

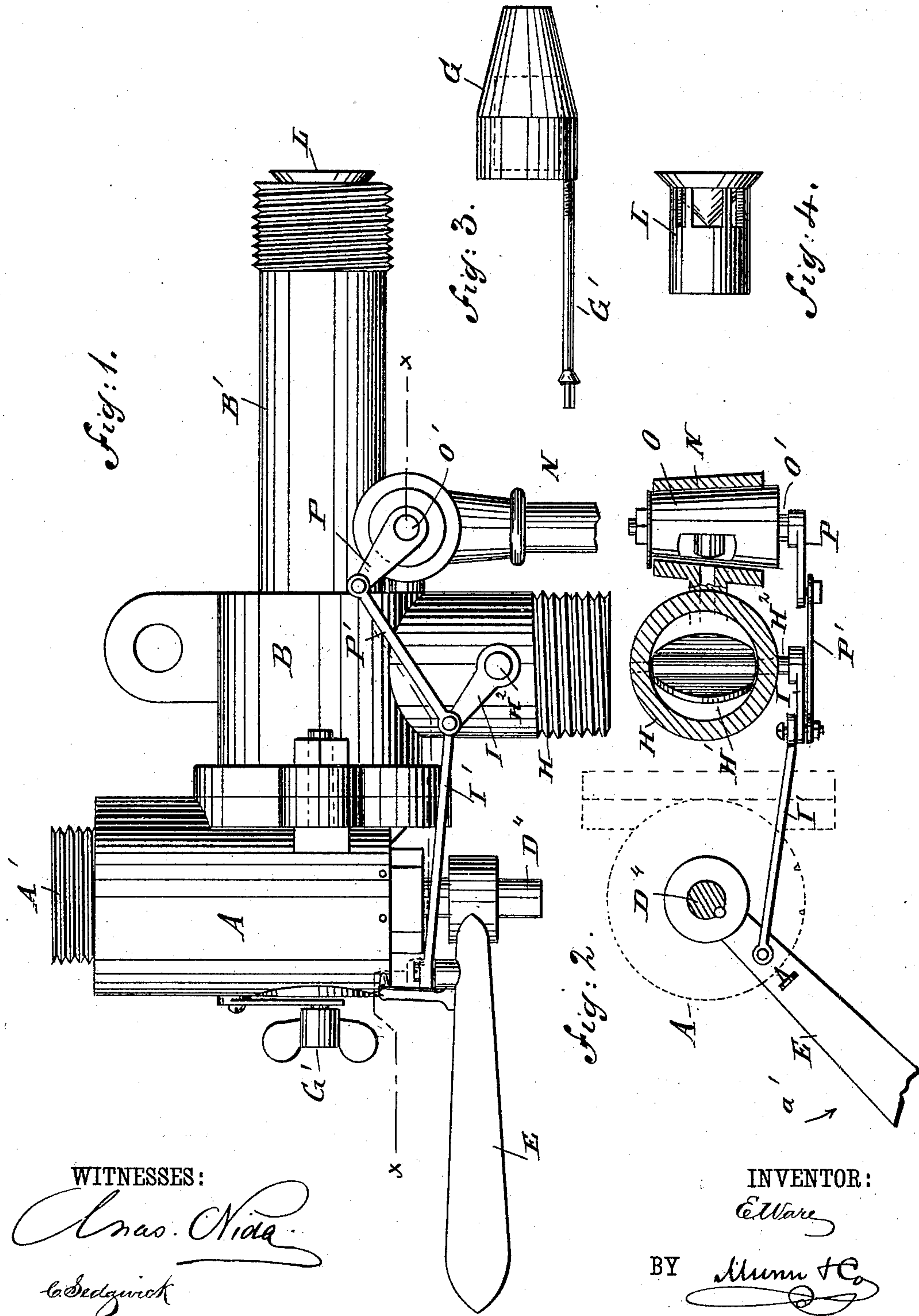
(Model.)

2 Sheets—Sheet 1.

E. WARE.
INJECTOR.

No. 368,798.

