J. Edson,

Force Pump,

No. 10,746. Patented Apr. 4, 1854.

Fig. 3.

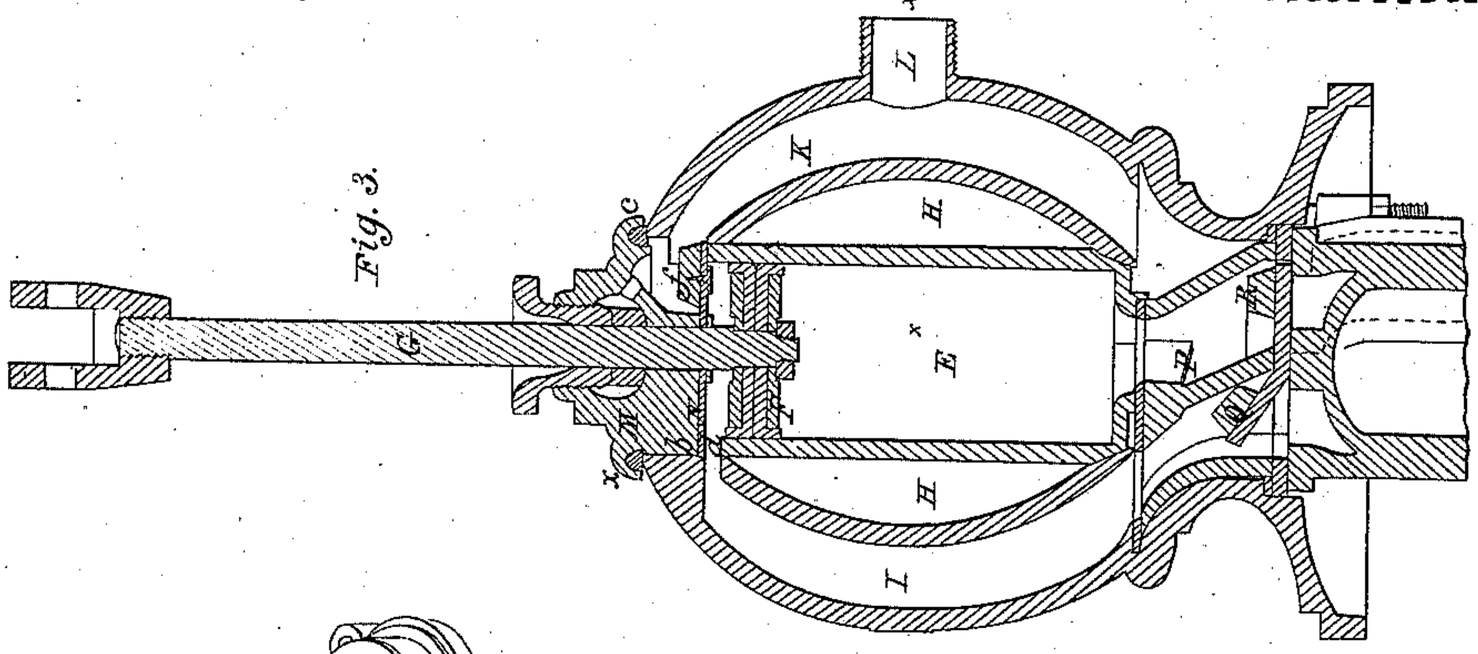


Fig. 7.

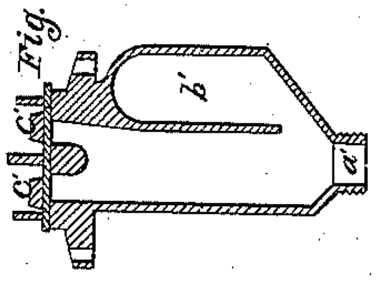


Fig. 6.

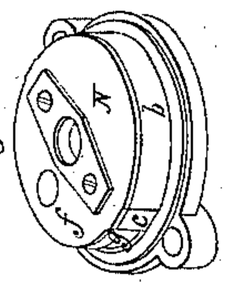


Fig. 2.

