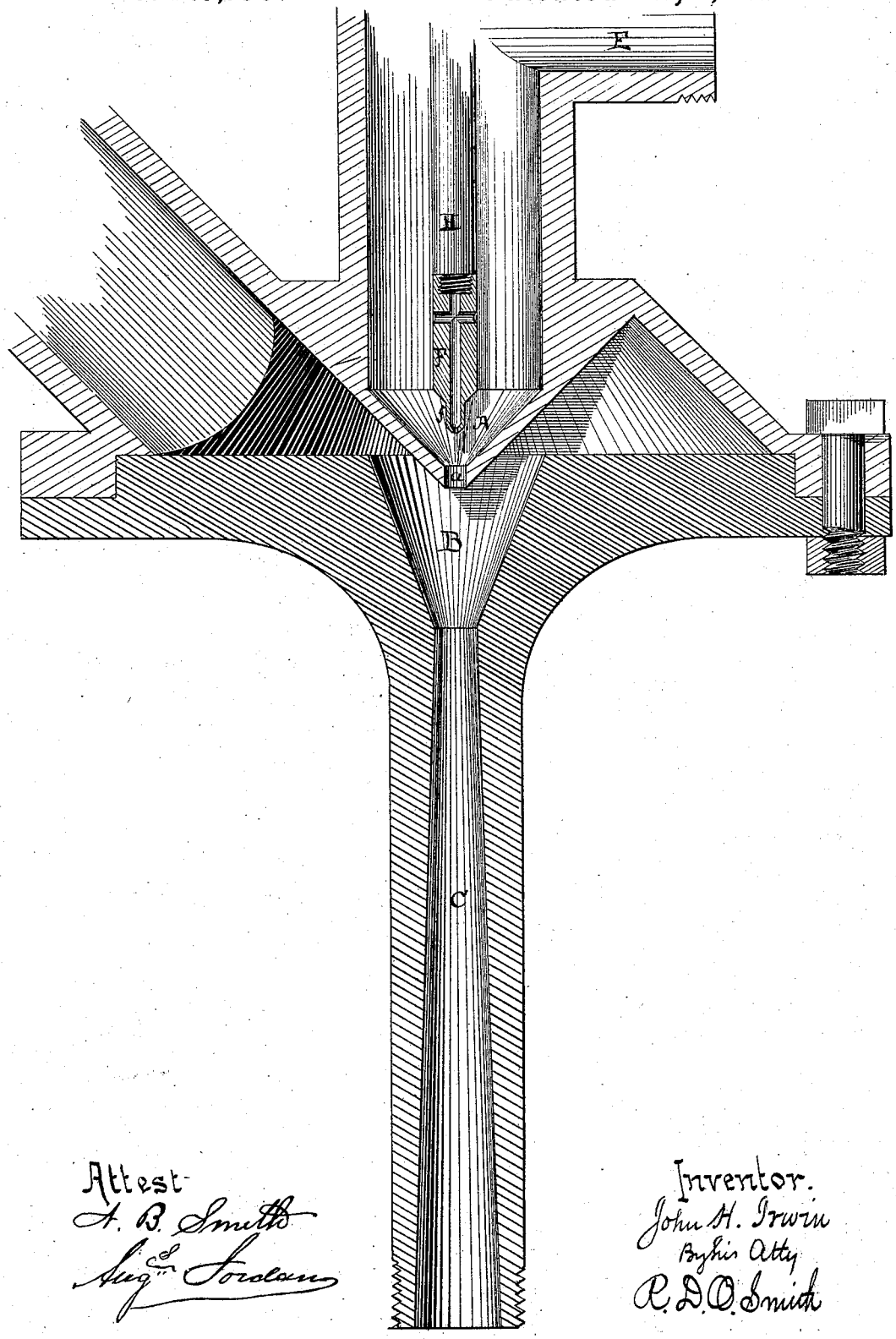
J. H. IRWIN.
Ejector.

No. 217,109. Patented July 1, 1879.



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UNITED STATES PATENT OFFICE.

JOHN H. IRWIN, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN EJECTORS.

Specification forming part of Letters Patent No. **217,109**, dated July 1, 1879; application filed August 21, 1878.