Patented Aug. 23, 1887.



WITNESSES:
Chas. Nida
C. Sedgwick

INVENTOR:
E. Ware
BY *Munn & Co*
ATTORNEYS.

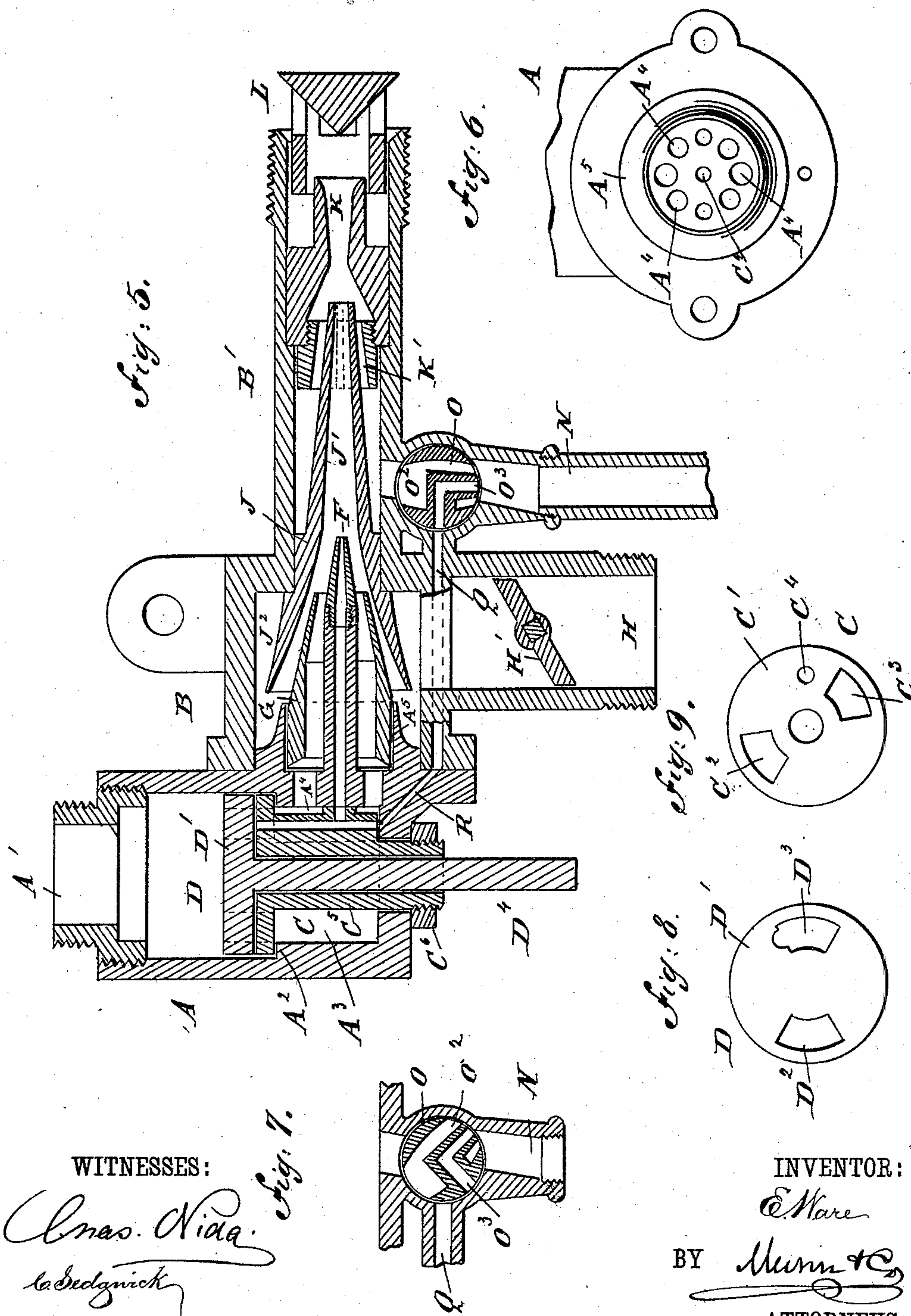
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UNITED STATES PATENT OFFICE.

