(Model.)

J. JENKS & T. J. HART.

INJECTOR.

No. 342,604. Patented May 25, 1886.

Fig. 1

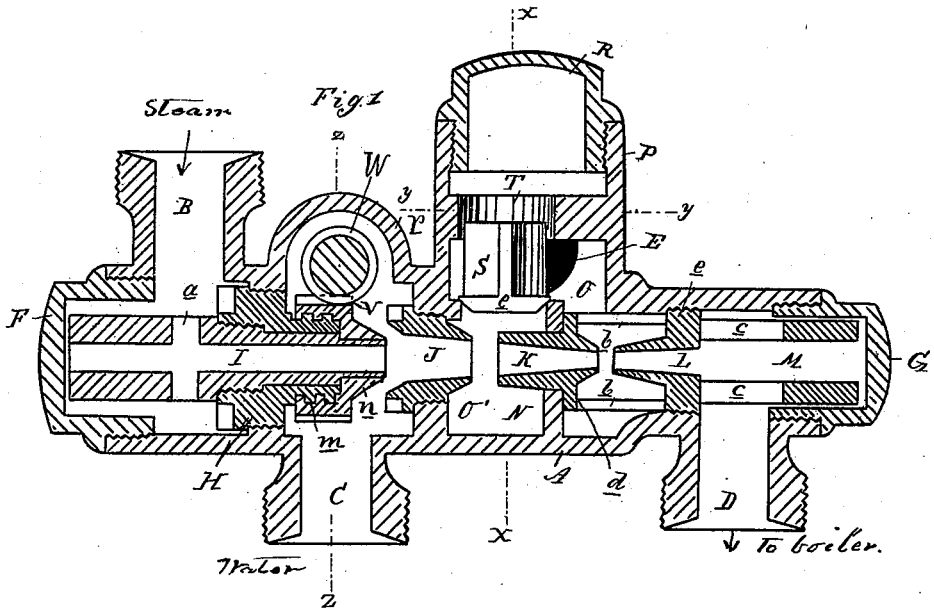


Fig. 2

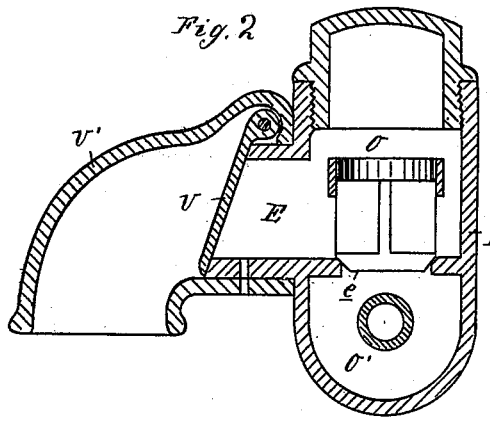


Fig. 3

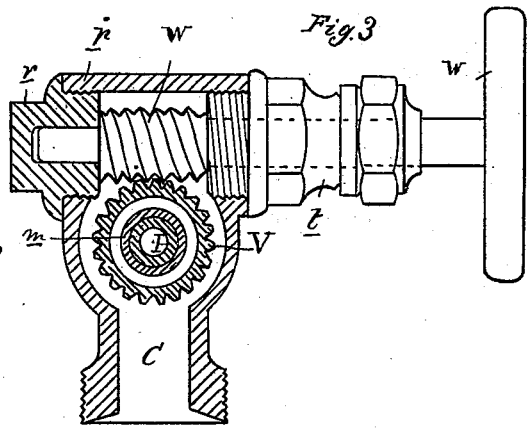
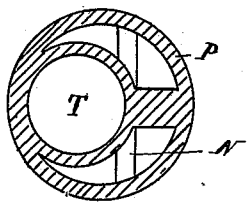


Fig. 4



Attest:
John Schuman.
A. Sprague

Inventors:
James Jenks and Thomas F. Hart.
by their Atty
Rob't S. Sprague.

UNITED STATES PATENT OFFICE.

JAMES JENKS AND THOMAS J. HART, OF DETROIT, MICHIGAN.

