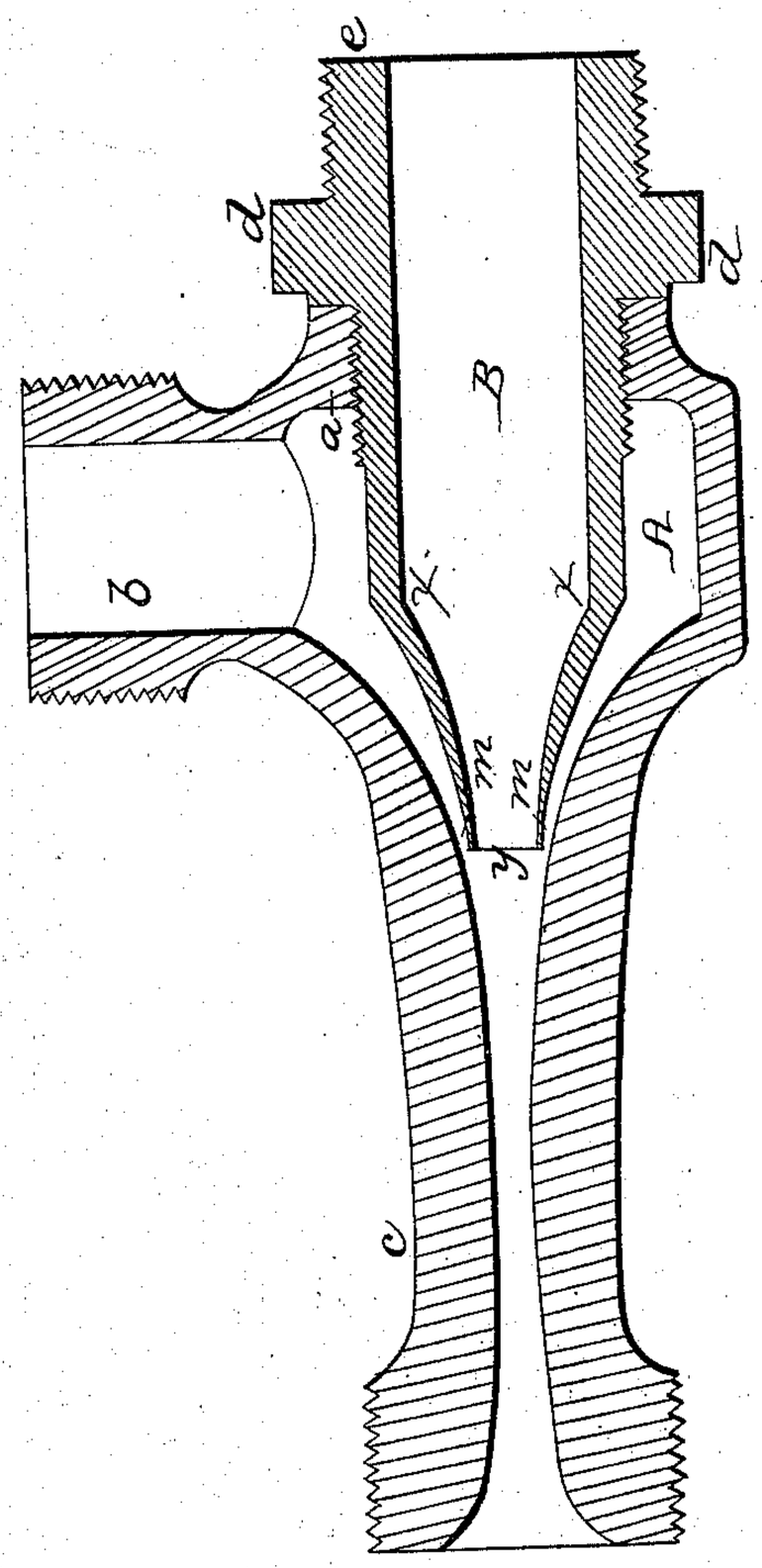
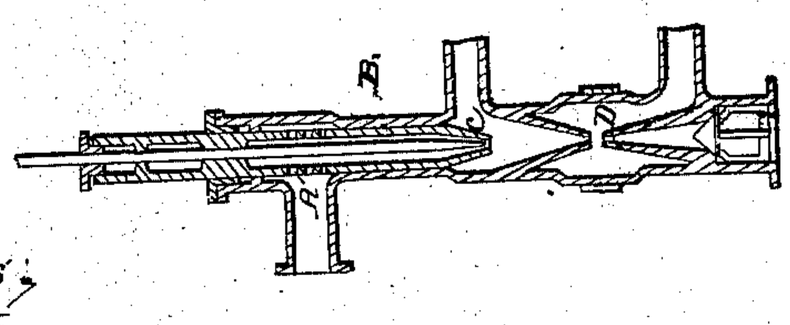
J. Millholland,

Ejecting Pump.