ELIJAH WARE, OF OMAHA, NEBRASKA.

INJECTOR.

SPECIFICATION forming part of Letters Patent No. 368,798, dated August 23, 1887.

Application filed February 5, 1887. Serial No. 236,706. (Model.)

To all whom it may concern:

Be it known that I, ELIJAH WARE, of Omaha, in the county of Douglas and State of Nebraska, have invented a new and Improved Injector, of which the following is a full, clear, and exact description.

The object of my invention is to provide a new and improved injector, in which the proportion of steam and water is governed at the point of contact.

The injector is also simple in construction and very effective in operation.

The invention consists in the construction and arrangement of parts and details and combinations of the same, as will be fully described hereinafter, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of my improvement. Fig. 2 is a sectional plan view of the same on the line *xx* of Fig. 1. Fig. 3 is a side elevation of the regulating-cone. Fig. 4 is a side elevation of the check-valve. Fig. 5 is a longitudinal central section of my improvement. Fig. 6 is an end elevation of the steam-inlet casing. Fig. 7 is a sectional side elevation of the overflow-valve in a closed position. Fig. 8 is a plan view of the steam-valve, and Fig. 9 is a plan view of the steam-valve seat.

My improved injector is provided with the casings A and B, secured together at right angles by bolts or other means. The casing A is provided with the steam-inlet pipe A', and with an offset, A², on which is held the valve-seat C, consisting of a disk, C', (see Fig. 9,) having the ports C², C³, and C⁴, and of a hollow reduced stem, C⁵, which supports the seat-disk C' and passes to the outside of the casing A, being firmly secured thereto by the nut C⁶, screwing on the threaded end of the said stem C⁵ and against the bottom of the casing A.

The valve D is provided with a disk, D', operating on top of the seat-disk C' and having the ports D² and D³ adapted to connect with the ports C², C³, and C⁴ of the seat-disk C'. The valve-disk D' is supported on a stem, D⁴, passing through the hollow stem C⁵, and provided on the outer end with a lever, E, by which the said valve D can be turned so that

its ports D² and D³ are connected with or disconnected from the ports in the seat-disk C'.

The port C⁴ of the disk C' continues downward in an offset on the stem C⁵ and opens into the ejecting or starting cone F, secured to the casing A and projecting centrally into the casing B at right angles to the casing A. The other ports, C² and C³, open into the space A³ surrounding the stem C⁵, and the said space A³ connects by the apertures A⁴ with the interior of the regulating-cone G, held loosely on the bearing A⁵, formed in the casing A and projecting centrally into the casing B.

The cone G can be moved forward and backward in its bearings A⁵ by a screw-rod, G', which projects to the outside, or by other suitable means. The regulating-cone G is concentric with the ejecting or starting cone F, and opens upon the rim of the latter. The casing B is provided with the downwardly-extending water-inlet pipe H, in which is pivoted the water-regulating valve H', which has one of its trunnions, H², projecting to the outside. On the outer end of the said trunnion H² is secured a crank-arm, I, which is connected by the link I' with the lever E, secured to the valve-stem D⁴.

From the casing B extends the pipe B', placed at right angles to the inlet water-pipe H and the casing A, and in line with the cones F and G. The outer end of the pipe B' is secured to the boiler or other apparatus to be provided with my injector. In the pipe B' is held the main double cone J, of which the front cone, J', is a combination-cone, into which open the ejecting-cone F and the regulating-cone G. The front end of the cone J' is held in a nut, K', secured to the delivery-pipe K, having in its front the usual check-valve, L, held in the end of the pipe B'. The other part, J², of the cone J is the water-inlet cone, which surrounds the regulating-cone G and opens at its large end into the casing B, and is thus connected with the water-inlet pipe H.