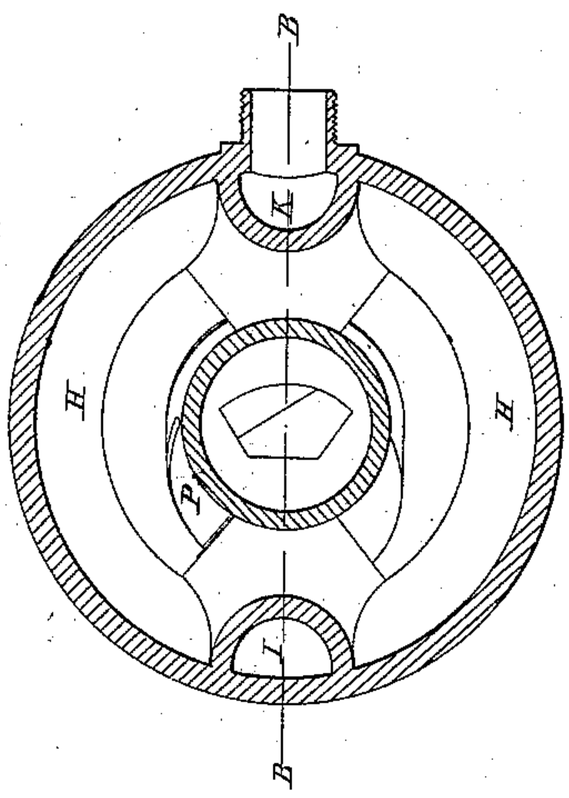


Fig. 5.

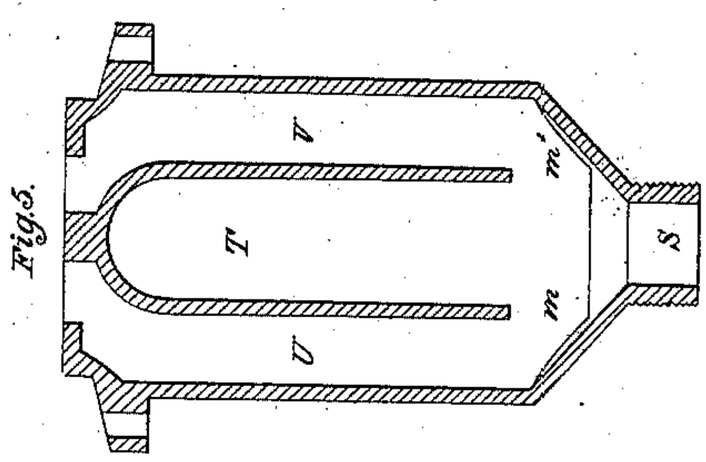


Fig. 4.

