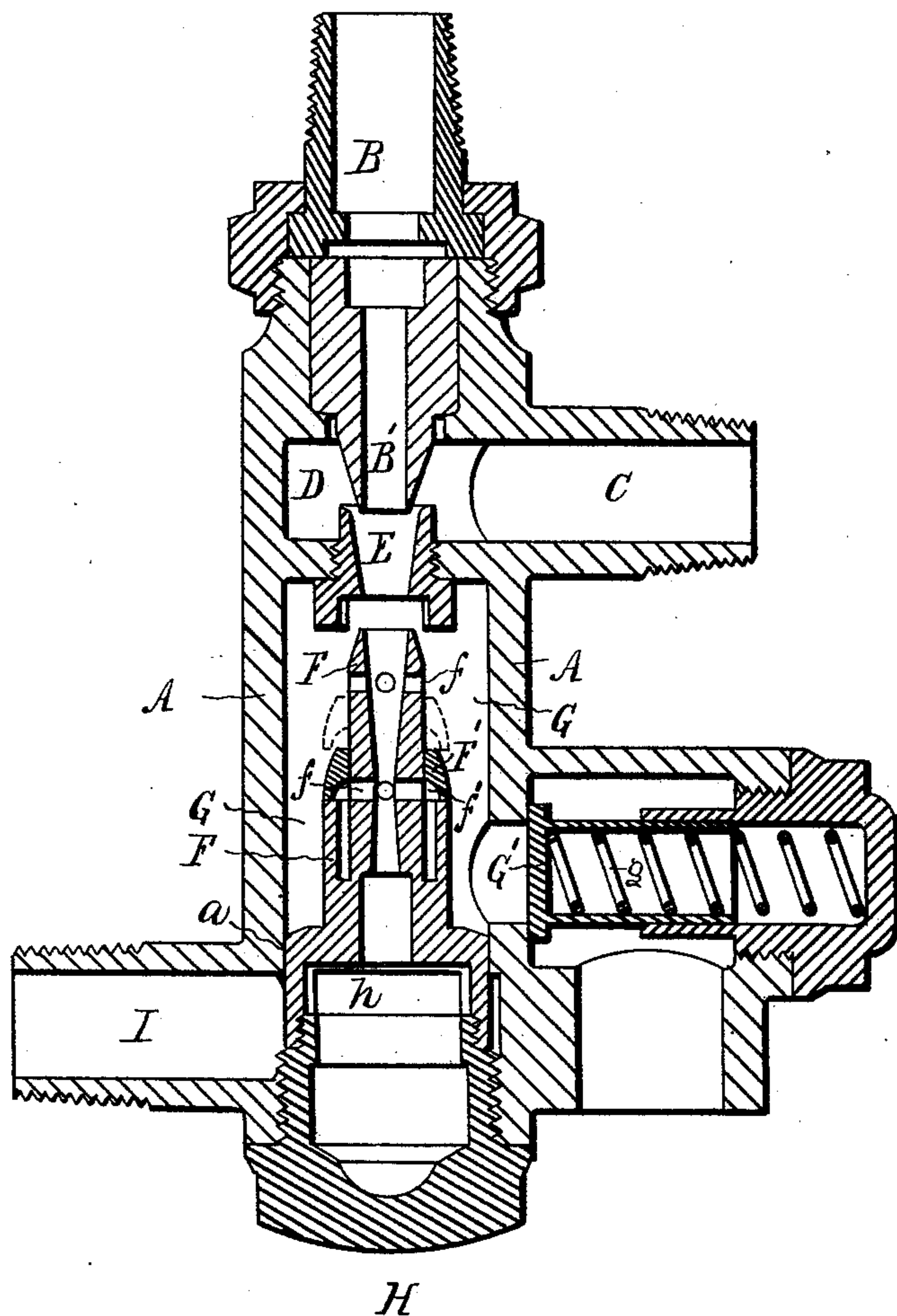


(Model.)

L. E. BOURQUIN.
INJECTOR.

No. 415,441.

Patented Nov. 19, 1889.



WITNESSES
W. H. Chamberlin.
L. A. Daelty.

INVENTOR
Louis E. Bourquin
By Thos W. Leggett & Co.
Attorneys.

UNITED STATES PATENT OFFICE.

LOUIS E. BOURQUIN, OF DETROIT, MICHIGAN, ASSIGNOR OF ONE-HALF TO
EDWARD GRACE, OF SAME PLACE.