INJECTOR.

SPECIFICATION forming part of Letters Patent No. 342,604, dated May 25, 1886.

Application filed April 29, 1885. Serial No. 163,792. (Model.)

To all whom it may concern:

Be it known that we, JAMES JENKS and THOMAS J. HART, of Detroit, in the county of Wayne and State of Michigan, have invented new and useful Improvements in Injectors; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to a new and useful improvement in injectors such as are commonly used for feeding water to steam-boilers, but may also be employed for analogous purposes.

The object of our invention is to produce a simple, compact, durable, and efficient apparatus composed of few and simple parts, which may be removed from the apparatus for the purpose of examining and cleaning without disturbing any steam or water connection, and which may be adjusted to work to the right or left. A further object is to accurately control the quantity of the incoming water, so as to produce the least waste of steam and water, and also to gain certainty and rapidity of action by providing ample overflow-ports for the excess of water with such direct and independent passages to the waste-pipe as to prevent any circulation of such excess between the overflow-ports. To accomplish all this we have devised certain novel and useful improvements in the construction, arrangement, and combinations of old and new parts, all as hereinafter described and set forth.

In the drawings which accompany this specification, Figure 1 is a vertical central longitudinal section of our improved injector. Fig. 2 is a cross-section on line *x x* in Fig. 1. Fig. 3 is a cross-section on line *z z* in Fig. 1. Fig. 4 is a horizontal section on line *y y* in Fig. 1.

A is the shell or main body of the apparatus, preferably made of brass and cast in one piece.

B is the inlet for the steam. C is the inlet for the water. D is the outlet for the water to the boiler; and E is the outlet for the overflow, all these inlets or outlets being arranged to be coupled in the usual manner to the necessary pipe-connections.

F is a screw-cap closing one end of the shell, and G is another screw-cap closing the opposite end of the shell. Between these two caps, and in direct axial line with each other, all the different tubes or nozzles are secured to suitable seats formed within the shell in such manner that they may all be withdrawn through one or the other end of the shell after removing the caps.

H is a plug secured in the shell and provided with a central opening in which the steam-nozzle I is secured. The latter has an opening, *a*, through which the steam is admitted into it from the steam-inlet B.

J is the suction-tube, secured in the shell. It is placed in the usual relation to the steam-nozzle I and suction-pipe C.

K is the combining-tube, and L is the delivery-tube. These two tubes are preferably formed as integral parts of the hollow plug M, which is cut away at *b b* and largely cut away at *c c* where necessary to permit the free passage of water. The tube K is provided with a shoulder, *d*, which is seated against the diaphragm N in the shell, and a screw-seat, *e*, in the shell secures the plug M in place.

O′ is an overflow-chamber, into which the excess of water escapes. This chamber is formed by that portion of the shell between the tubes J and L and by an upward extension, P, of the shell, which is provided with a screw-cap, R, and opens into the overflow-pipe E.

The diaphragm N separates the chambers O and O′, and the gravity-valve S prevents any backflow of water from the chamber O into the chamber O′. By this arrangement ample and direct exits for the excess of water are provided into the overflow, and the valve V closes the water-opening of the overflow and prevents the indraft of air. The valve S is guided upon its seat by a spider, T, and can be readily removed, if necessary, by unscrewing the cap R.

The overflow E is controlled by a check-valve, U, which opens outwardly to permit the escape of water, and closes to prevent the inlet of air. This check-valve may be conveniently combined with an elbow to direct the overflow in a downward direction.

To regulate the quantity of the incoming water the following arrangement is provided: The plug H is provided at one end with a

screw-threaded section, *m*, and a movable nozzle, *n*, provided with a corresponding thread to engage with it in the manner of a screw-nut, is fitted over it and loosely fitted over the projecting end of the steam-nozzle, and is provided with a pinion, V. W is a worm-screw adapted to engage with the teeth of the pinion and rotate it. It is provided with a stem which projects through the casing, and has a hand-wheel for operating it. This screw is secured in an upward extension, *p*, of the shell. Its stem is stepped at one end into the screw-plug *r* and passed through a stuffing-box, *t*, at the other end. The screw-plug *r* and stuffing-box *t* are interchangeable, so as to allow of the screw being adjusted to be operated either from the right or from the left, as circumstances may require. It will be seen that this mode of regulating the admission of water is far preferable to the use of an adjustable steam or suction tube, which must be loose in its seat, and is therefore always liable to stick or be leaky.

