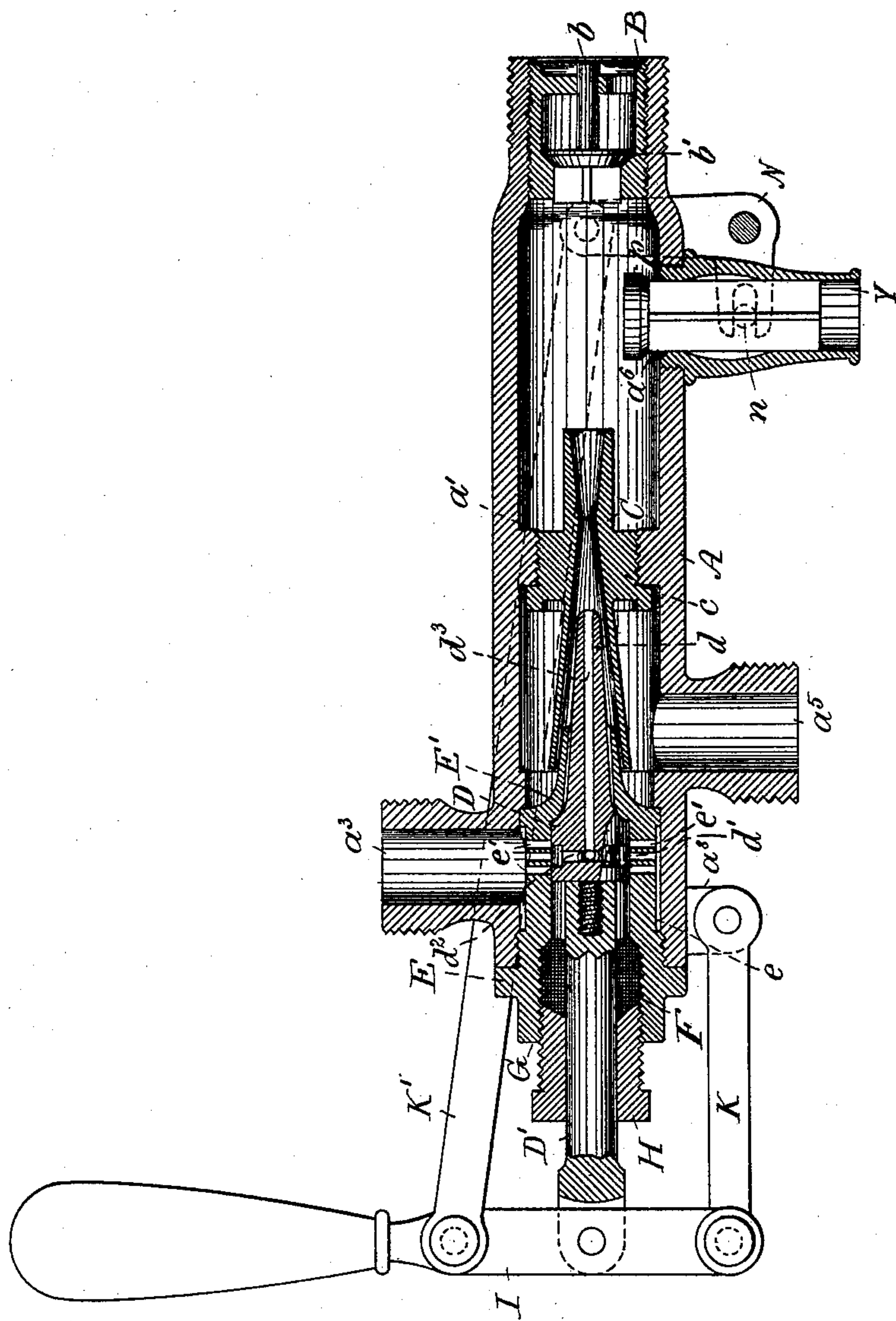


(Model.)

J. W. BINDER.  
INJECTOR FOR FEEDING STEAM BOILERS.

No. 452,175.

Patented May 12, 1891.



Witnesses:  
Hermann Bornmann  
Thomas M. Smith.

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Att'y.



# UNITED STATES PATENT OFFICE.

JOHN W. BINDER, OF PHILADELPHIA, PENNSYLVANIA.

## INJECTOR FOR FEEDING STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 452,175, dated May 12, 1891.

Application filed August 15, 1889. Serial No. 320,888. (Model.)

*To all whom it may concern:*

Be it known that I, JOHN WILLIAM BINDER, a citizen of the United States, residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Injectors for Feeding Steam-Boilers, of which the following is a specification.

The principal objects of my present invention are, first, to reduce the cost of the injector by simplifying the construction and reducing the parts thereof; second, to protect the working parts from abrasion by sand or other gritty matter contained in and necessarily transported by the steam, and, third, to lift and feed water at a higher temperature than has heretofore been possible to the boiler.

My invention for attaining the above-mentioned objects will be fully understood by reference to the accompanying drawing, forming part hereof, which shows, partly in longitudinal section and partly in elevation, an injector embodying my invention.

