(No Model.)

L. B. FULTON.
Water Ejector.

No. 231,789. Patented Aug. 31, 1880.

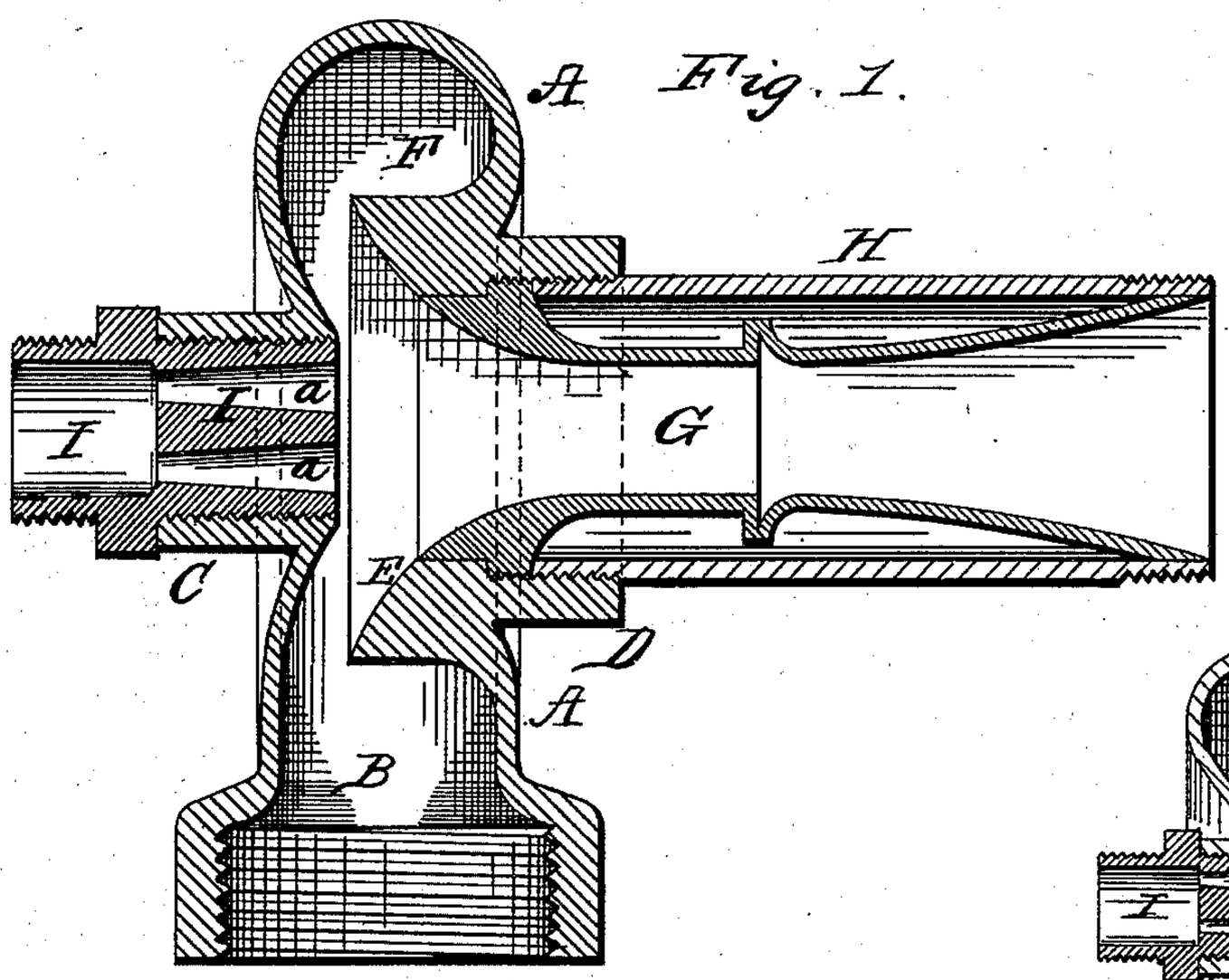


Fig. 1.

Fig. 2.