INJECTOR.

SPECIFICATION forming part of Letters Patent No. 415,441, dated November 19, 1889.

Application filed May 27, 1889. Serial No. 312,260. (Model.)

To all whom it may concern:

Be it known that I, LOUIS E. BOURQUIN, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented certain new and useful Improvements in Injectors; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawing, which forms a part of this specification.

This invention has for its object to provide a new and improved injector which is simple and economical in construction and can be easily repaired and cleaned when occasion demands.

The object of my invention I accomplish by the features of construction and arrangement of devices hereinafter described and claimed, reference being made to the accompanying drawing, in which the figure is a longitudinal central sectional view of an injector embodying my invention.

In carrying out my invention, A represents the case; B, the steam-admission port; B', the steam-nozzle; C, the water-supply port; D, the lifting-chamber; E, the combining-tube; F, the force-tube; G, the overflow-chamber; G', the overflow-valve; H, the retaining-plug; *h*, its perforated shell; I, the delivery-port leading to the check-valve and boiler.

The force-tube F has lateral overflow-orifices *f*, and an annular valve F' is sleeved over the tube, so as to cover up and close said lateral orifices. This valve is hollowed out on the inside at *f'*. The case A is brought in against the side of the force-tube at *a*, so as to form a snug fit and prevent communication from the overflow-chamber down around the tube into the delivery-passage below. It serves also to hold the tube centrally within the shell. The lower end is screwed into or otherwise secured to the plug H, and when the plug is screwed home the force-tube is held firmly in place at its lower end only and is free to expand or contract lengthwise without binding or straining.

The overflow-valve G' is in the nature of a light cylinder with a closed end adjacent to

the seat. It moves horizontally, opens with the slightest pressure from within, and closes easily by atmospheric pressure assisted by the spring *g* as soon as the flow of water through the force-tube is established.

The operation of the apparatus is as follows: Steam through the steam-nozzle produces a vacuum in the lifting-chamber, which serves to lift the water into the said chamber. The initial steam passing through the combining-tube into the overflow-chamber condenses, and the steam and water find an outlet through the overflow-valve G'. As soon as the water has been lifted it is forced through the combining-tube into the entrance end of the force-tube. Its passage is here impeded, and considerable water overflows through the lateral orifices *f*. This flowing into the hollow cavity *f'* easily lifts the annular valve F' and flows freely into the overflow-chamber, and thence off through the overflow-valve opening. Soon, however, the flow through the force-tube is established, and as soon as established the tendency to form a vacuum in the overflow-chamber closes the overflow-valve, and at the same time the annular valve F', closed down by gravity, shuts the lateral orifices *f* in the force-tube, making it essentially an unbroken tube, thus greatly assisting the tube in maintaining the flow of water through it. The water finds free exit beneath, through the perforated shell *h*, into the delivery-port I, and thence through the usual check-valve into the boiler.

Should the force-tube need repairing, or should it become incrustated or foul, the plug H may be unscrewed and removed, and as the force-tube is engaged with it the latter will come out with the plug.

What I claim is—

1. An injector consisting of the case A, the steam-admission port B, the steam-nozzle B', the lifting-chamber D, the combining-tube E below the lifting-chamber, the force-tube F, secured in the lower end of and abutting the case, having lateral ports *f*, and located wholly beneath the combining-tube, with its central passage in line with but terminating below the passage through the com-

binning-tube, and the valve F', sleeved on the force-tube and having the internal hollowed portion f', substantially as described:

2. An injector consisting of the case A, the steam-admission port B, the steam-nozzle B', the lifting-chamber, the force-tube F, inserted through an opening in the lower end of the case, having lateral ports f, and terminating beneath the combining-tube, the valve F', sleeved on the force-tube and having the internal hollowed portion f', and the screw-plug H, screwed into the lower end of the case and having a threaded part engaging and holding the force-tube, substantially as described.

3. An injector comprising a case A, having

the inward projection a, the force-tube F, seated on said projection, having lateral ports f, and provided with a rising and falling valve F', sleeved on said force-tube, and a screw-threaded plug H, screwed into the lower end of the case and provided with the perforated shell h, having a screw-threaded engagement with the lower end of the force-tube, substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses.

LOUIS E. BOURQUIN.

Witnesses:

WM. M. STEUART.

W. H. CHAMBERLIN.