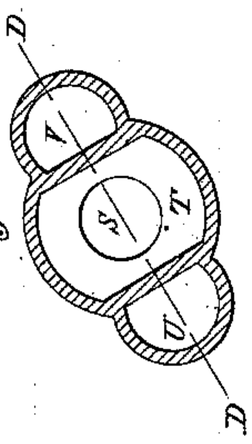
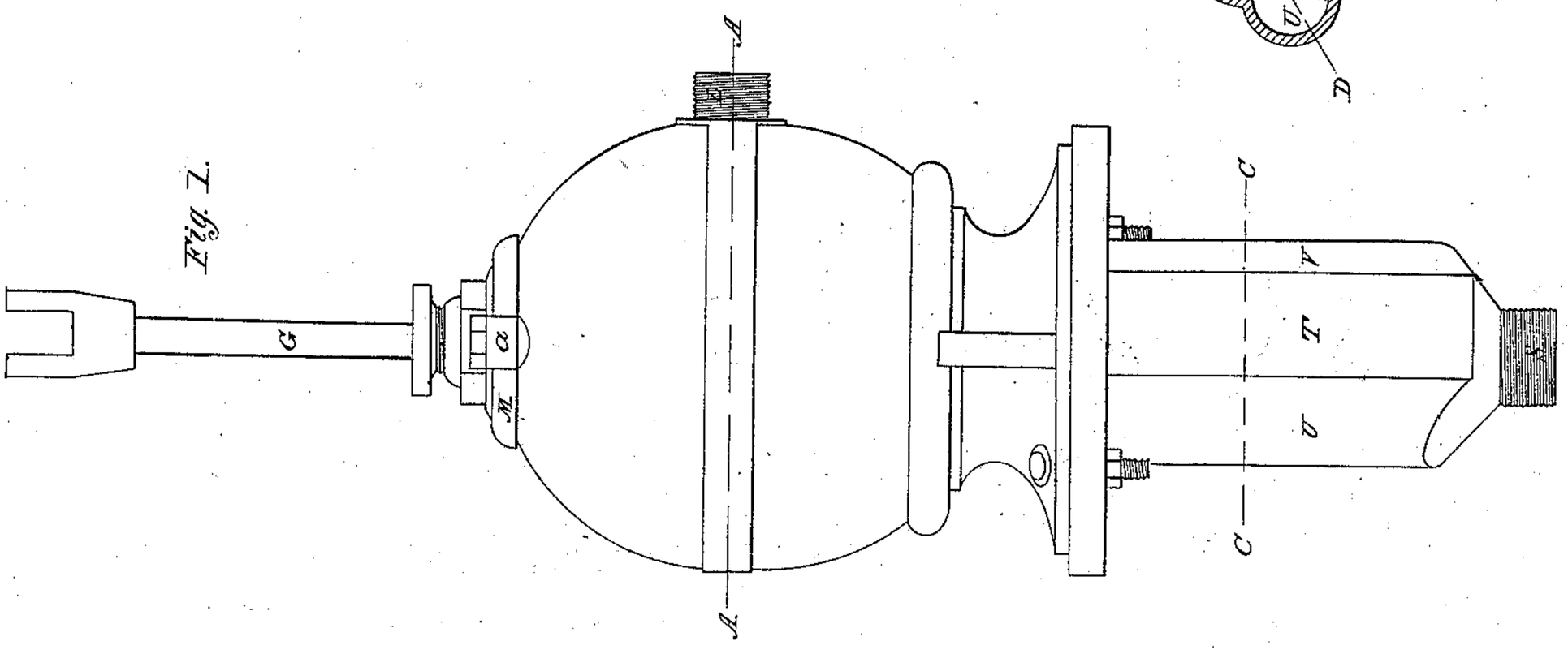


Fig. 1.



UNITED STATES PATENT OFFICE.

JACOB EDSON, OF BOSTON, MASSACHUSETTS.

PUMP.

Specification of Letters Patent No. 10,746, dated April 4, 1854.

To all whom it may concern:

Be it known that I, JACOB EDSON, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Double-Action Force-Pumps; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the annexed drawings, making part of this specification, in which—

Figure 1 is a front view of a pump with my improvements attached; Fig. 2, a horizontal section upon the line A, A, of Fig. 1. Fig. 3 is a vertical section through the upper portion of the pump upon the line B B of Fig. 2. Fig. 4 is a horizontal section upon the line C C of Fig. 1. Fig. 5 is a vertical section through the lower portion of the pump upon the line D D of Fig. 4. Fig. 6 is an underside view of the pump cap with the valve attached.

In double acting force pumps as heretofore constructed the position of the eduction valves has been such with regard to the piston as to afford a lodgment for a portion of air which is not driven out by the ascent or descent of the piston. This air forms a cushion, as it were, within the cylinder and prevents the pump from raising a column of water due to the pressure of one atmosphere. A portion of each stroke of the pump is also productive of no useful effect, as the water will not commence to flow through the induction valves until the air within the cylinder is rarefied an amount due to the perpendicular height of the column of water raised. This air is again compressed when the piston returns and upon the next stroke is rarefied, and thus a large portion of the power applied to the pump is expended in rarefying and compressing the air at the top and bottom of the cylinder. To remedy this inconvenience and to produce a pump capable of raising a column of water due to the whole pressure of the atmosphere, and without the loss of power in the manner above described, I have so arranged the exit valve from the top of the cylinder that any air that may collect there shall be instantly expelled. This I accomplish by making the top of the cylinder the valve seat. Any air that may be in the cylinder is thus driven out upon the ascent of the piston.