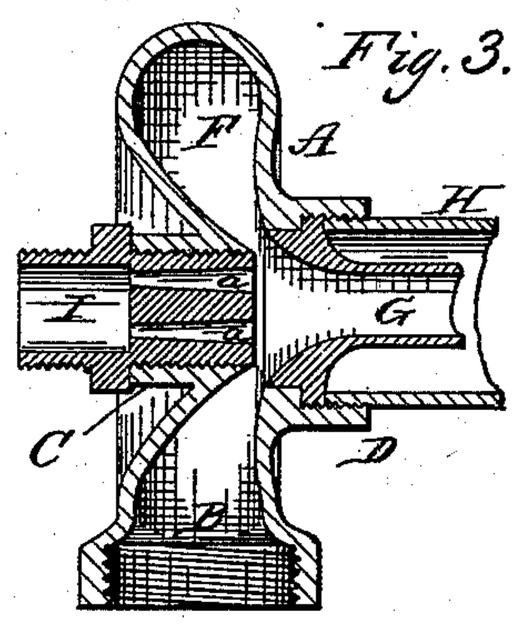
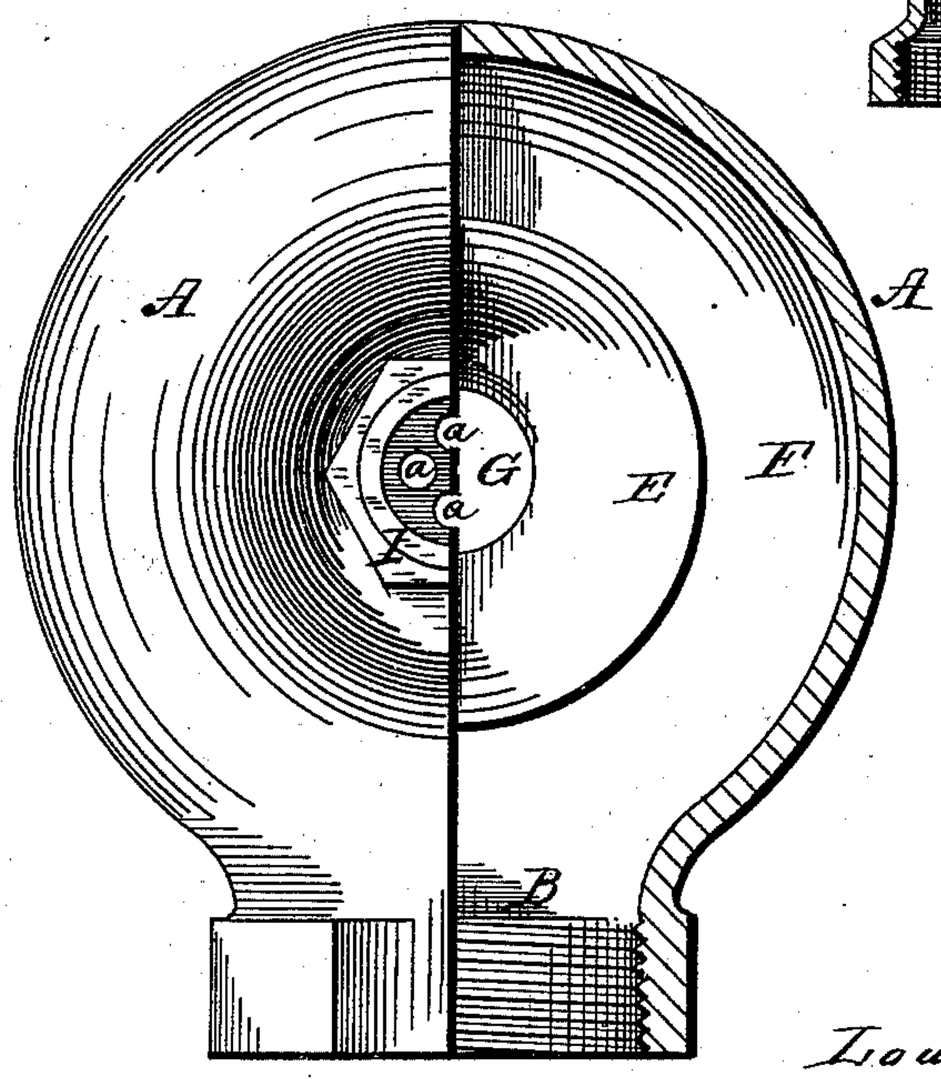


Fig. 3.



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UNITED STATES PATENT OFFICE.

LOUIS B. FULTON, OF PITTSBURG, PENNSYLVANIA.

WATER-EJECTOR.

SPECIFICATION forming part of Letters Patent No. 231,789, dated August 31, 1880.

Application filed June 5, 1880. (No model.)

To all whom it may concern:

Be it known that I, LOUIS B. FULTON, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Water-Ejectors; and I declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal vertical section of my ejector. Fig. 2 is a rear view, partly in section. Fig. 3 is a longitudinal vertical section of a modified form.

This invention relates to that class of devices known as ejectors, in which the condensation of steam acts to lift liquids by its tendency to create a vacuum, and in which the projectile force or momentum of the steam escaping from an orifice is utilized to propel the liquid thus lifted.

My present improvements have especial reference to the most advantageous distribution of the water from the induction-port to the combining-tube, to economy of steam by lifting the greatest possible quantity of water with the least expenditure of steam, and to greater facility and cheapness of construction and mounting.

To these ends my invention consists in constructing the shell with an annular supply-chamber communicating with the induction port or opening and located directly around the mouth of the combining-tube, and communicating therewith through an annular slit whose total area is about equal to the area of the induction-opening, whereby the water is compelled to distribute itself throughout the annular chamber, and then pass, in equal volumes, to the combining-tube from all directions; further, in so constructing the walls of said annular chamber that the distributed water shall sweep into the combining-tube without meeting any abutments or so-called "breakwaters," or other obstacles to its direct flow to the combining-tube; further, in constructing the steam-nozzle with two or more conical steam-ports having straight tapered sides enlarging gradually toward the combining-tube, whereby the steam meets with as little friction as possible and spreads out so as to act upon as large a body of water as possible; further, in the combination and arrangement of parts, substantially as hereinafter fully described and claimed.