No. 35,575. Patented June 10, 1862.





Witnesses;
Charles E. Foster
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UNITED STATES PATENT OFFICE.

JAMES MILLHOLLAND, OF READING, PENNSYLVANIA.

IMPROVEMENT IN GIFFARD'S INJECTORS.

Specification forming part of Letters Patent No. **35,575,** dated June 10, 1862.

To all whom it may concern:

Be it known that I, JAMES MILLHOLLAND, of Reading, Berks county, Pennsylvania, have invented an Improvement in Giffard's Injectors; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention consists of a chamber with certain branches in combination with an internal nozzle, the whole being constructed and arranged substantially as described hereinafter, so as to form an injector of the most simple and inexpensive character, compared with the elaborate and costly instruments known as "Giffard's injector."

In order to enable others to make and use my invention, I will now proceed to describe its construction and operation.

Figure 1 in the annexed drawings is a sectional view (full size) of my improvement in Giffard's injector. Fig. 2 represents the Giffard injector in section.

My improved feed-water apparatus consists of two parts—namely, the metal casing inclosing a chamber, A, and having three projecting branches, *a b c*, and the nozzle B. The latter consists of a tube having throughout a greater portion of its length a parallel bore, but diminishing gradually in diameter with a gentle curve from the point *x* to its termination *y*, where the diameter is one-third, or thereabout, of that of the main body of the tube. The nozzle is screwed into the branch *a*, projects through the chamber A, and penetrates a short distance into the interior of the branch *c*, the extent of penetration being limited by the collar *d* of the nozzle. On the outer end, *e*, of the latter are cut the threads of a screw adapted to the internal threads of an ordinary cock, which, being connected to the steam-pipe, serves to regulate the flow of steam through the nozzle. A similar cock connected to the water-pipe is screwed onto the end of the branch *b*, and serves to regulate the admission of feed-water to the chamber A. The branch *c* is connected directly to the boiler, or to a cock communicating therewith, as well as with a pipe leading to the tender, for a purpose alluded to hereinafter.

It will be observed that the interior of the branch *c*, where it is smallest in diameter, is somewhat less than the termination *y* of the nozzle, and that this interior of the branch gradually increases in diameter as it approaches the chamber A with a gentle curve, this curve being such in relation to the termination *y* of the nozzle that between the latter and the interior of the branch intervenes a narrow annular space, *m*, which gradually increases in size as it approaches the chamber A.

In making what is known as "Giffard's injector" the peculiar construction and arrangement of parts well known to engineers have hitherto been considered indispensable, as the result of a series of careful experiments, the plan illustrated in Fig. 2 having been generally adopted by the manufacturers both in this country and Europe. The adjustable perforated tube A, the adjustable rod B, the nozzle *c*, through which the steam and water passes, and the second nozzle, D, for receiving the jet of steam and water and directing it to the boiler are common to the injectors now in use. The accurate fitting of the parts composing these instruments, the number of tight packings required, the elaborate patterns and castings render them so expensive that there is little or no gain in adopting them in the place of ordinary feed-pumps.

After a series of practical tests I have discovered that the complex arrangement of parts constituting the Giffard injector and the elaborate appliances for operating the same are unnecessary, and that the end attained by these costly instruments now in use may be acquired by the device illustrated and described, which may be constructed at a cost one-twentieth that of a Giffard injector. The flow of steam into the nozzle B is regulated by an ordinary cock, the flow of water into the chamber A being regulated by a similar cock, and the proper management of these two cocks is all that is required from the attendant engineer.

In starting the injector in the first instance the steam and water may be directed to the tender, (if the instrument be applied to a locomotive,) or may be otherwise disposed of by means of a cock attached to the branch *c*, and when the instrument is fairly in operation the plug of the cock may be turned, so as to direct the steam and water to the boiler.

I claim as my invention, and as an improved device for carrying out the principle described in the patent of Giffard of forcing water into steam-boilers or for any other purpose to which the instrument may be applicable—

The chamber *a*, with the branch *c*, communicating with the boiler, and branch *b* for the water, in combination with the nozzle B for the steam, the whole being formed and arranged substantially as and for the purpose herein set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES MILLHOLLAND.

Witnesses:

DE B. KEIM,

THOS. M. RICHARDS.