N. Cope,

Ejecting Pump,

No. 37,542. Patented Jan. 27, 1863.

Fig: 1.

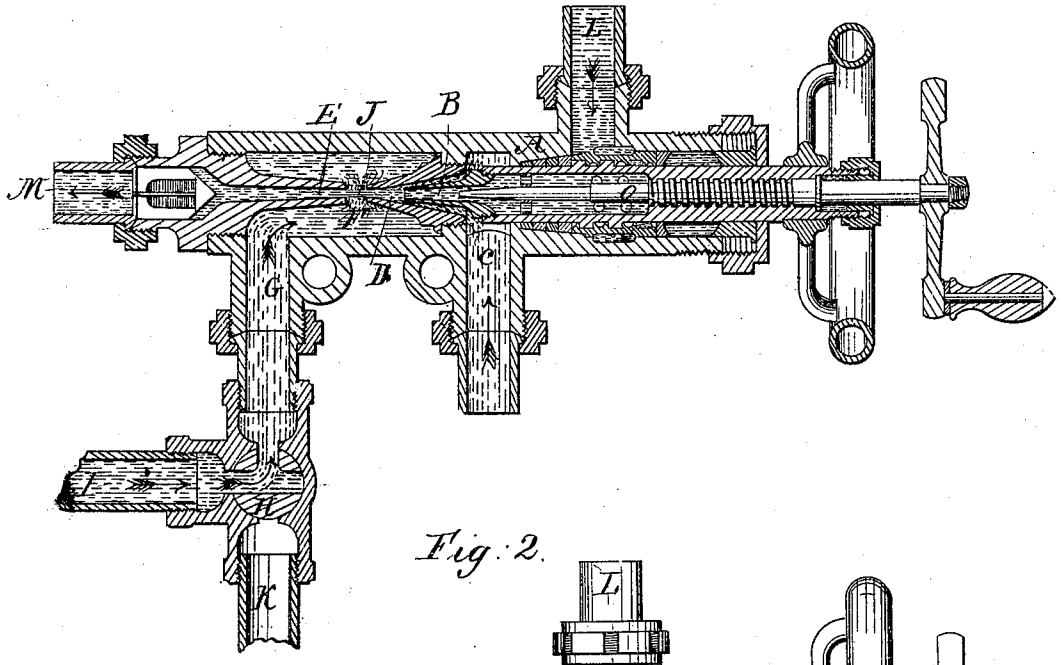
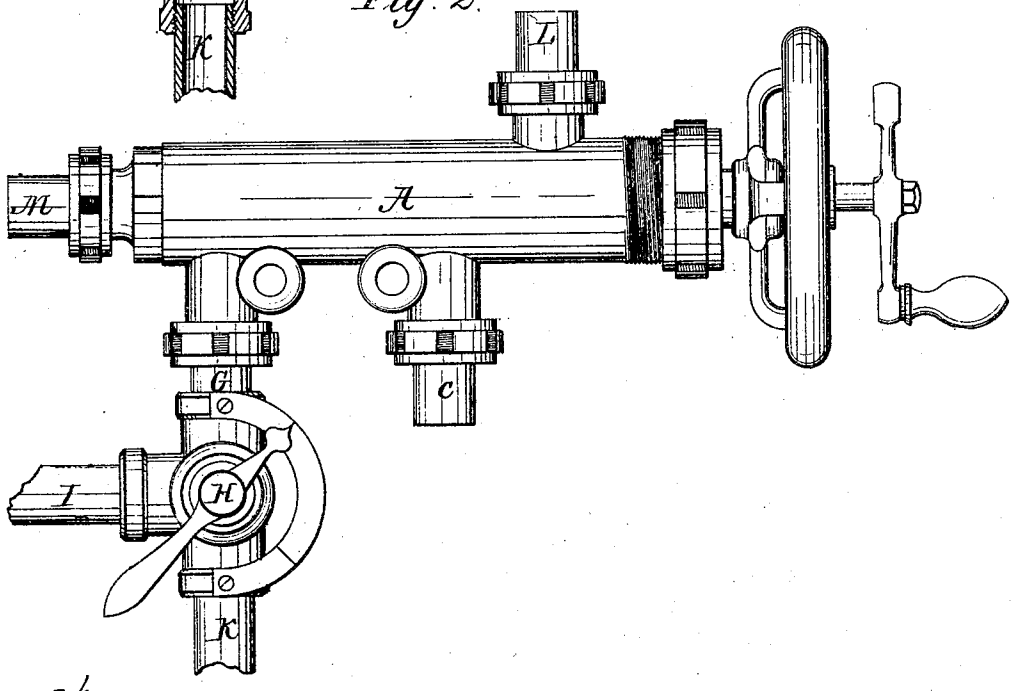


Fig: 2.



Witnesses;
Jacob. F. Stevens
H. N. Clark.