Referring to the accompanying drawings, my invention more particularly is as follows: I cast the peculiarly-shaped shell A generally of iron. This shell has the general appearance of a flattened sphere exteriorly, having underneath the branch or leg B and the axial branches C D, respectively, on opposite sides of the shell, as shown in Fig. 1. In the interior the shell has the rear wall cusp-shaped—*i. e.*, sweeping on a concave toward the axis, but stopping at the edge of the branch C. The opposite wall of the shell, inside, springs forward, as shown, to form the mouth-piece E, having the flaring opening, as in the figure. This construction of the walls forms an annular chamber, F, within the shell A, communicating with both the induction-port B and the mouth-piece E, as shown. The space or annular slit thus left between the mouth-piece and rear wall of the shell is so sized that its total area of opening shall be substantially equal to the area of the induction-port B. The atmospheric pressure, striving to supply the vacuum created by the steam, urges the water upward into the chamber F; but this having the described limitation as to opening to the mouth-piece, the water is forced to equally surround the mouth-piece, or, rather, to fill the chamber F, and thence flow equally from all sides into the mouth-piece. The water rises without meeting any dams or abutments in the shell, whose lines are all sweeping curves, and hence no frictional resistance is offered to the passage of the water. The combining-tube G is flared from the center, or thereabout, toward both ends, its position being maintained by screwing into the branch D, as shown. It is further jammed by the casing-tube H screwing into the same branch, thereby also protecting said combining-tube against injury from an exterior source. The flare given the mouth of the combining-tube and that of the mouth-piece are alike, so that the curve from the edge of the mouth-piece to the interior of the combining-tube is continuously convex, as seen.

The nozzle I has a full opening at its rear end, but forward it is constructed with two

or more conical holes or ports, *a*, whose sides are tapered on straight lines, the taper having its larger end toward the combining-tube. Openings or ports *a* are cut at such distances from the center as will deliver all their steam toward the mouth-piece and drive all water therethrough. Being tapered reversely, the steam does not crowd, but passes through with practically no friction, thus permitting its full force to be applied to the main purpose of the ejector. The nozzle I is screwed or otherwise fixed in branch C till its forward end is flush with the part of shell A which surrounds it, as in Fig. 1. The incoming steam is thus protected against premature condensation.

Steam being admitted, it spreads over the interior of the combining-tube G, and tends to create a vacuum therein and in the chamber F and induction-port B. The water rises and fills chamber F, whence it flows unobstructedly into the mouth-piece and combining-tube, whence it is discharged.

By reason of the peculiar cusp shape of the rear wall of the shell and its location immediately above the induction-port B the water has a direct sweep, and all the force of condensation is thereby utilized.

The projecting mouth-piece is for the purpose of contracting the annular opening between its interior and the chamber F. This will be further perceived from an inspection of Fig. 3, where the cusp-shaped rear wall is more acute and the wall of the front is contracted to effect the same results.

The shape of the shell requires less metal than is usual in this class of devices, and permits all the working-faces to be conveniently trued up in the lathe.

I claim as my invention—

1. A water-ejector constructed with an annular supply-chamber communicating with the induction-port and located directly around the mouth of the combining-tube and communicating therewith through an annular slit whose total area is substantially that of the induction-port, substantially as described.

2. A water-ejector having its rear wall behind the plane of the discharge end of the steam-nozzle and sweeping forward thereto in a gradual curve, substantially as described, whereby the inflowing water has a clear and unobstructed passage through the water-chamber and eddies are avoided.

3. A water-ejector having an annular water-chamber surrounding the mouth of the combining-tube, but located wholly to the rear of the same, and in communication therewith by means of an annular slit, substantially as described.

4. The shell A, having the annular chamber F, the induction-port B, and branches C and D, for the steam-nozzle and combining-tube, respectively, said shell having its main portion of a flattened spherical form whose plane is at right angles to the axis of the shell, and whose rear wall sweeps forward in cusp shape toward the steam port or nozzle, substantially as described.

5. The water-ejector comprising the shell A, of flattened spherical form, having its rear wall of cusp shape, as described, and water-chamber F, annular and surrounding the mouth of the combining-tube, steam-nozzle I, induction-port B, and combining-tube G, substantially as described.

6. The water-ejector comprising the shell A, of flattened spherical form, having cusp-shaped rear wall, flaring mouth-piece E, and annular water-chamber F, communicating with the same through an annular slit, steam-nozzle I, induction-port B, and combining-tube G, substantially as described.

In testimony whereof I have hereto set my hand.

LOUIS B. FULTON.

Witnesses:

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