In the drawing, A is the casing of the injector, provided with a steam-inlet  $a^3$ , a water-inlet  $a^5$ , an overflow or outlet  $a^6$ , and a lug  $a^8$ , and these parts are preferably cast in one piece with a contracted end for the reception of a spider B and an internally-threaded annular rib  $a'$ . The spider B, provided with a guide for the stem  $b$  of the check-valve  $b'$ , is screwed or otherwise secured into the contracted end of the casing A. The branch overflow Y is screwed or otherwise secured into the overflow-outlet  $a^6$  and affords a seat for the check-valve  $p$ . The combining-tube C, having funnel-shaped or flaring tubular ends and provided with an externally-threaded flange  $c$ , is screwed into the internal rib  $a'$ . The thimble E is externally flanged at one extremity and drawn out at the opposite extremity thereof, so as to form an inverted funnel-shaped or contracted tubular projection E', hereinafter called the "forcing jet-tube." This thimble E is screwed into or otherwise rigidly attached to the rear or steam-inlet end of the casing A and serves to close the same. An external annular groove  $e$  is provided around the thimble E, and a row of radial perforations or holes  $e'$  extends through said thimble and communicates with

the interior thereof and with the annular groove  $e$ . The rear end of the thimble E is bored or reamed out and tapped or internally threaded for the reception of the gasket F and bushing H, which form the stuffing-box G. The opposite interior end of the thimble E is faced or otherwise constructed so as to form a seat for the stem D.

$d$  is an extension of the stem D, having an aperture or passage  $d^3$  formed therein, and hereinafter called the "lifting jet-tube." The stem D is provided with radial apertures  $d^2$ , communicating with the passage  $d^3$  and with an annular groove  $d'$ . This groove  $d'$  communicates with the annular groove  $e$  by means of the radial perforations  $e'$ . A spindle D', connected with or made part of the stem D, extends rearwardly through the stuffing-box G. The link K, at one end pivotally connected with the lug  $a^8$ , forms at its opposite end the fulcrum of the hand-lever I, to which is pivoted the spindle D'. The link K' is pivotally connected at one end to the hand-lever I and at the opposite end to one of the arms of the bell-crank lever N. The other arm of said bell-crank lever N is slotted or bifurcated and partially encircles the pin  $n$  of the check-valve  $p$  for actuating the same.

It may be remarked that by the above construction of an injector expensive joints in the casing thereof are entirely avoided, and the several internal parts are mounted and secured therein by simply reaming and tapping the same; and, moreover, as the internal parts of the injector may be introduced into or withdrawn from the rear or steam-inlet end thereof, it is obvious that it is not necessary to detach either the steam or water inlet pipes or the pipe leading to the boiler in order to remove said parts for cleansing or other purposes.

The mode of operation of my improved injector is as follows: The steam-passage through the forcing jet-tube E' is closed by means of the stem D, and the overflow  $a^6$  is opened by moving the hand-lever I forward, when steam may be admitted through the steam-inlet  $a^3$  by opening a valve (Not shown.) The entering steam, passing around the groove  $e$ , enters through the holes  $e'$ , groove  $d'$ , and holes  $d^2$ , and is discharged in a jet-like stream through



the passage  $d^3$  of the lifting jet-tube  $d$  into the combining-tube C. A partial vacuum is formed in and around the rear or steam-inlet end of the combining-tube C, and the water, 5 rising, fills said space and flows through the combining-tube C, only to be discharged either through the overflow  $a^6$  or the spider B into the boiler. When a sufficiently continuous stream of water flows through the apparatus, the overflow check-valve  $p$  is gradually 10 closed and held firmly against its seat, and the steam-passage between the lifting jet-tube  $d$  and the forcing jet-tube  $E'$  is at the same time gradually opened by shifting the stem D 15 away from the forward interior surface of the thimble. The said movements of the valves are accomplished by drawing the hand-lever I backward. A portion of the entering steam now passing around the stem D and lifting 20 jet-tube  $d$  escapes in a jet-like stream through the forcing jet-tube  $E'$  into the combining-tube C and forces the contents thereof forward, the combined action of the two steam-jets being to raise the feed-water into the apparatus and force it forward through the in-

jector and to actuate the check-valve  $b'$  sufficiently to deliver the water to the boiler.

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is— 30

The combination, in an injector for steam-boilers, of a radially-perforated thimble secured into the steam-inlet end of the casing and having the rear extremity reamed out to receive a stuffing-box, a forcing jet-tube 35 formed integral with said thimble, a radially-perforated stem, and a lifting jet-tube formed integral therewith, the said thimble provided with a valve-seat for the adjustable stem, a spindle attached to said stem for actuating 40 the same with relation to its seat, and a fulcrumed lever attached to said spindle, substantially as and for the purposes described.

In witness whereof I have hereunto set my signature in the presence of two subscribing 45 witnesses.

J. W. BINDER.

Witnesses:

GEO. W. REED,

A. B. STOUGHTON.