W. SELLERS & J. S. BANCROFT.

Injector for Feeding Boilers.

No. 224,798. Patented Feb. 24, 1880.

Fig. I

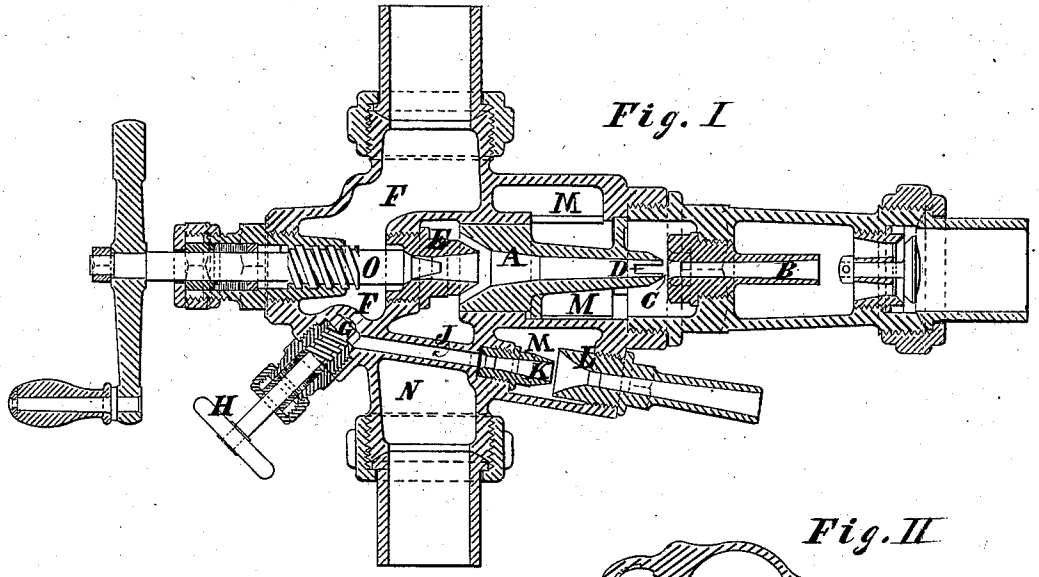


Fig. II

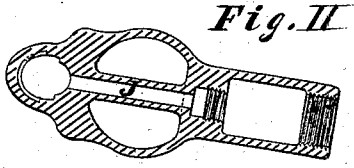


Fig. IV

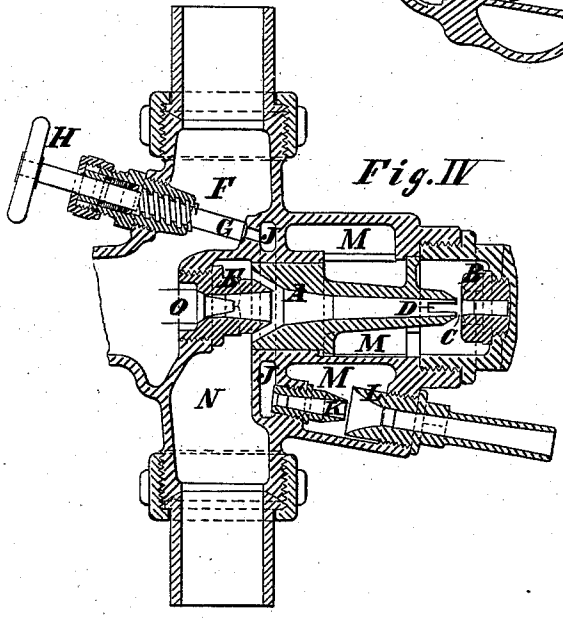
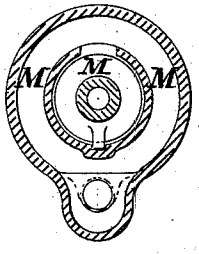


Fig III



Witnesses:

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UNITED STATES PATENT OFFICE.

WILLIAM SELLERS AND J. SELLERS BANCROFT, OF PHILADELPHIA, PENNSYLVANIA; SAID BANCROFT ASSIGNOR TO SAID SELLERS.

INJECTOR FOR FEEDING BOILERS.

SPECIFICATION forming part of Letters Patent No. 224,798, dated February 24, 1880.

Application filed December 2, 1879.

To all whom it may concern:

Be it known that we, WILLIAM SELLERS and J. SELLERS BANCROFT, of the city and county of Philadelphia, and State of Pennsylvania, have invented certain new and useful Improvements in Injectors for Feeding Boilers; and we hereby declare the following to be a full and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

An object of our present invention is to provide a supplemental lifting jet or ejector apart from the ordinary lifting and forcing nozzles of the injector, but which shall be combined with the outer casing of the injector, and so arranged as to draw its steam-supply within this casing and its water-supply through the combining-tube and overflow-chamber of the injector with which it is placed.

A further object of our invention is to improve the means of escape for the overflow between the combining and discharging tubes to facilitate the starting of the injector.