The overflow-pipe N enters the bottom of the pipe B' between the bearing of the double cone J and the nut K', and is provided with a valve, O, having the stem O', on which is secured a crank-arm, P, connected with the crank-arm I by the link P'. This arrangement permits of operating the overflow-valve O, the water-valve H', and the steam-valve D

simultaneously by turning the lever E. The overflow-valve O is provided with a central slot, O², connecting or disconnecting the upper and lower ends of the pipe N with each other, as shown in Figs. 5 and 7, and the said valve O is also provided with a right-angular aperture, O³, of which the upper arm is connected with or disconnected from a channel, Q, formed in the casing B, and connecting with a channel, R, formed in the casing A. The channel R connects with the lower end of the port C⁴ in the seat C. The other lower arm of the aperture O³ opens downward into the pipe N.

The operation is as follows: The injector is set in operation by first starting the ejector F, which is done by moving the lever E in the direction of the arrow a', (see Fig. 2,) so that the port D³ in the valve D comes over the port C⁴ in the seat C, thus admitting steam to the ejecting-cone F. The movement of the lever E also opens the water-valve H', and water is forced into the cone J by the action of the steam in the ejector F. Part of the steam entering the port C⁴ passes into the channels R and Q and into the right-angular aperture O³ of the valve O, and thereby creates a downward suction in the overflow-pipe N, so that the water accumulating in front of the combination-cone J flows from the pipe K through the nut K' and out of the pipe N through the central aperture, O², in the valve O. The overflow-valve O commences to close as soon as the valve E opens, with its ports D² and D³ upon the ports C² and C³ of the valve-seat C, and when the operator sees that water flows out of the overflow-pipe N then he moves the lever E still farther and opens the valve D fully, so that the ports D² and D³ are over the ports C², C³, and C⁴, and steam now enters the regulating-cone G and then passes into the combination-cone J. The starting or ejecting cone F remains open, as the port D³ is sufficiently large to open into both ports C³ and C⁴. (See Figs. 8 and 9.) When the valve is entirely open, the overflow-valve is closed, as shown in Fig. 7—that is, the central aperture, O², is disconnected from the upper and lower ends of the pipe N, and the angular aperture O³ is disconnected from the channel Q and the lower end of the pipe N.

If sufficient steam does not enter the combination-cone J, then the regulating-cone G is moved forward by its screw-rod G', so as to enlarge the space between the regulating-

cone G and the ejecting-cone F, and to diminish the space between the outside of the regulating-cone G and the rear water-cone, J², of the double cone J, whereby a greater amount of steam is permitted to enter the combination-cone, while the water-supply is lessened. By this means I am enabled to regulate with great precision the supply of steam and water by one and the same movement simultaneously.

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

1. In an injector, the combination, with the steam-inlet valve and the water-inlet valve, of means, as described, for operating the said valves simultaneously, substantially as shown and described.

2. In an injector, the combination, with the ejecting-cone and the main or combination cone, of a steam-inlet valve, a water-valve, and means, as described, for operating the said valves simultaneously, substantially as specified.

3. In an injector, the combination, with the ejecting-cone, the main or combination cone, and the overflow-pipe, of a steam-inlet valve, a water-valve, an overflow-valve, and means, as described, for operating the three valves simultaneously, as set forth.

4. In an injector, the combination, with the steam-inlet valve, the water-valve, and means, as described, for operating the said valves simultaneously, of a regulating-cone and the main or combination cone, substantially as shown and described.

5. In an injector, the combination, with a steam-inlet valve, the water-valve, and means, as described, for operating the said valves simultaneously, of an ejecting-cone, a regulating-cone, and a main or combination cone, substantially as shown and described.

6. In an injector, the ejecting-cone, the main or combination cone, and the overflow-pipe, in combination with a steam-inlet valve, a water-valve, an overflow-valve adapted to be connected with the inlet-port of the steam-valve, so as to cause a suction in the said overflow-pipe, and means, as described, for operating the three valves simultaneously, substantially as set forth.

ELIJAH WARE.

Witnesses:

THEO. G. HOSTER,
C. SEDGWICK.