Inventor;
Nathan Cope

UNITED STATES PATENT OFFICE.

NATHAN COPE, OF CINCINNATI, OHIO, ASSIGNOR TO EZRA COPE, OF SAME PLACE.

IMPROVEMENT IN GIFFARD'S INJECTOR.

Specification forming part of Letters Patent No. 37,542, dated January 27, 1863.

To all whom it may concern:

Be it known that I, NATHAN COPE, of Cincinnati, in the county of Hamilton and State of Ohio, have invented (and assigned to Ezra Cope, of same place) a new and useful Improvement to be applied to the Giffard Injector; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a longitudinal section, and Fig. 2 is a longitudinal elevation.

Like letters of reference refer to like parts.

The nature of my invention consists, first, in the application of a secondary water-supply for the condensed or heated water to the well-known Giffard injector at the point as known in the Giffard arrangement as the "overflow" or "waste" pipe; second, also the manner of regulating the amount of water required in connection with the said waste or overflow—*i. e.*, to so regulate the cold-water supply as to produce the greatest amount of vacuum between nozzles D and E. (This is soon found by a little practice with the instrument.)

The advantages of this arrangement are, first, the increased capacity of the instrument without increasing the consumption of steam, as the great momentum imparted to the water-jet (in all injectors) produces a partial vacuum in the space around the injecting-nozzle, which space, when supplied with condensed or heated water, brings it in contact with said jet at F, and carries a portion of it along into the boiler; second, the greatest practical difficulty heretofore with the Giffard injector has been the water-supply, which, for the sure and certain working of the instrument, must be at a very low temperature, so as to insure a perfect condensation of the steam as it issues from the nozzle B, otherwise if the steam was not perfectly condensed, it would expand after it had left the injector-nozzle D, and thus break the water-jet before it had reached the receiving-nozzle F, while in my arrangement the water can be admitted at a temperature bordering on to the heat of the water-jet after it has received the steam from the steam-nozzle, thereby producing a degree of economy that has not been before attained in fuel, beside the advantage of having pure distilled water for the boiler-supply from the condensation of the steam of steam-engines, water-heaters, warming buildings by the exhaust or steam taken direct from the boilers, &c.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation by referring to the accompanying drawings, of which—

Fig. 1 is a longitudinal section, and Fig. 2 is a longitudinal elevation of Giffard injector with my improvement attached.

Like letters of reference refer to like parts in both figures.

The arrows show the direction of the currents.

A is the shell or main body of Giffard's injector; B, the steam-nozzle; C, water-supply.

D is the nozzle through which the combined steam and water are injected.

E is the receiving-nozzle, which connects with the boiler.

F is the space between the discharge and receiving nozzles, (generally called the "break.")

G is the overflow or waste communicating with the break F; but in my arrangement is used for the secondary water-supply, or may be opened as a waste when desired to start the injector.

H is the regulating-valve, which is of the three-way-cock class. This form is used for its cheapness and simplicity, (as by it one cock answers the place of two of the ordinary construction,) and facilitates the operation of starting the instrument.

I is the secondary water-supply pipe, communicating with G through the valve H.

K is the waste or overflow, also communicating with G through the valve H when it is desired to start the injector.

L is the steam-pipe.

M is the water-supply pipe, leading to the boiler.

When it is desired to start or put this injector in operation the water is admitted at the usual water-supply, C; then steam is turned on in such quantities by means of the regulating-mandrel O as will cause the water to be injected across the space or break F into the receiving-nozzle E, during which time the valve

of H of the secondary supply is turned so as to leave the space G open to the atmosphere and the supply-water shut off.

To bring the secondary water-supply into action, it is only necessary to turn the valve H until water is admitted in such quantities as meets the demands of the water-jet J, which can be determined by the sound produced by the instrument, with which a person of but slight experience soon becomes familiar. This supply can be admitted at a degree of heat about equal to the passing jet, or, in fact, at any temperature less than 212° of Fahrenheit; but the water at the first or usual supply at D should and has always been at as low a temperature as possible, so as to insure a complete and perfect condensation of the steam to insure success, (as referred to above.)

I do not claim any part of the injector as patented by Henry Giffard, April 24, A. D. 1860. for that I am familiar with and is well known; but

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

1. The within-described arrangement of the secondary water-supply to the Giffard injector, as herein set forth.

2. The supplying of a portion of the water of a boiler-feeder by a jet of water that has momentum imparted to it by a jet of steam, said water-jet acting upon the water of the secondary supply, as herein described.

3. The waste-pipe K, in combination with secondary water-supply G, which may be opened or closed at pleasure for the purpose of regulating the action of the injector, substantially as and for the purpose set forth.

NATHAN COPE. [L. S.]

Witnesses:
JACOB A. STEVENS,
H. N. CLARK.