To all whom it may concern:

Be it known that I, JOHN H. IRWIN, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented new and useful Improvements in Ejectors, of which the following is a full and accurate description, reference being had to the accompanying drawing, which is a longitudinal section, showing the lower part of the steam-cone, the combining-cone, and receiving-cone.

This invention relates to that class of instruments known as "injectors," and its structure has special reference to the operation of raising air or water and discharging it from a reservoir, the general principles of operation being the same whatever may be the source or destination of the fluid under treatment.

In this invention the chief features are the relative form and proportion of the steam combining and receiving cones, which have been found after a long series of experiments to be most effective in results.

In my patents dated May 6, 1879, and May 27, 1879, I have shown that the proper inclination of the steam-cone A is forty-five degrees, and that the steam-jet opening should be cylindrical, and of length and diameter equal. The combining-cone B in this invention is in length four times its smaller diameter, and the larger diameter is also four times the smaller diameter. The receiving-cone C at its smaller diameter is equal to the smaller diameter of the combining-cone, its larger diameter twice the smaller diameter, and its length sixteen times the smaller diameter. These relative proportions are the same as expressed and explained in my patents aforesaid; but for the purpose of an ejector this device differs from the injector described in said patents in the following particulars: In said patents the diameter of the steam-jet opening *a* in the steam-cone is twice the smaller diameter of the combining-cone, or as 2 to 1. In this device the most efficient steam-jet opening is one-half the smaller diameter of the combining-cone, or as $\frac{1}{2}$ to 1.

The steam-cone A projects into the combining-cone past the plane of its base a distance equal to one and one-half ($1\frac{1}{2}$) time the diameter of the steam-jet opening *a*. Steam enters the steam-cone through the pipe E, which is provided with a proper valve to cut off the flow whenever desired.

A spindle, F, is placed axially in the steam-cone, and is provided with some suitable means for causing it to reciprocate. The forward end of said spindle is fitted to conform to the interior surface of the steam-cone and close against the same as a seat, so that when so closed it may act as a valve to close the flow of steam through said jet-opening.

The forward end of the spindle F is provided with a nose, *f*, smaller in diameter than the steam-jet opening *a*, and projecting through the same when the spindle is closed upon the cone. Said nose is perforated axially, and its front end is contracted, the inner and outer faces being inclined at an angle of forty-five degrees to the axis. The diameter of the central orifice is equal to its length, which equals one-fourth the diameter of the steam-jet opening. The nose *f* is in length equal to the length of the steam-jet opening *a*.

In starting this implement the spindle F is pushed forward against the steam-cone, and steam is turned on. The jet of steam then issues from the spindle-opening in nose *f*, and the air is thereby expelled from the combining and receiving cones, and the fluid to be ejected is immediately drawn in and moved forward with velocity approximating the velocity of the steam-jet. When the current is thus established more steam may be admitted, and the spindle F is drawn back gradually and an annular jet of steam admitted around the nose *f* to re-enforce the spindle-jet, which loses power as the spindle is retracted, and may finally replace it entirely.

The spindle H, whereby spindle F is actuated, is provided with a screw-thread near its outer end and a hand wheel or crank whereby it may be turned.

This apparatus may be economically used for raising or propelling water, for propelling air for all the various purposes of ventilation, blasts, pneumatic purposes, &c.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an injector, a steam-cone having its

face inclined to its axis at an angle of forty-five degrees, or thereabout, and having a cylindrical jet-opening whose length and diameter are equal, in combination with a combining-cone, the smaller internal diameter whereof is equal to twice the diameter of said jet-opening, and its axial length and larger diameter each equal to four times its smaller diameter.

2. In an injector, a steam-cone having its face inclined to its axis at an angle of forty-five degrees, or thereabout, and having a cylindrical jet-opening whose length and diameter are equal, and a combining-cone, the smaller internal diameter whereof is equal to twice the diameter of said jet-opening, and its axial length and larger diameter each equal to four times its smaller diameter, combined with a hollow central spindle, the front end whereof is fitted to close upon the steam-cone as a seat to cut off the flow of steam through the jet-opening, as set forth.

J. H. IRWIN.

Witnesses:
R. D. O. SMITH,
CHAS. F. R. HEUCKEROTH.