In all pumps which are placed at a considerable distance horizontally from the source from which the water is drawn the momentum of the moving column of water is so great as materially to retard the operation of the pump, as the column of water requires to be set in motion and stopped each time the piston rises or falls, which causes a great loss of power, and the constant blows of the moving column of water upon the valves, technically known as the water hammer, soon destroys them. To remedy this inconvenience air chambers have been applied to the induction pipe immediately beneath the induction valves, as represented in Fig. 7, in which *a'* is the induction pipe, *b'* the air chamber, *c'* the induction valves, but this only partially accomplished the desired end, for the motion of the column of water, being in a straight line, it was not until after it had expended its force upon the valves that it commenced to rise in the air chamber, and the motion of the water was almost annihilated before it was deflected into the air chamber. My improvement upon this portion of the pump consists in placing the air chamber immediately over the induction pipe, of which it forms a continuation, with a water passage upon each side of it, one for each induction valve. By this means when the motion of the piston ceases the column of water continues in a straight line into the air chamber until the piston commences upon its next stroke, when it ascends the other side passage and thus the motion of the column of water in the induction pipe is never interrupted and the injurious effect of the water hammer before mentioned is avoided.

To enable others skilled in the art to make and use my invention I will proceed to describe its nature and operation.

E is the cylinder; F, the piston; G, the piston rod; H, the air chamber; I, the induction passage for the water to the space above the piston; K, the eduction pipe from the same; L, the outlet pipe.

M is the cap which is secured to the body of the pump by suitable screws *a*. One half of the cap is solid, as at *b*, and is packed tightly into the top of the pump, or it may be packed at two points *c* midway between the passages I and K, for the purpose of preventing the water from passing around from the eduction pipe K in at the opening *d* when the piston descends.

N is a disk of leather or other suitable packing which is secured to the bottom of

the cap and fits tightly upon the top of the cylinder, except where the latter is cut away at *d* to admit the water from the passage I. The passage *d* may be opened slightly below the top of the cylinder, in which case the side packing *c* may be dispensed with, as the bottom of the cap will entirely close the top of the cylinder and prevent communication between the passage K and the cylinder when the piston descends.

f is a valve in the pump cap which is cut away as seen in Fig. 3, to admit the passage of the water through the pipe K to the air chamber H. It will thus be perceived that the top of the cylinder is made the valve seat and that any air which may collect at the top of the cylinder is instantly thrown out at each downward stroke of the piston.

P is the valve between the bottom of the cylinder and the air chamber H.

My second improvement consists in the above mentioned construction and arrangement of the air chamber and water passages beneath the body of the pump, and may be described as follows: S is the induction pipe from the well or cistern; T, the air chamber; U and V, the induction passages which are covered by valves Q and R. When the piston reaches the extreme of its upper stroke and before it commences to return the momentum of the moving column of water impels it in a direct line into the air chamber T past *m m'* of the water passages U and V. The next instant the piston commences to descend and the valve Q is raised before the momentum of the moving column of water has been annihilated, and without the destructive hammering upon the valves before mentioned as experienced where there is but a single air chamber upon one side of the induction pipe.

It is evident that a single water passage may be used upon one side of the central air chamber, but in that case the top of the same should be furnished with two valves, one to deliver water to the space above the piston, and the other communicating with the space beneath it, the object being in either case to have the air chamber immediately over and in continuation of the water pipe and the water passages upon the side.

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

The cap M with its valve *f* constructed and arranged in the manner substantially as described, for the purpose set forth, the cap being cut away upon one side for the accommodation of the valve, and packed at the point *c* to prevent the return of the water from the passage K to the cylinder, the valve being made to bear immediately upon the upper end of the cylinder, by which construction and arrangement of parts I am enabled to force out from the cylinder each time the valve *f* is raised any air which may have collected above the piston, and thus effectually avoid the air cushion above the piston.

JACOB EDSON.

Witnesses:
SAM. COOPER,
H. B. SPINNEY.