In practice, all there is to do to operate the injector is to turn on the steam, and if the necessary conditions for its operation are given it will begin to raise and force the water into the boiler almost simultaneously. There may be at the start some overflow, but not necessarily. Should such overflow appear and continue it is an indication that too much water is admitted. This is then easily regulated by a proper turn of the hand-wheel *w*, which is made to approach the pinion V nearer the suction-tube, and thereby cut off the water.

We are aware that it is not new to divide the overflow-chamber by a diaphragm surrounding the combining-tube, as this is shown in the patent of A. Friedman, No. 213,648, and others, and we therefore do not claim this as our invention.

What we claim as our invention is—

1. In an injector, the shell A, having its opposite ends closed by removable screw-caps, and having proper steam and water connections, in combination with the tubes I J K L, axially and removably secured within said shell, substantially as and for the purposes described.

2. In an injector, the shell A, having proper steam and water connections, in combination with the steam-tube I and plug H, the plug H forming a wall between the water and steam inlets, and having a central orifice through which the steam-tube I passes, said plug H and steam-tube I, when secured in position, being fixed and not adjustable, substantially as and for the purposes specified.

3. In an injector, the shell A, having proper steam and water connections, in combination with the steam-tube I, plug H, and adjustable nozzle *n*, the said plug being fitted to receive said nozzle *n*, and having a central orifice through which the steam-jet tube I passes, the plug H and steam-jet tube I, when in position, being fixed and not adjustable, and the nozzle *n* being adjustable independently of said plug and tube, substantially as and for the purpose described.

4. In an injector, in combination with a steam-jet tube stationarily secured in position, a plug, H, through which the steam-jet tube passes and an extension-nozzle movably secured upon the plug H to form an adjustable cut-off for regulating the inflow of water into the suction-tube, substantially as described.

5. In an injector substantially as described, the combination, with the extension-nozzle *n*, of an operating-stem, as W, held in interchangeable bearings, as set forth.

6. The combination, in an injector as described, with the extension-nozzle *n*, of an operating-stem reversibly secured in position by means of the interchangeable plug *r*, and stuffing-box *t*, as set forth.

7. In an injector, the shell A, having proper steam and water connections, in combination with steam-tube I and plug H, said plug being threaded to receive the internal threaded nozzle, *n*, and the means described for operating the same, substantially as set forth.

8. In an injector, the combination, of the steam-jet tube I, plug H, provided with screw-threads *m*, and extension-nozzle *n*, engaging therewith, and a gear for operating the extension-nozzle, all arranged substantially as described.

9. In an injector, in combination with the screw-nozzle *n* and pinion V, the worm W, reversibly secured in position by means of the interchangeable plug *r*, and stuffing-box *t*, substantially as described.

10. In an injector, the combination of the plug H, provided with screw-threaded neck *m*, the screw-nozzle *n* engaging thereon and provided with pinion V, the worm W, reversibly secured in position by interchangeable plug *v* and stuffing-box *t*, and the hand-wheel *w*, all arranged and operating in connection with the steam-jet tube, substantially as described.

11. In an injector substantially as described, the combination, with the shell A, having diaphragm N to divide the interior of the shell into chambers O O′, the diaphragm supporting the combining-tube and forming a seat for a gravity-valve, S, the said combining-tube and valve, and a controlled overflow-outlet, all arranged and serving as and for the purposes set forth.

12. In an injector, the combination of the overflow-chamber O, having lateral outlet E, terminating in a valve-seat, the hood U′, secured over said outlet, and provided with the check-valve U, all arranged substantially as described.

JAMES JENKS.
THOS. J. HART.

Witnesses:
H. S. SPRAGUE,
CHARLES J. HUNT.