in the use of the ordinary construction is made apparent by stating the single fact that the ascending piston-head carries with it the contents of the pump-cylinder, the water reaching and reacting upon the head of the cylinder at the moment the piston-head is at its greatest speed, and consequently producing a severe concussion or shock. This concussion is often so violent in fast-working engines as to break through the head of the cylinder and otherwise injure the machinery.

It is the object of my improvement to cause a constant flow of water through the exit-pipe while the piston is rising throughout its whole upper stroke, as hereinafter explained.

For the purpose of relieving the condensing-chamber from an excess of water when the engine is first started, and also for causing a partial vacuum in the condensing-chamber while at work, the pump is constructed with double capacity. In this manner a few strokes will clear the condensing-chamber from its excess of water.

The exhausting-chamber is constructed in the usual form, the induction-pipe A, Fig. 2, leading therefrom to the pump-cylinder B. At C is seen the guard that supports the lower valve,

D. This valve is represented as being open, the upper side of which rests upon the under side of the guard C. When this valve is closed, it rests upon the valve-seat, the position of which is indicated by the red line *Y Y*. The outer edge of this valve is indicated by the red circular line *o* in Fig. 4. The valve when closed covers the holes *E E* in Figs. 2 and 4.

The piston-head is seen at F. This is also furnished with valves like those just described, and seen at G G. They are represented as being closed, in which position they are always found when the piston is rising.

In the ordinary mode of construction the piston-head is worked by a common piston-rod; but in my improved mode, instead of the common piston-rod, I introduce a hollow trunk or cylinder, H, having a diameter sufficient to fill half of the area of the pump-cylinder. At the point of union of this with the piston-head it is made of such form as to serve the purpose of a guard for the valve G, as seen at *g*, Fig. 2. From this point to *g'* this cylinder is turned straight and smooth and works in the packing I, which is inclosed in the packing-box I'. The hollow trunk H is worked by a connecting-rod, K, which is attached by a connection, K', within the trunk H.

Upon a line horizontal to the bottom of the exit-pipe L is another set of valves, M, which open into the chamber of the exit-pipe. These valves open upward when the piston is rising and close when the piston descends. The valves are also shown in Fig. 3, which is a section of the pump at the line *x x* in Fig. 2, and prevent the water and air from returning back into the pump-cylinder.

The mode of operation of this pump is as follows: Suppose the engine to be in a state of rest and the pump and induction-pipe filled with water, as is also the condensing-chamber, it is necessary for the free and perfect working of the engine that the condensing-chamber should be properly cleared from water by a few strokes of the engine. The pump working double the capacity (more or less) of the induction-pipe, will clear this space of its surplus water by a few strokes of the engine, but afterward will only raise half its capacity, thus forming a partial vacuum in the condensing-chamber. The upward stroke of the pump-

piston filling the pump-cylinder but half-full of water at every descent of the piston this amount of water passes through the valves G in the piston-head, but as the space above the piston-head, when the piston-head is down, has only half the capacity of the whole solid contents of the pump-cylinder when the piston is up, in consequence of the space being half occupied by the hollow piston-trunk H, the water which only half fills the cylinder when the piston is up will completely fill the space above the piston-head when the piston is down. Now, when the piston is down, the space above the piston-head being completely filled with water, this water commences to move or is discharged at the exit-pipe through the valves M the moment the piston begins to move upward, and consequently no shock can be felt consequent upon the striking of the water against the upper head of the pump-cylinder, as is the case in the usual form of construction, in which case the water does not begin to move until the piston-head is upon

the live center. It therefore meets the top of the cylinder-head with a velocity equal to the speed of the piston-head.

In my improvement the water begins to flow the moment the piston begins to move upward and continues to flow throughout the whole upward stroke; but in the old form of construction the water flows through the exit-pipe only during half the upward stroke, except when there is a surplus of water in the condensing-chamber.

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

The cylinder B, plunger H, and piston-head F, in combination with the valves D G M and induction-pipe A and exit-pipe L, these several parts being arranged and operating as and for the purpose specified.

JOHN VIAL.

Witnesses:

W. H. BURRIDGE,
HENRY VOTH.