The nozzles of the injector, when properly proportioned for forcing water into a boiler, are not well adapted for lifting the supply-water to the injector. This latter has been improved in two ways—first, by a supplemental jet, which draws its supply through the combining-tube of the injector, as shown and described in the patent granted James Gresham, August 7, 1866; second, by forming a steam-nozzle in the spindle, which regulates the supply of steam to the injector, as shown and described in the patent granted Wm. Sellers, March 3, 1868, and the lifting-jet of our present invention is an improvement upon the former. All such supplemental lifting jets or ejectors having the nozzles separate and apart from the injector-nozzles have heretofore required extra pipes and fittings outside the injector-case, involving much additional expense and increasing the number of joints to be kept tight, as well as requiring more space than was necessary for the injector alone; and our improvement consists in providing a conduit within the injector-case, from the steam-chamber to the ejector, in connection with the overflow-chamber, and providing said conduit with an inlet-valve.

The overflow-space between the combining and delivery tubes of injectors as heretofore constructed usually consists of an annular opening of sufficient width to permit the necessary escape of water in starting the instrument. With such an arrangement of overflow, and with a water-supply regulated by hand, either by adjusting the relative position of the tubes or by throttling the water-supply passage, if too much water is admitted to the instrument in starting, the combined jet of steam and water will all escape through the overflow-space without attaining sufficient velocity to enter the boiler through the delivery-tube. If the water-supply is then reduced, this escape or overflow water will gradually diminish, and finally cease when the jet is established and the injector is at work feeding into the boiler; but, however slowly the water-supply may have been reduced, it will be found, after the injector is at work, that more feed-water may be admitted without causing an overflow, and in many cases the point where all the water is taken up without waste at the overflow is so close to the minimum supply with which the injector will work that frequently the jet is entirely broken by the endeavor to stop the waste, and the operation of starting must be repeated.

To remedy this defect, which is probably due to the action of the atmosphere upon the exposed surface of the jet, the nature of our improvement consists in contracting materially the width of the annular overflow-space and providing one or more openings or slots (preferably two) in the lower end of the combining-tube and parallel to the axis thereof, which slots connect with the annular overflow-space.

The accompanying drawings, which form part of this specification, represent an injector embodying our present improvements.

Figure I is a longitudinal section, showing all the parts in position. Fig. II is a section of the water-passage N in the line of the steam-passage J. Fig. III is a cross-section through the overflow-chamber M. Fig. IV shows a modification of the steam-conduit.

Similar letters denote similar parts.

B, Fig. I, is a delivery-tube, and A is a combining-tube, having a narrow annular opening,

C, between them. The lower end of A has a slot or slots, D, extending from a short distance above the end into the annular opening C. The function of these slots is to permit a free escape of the water sidewise from the jet, while the walls of the tube between the slots serve to guide the jet and maintain its form, so that it reaches the delivery-tube with much greater velocity than is possible when the annular opening C is the only overflow; and hence the jet will have sufficient force to enter the boiler long before the waste from the overflow ceases.

F, Figs. I and IV, is the steam-chamber of the injector, from which steam is admitted, through the steam-nozzle E, to the combining-tube of the injector, and also by the valve G, operated by the hand-wheel H, to the ejector through the conduit J. The discharge-nozzle K, at the end of the conduit J, discharges a solid steam-jet into the mouth of the draft-tube L, the receiving end of which is in communication with the overflow-chamber M, and the discharging end opens into the air.

The operation is as follows: The valve G is opened, and the steam escaping from the discharging-nozzle K into the draft-tube L forms a vacuum in the overflow-chamber M, which communicates, through the combining-tube, with the water-supply passage N, thus raising the water, which finally escapes by the tube L. As soon as this occurs the spindle O is lifted from its seat on the nozzle E, and the injector begins to work, forcing water into the boiler. The valve G is then closed and the ejector ceases to operate.

We do not limit our invention to the particular arrangement of lifting jet or ejector hereinabove described, for the conduit J may be arranged within the flange which separates the water-supply and overflow-chambers, as shown in Fig. IV, in which the steam is carried from the upper part of the steam-chambers F around the bearing for the combining-tube.

It will be seen that the steam-supply and conduits for the ejector are entirely within the body of the injector, and do not in any way interfere with the ordinary arrangements of the instrument for steam, water, or delivery.

We are aware that combining-tubes of injectors have been provided with lateral circular holes near their discharging ends, in addition to an annular opening between the combining and delivery tubes, to facilitate the escape of water in starting the injector; but such holes, at their edges opposite to the direction of the jet, present an obstruction to the column of water passing them and create a drip, which is not the case with a slot extending from the end of the combining-tube, such as we have shown and described.

Having now described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. A solid steam-jet ejector, in combination with an injector, when the steam-conduit from the steam-valve of the ejector passes from the steam-chamber in the injector through the water-supply chamber of the injector, substantially as shown and described.

2. A solid steam-jet ejector, in combination with an injector arranged to discharge into the open air when the steam-conduit from the ejector-valve to the ejector is contained entirely within the body or casing of the injector, as and for the purposes set forth.

3. In an injector, a combining-tube provided with a slot at its discharging end, substantially as described, in combination with a delivery-tube, when these combining and delivery tubes are so arranged as to form an annular space between their adjacent ends, as and for the purposes set forth.

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