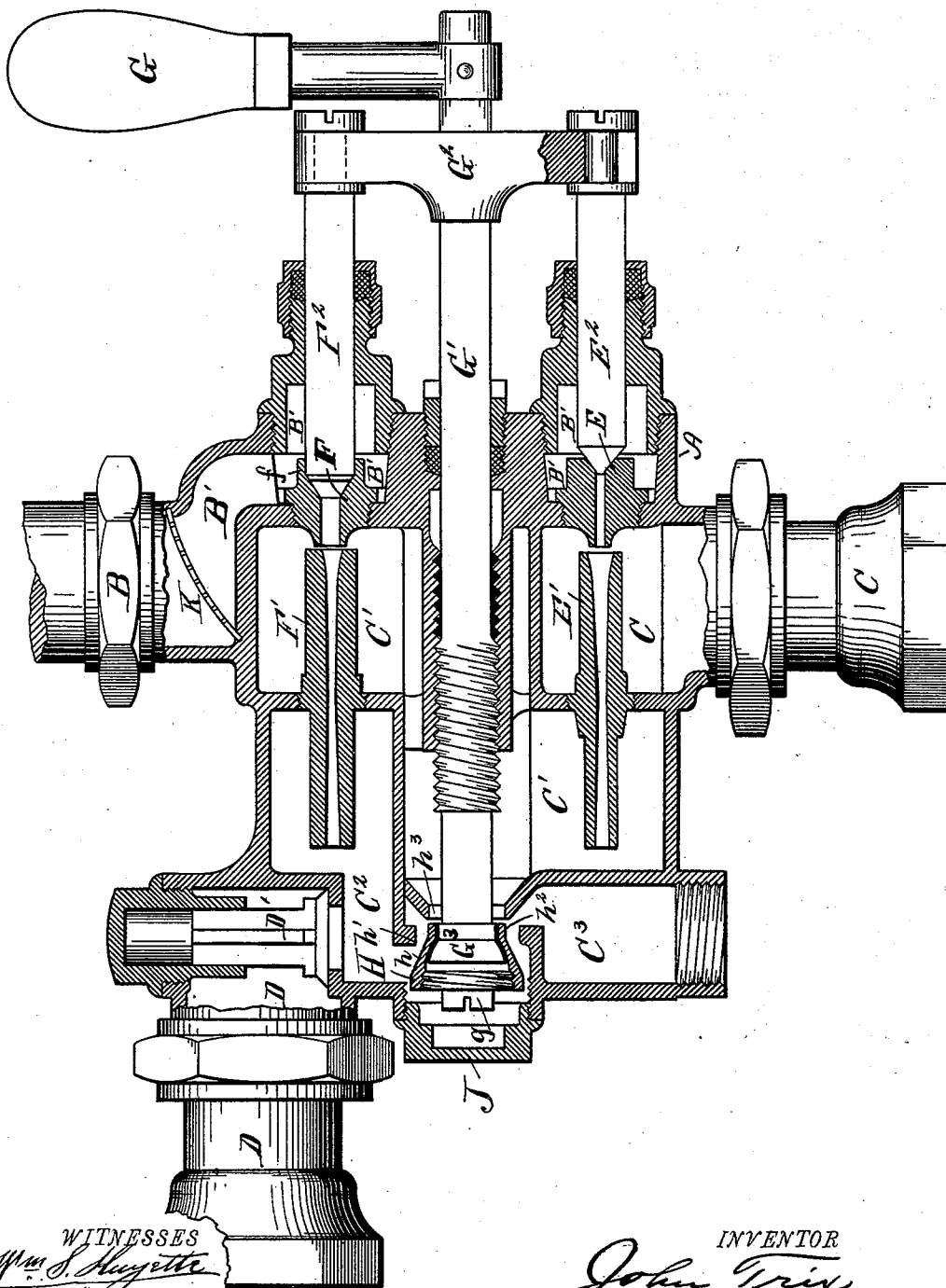


(Model.)

J. TRIX.  
INJECTOR.

No. 450,202.

Patented Apr. 14, 1891.



WITNESSES  
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# UNITED STATES PATENT OFFICE.

JOHN TRIX, OF DETROIT, MICHIGAN, ASSIGNOR TO THE AMERICAN INJECTOR COMPANY, OF SAME PLACE.

## INJECTOR.

SPECIFICATION forming part of Letters Patent No. 450,202, dated April 14, 1891.

Application filed February 4, 1891. Serial No. 380,131. (Model.)

*To all whom it may concern:*

Be it known that I, JOHN TRIX, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented  
5 a certain new and useful Improvement 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,  
10 reference being had to the accompanying drawing, which forms a part of this specification.

The drawing shows a longitudinal central section of an injector embodying my invention, showing the same as it is closed before  
15 starting.

It is the purpose of my invention to produce a device in the nature of an improvement upon the injector patented to H. B. Murdock, No. 440,183, dated November 11, 1890; and my invention consists in improved means for governing the overflow and to concentrate  
20 into a single readily-removable valve the two valves which were employed therein for controlling the overflow; also, in other special features of construction, as will be hereinafter specified, and more particularly pointed out in the claims.

In carrying out my invention, A represents  
30 the case or shell.

B is the steam-inlet; C, the water-inlet.

B' represents a connecting steam-passage, whereby steam is led from the steam-inlet to the steam-jets E and F at the entrance ends  
35 of the lift-tube and force-tube.

C' is a communicating water-passage joining the discharge end of the lifting-tube with the entrance end of the force-tube.

C<sup>2</sup> is a water-passage leading to the overflow-passage C<sup>3</sup>.

D is the exit to the boiler.

D' is a check-valve in the passage to the boiler.

E' is the lifting-tube.

F' is the force-tube.

G is a handle connected with a screw-threaded stem G'. A yoke G<sup>2</sup> is swiveled on this stem and serves to actuate the piston-valve F<sup>2</sup> and the seat-valve E<sup>2</sup>.

50 H is a valve provided with a conical portion h, adapted to seat at h', and h<sup>2</sup> is a cy-

lindrical or piston portion adapted to enter the cylindrical orifice h<sup>3</sup> and close the said passage.

G<sup>3</sup> is a head on the end of the stem G', which  
55 serves to swivel the valve H upon the end of the stem, and g is a wrench-headed plug which fills the outer end of the valve, whereby the valve may be ground upon its seat.

J is a screw cap or plug at the end of the  
60 case for gaining ready access to this valve.

K is a perforated screen or strainer in the steam-inlet passage. It is inclined in the said passage, the purpose being to secure thereby  
65 a larger perforated surface and so compensate for any obstruction that might otherwise be afforded, due to the material of the strainer itself. It is manifest that if a sufficient incline be given to this strainer the area of its openings may be made to equal the entire  
70 cross-sectional area of the steam-passage.

The operation of this injector will now be understood. We will presume the parts to be in their closed-off position, as shown. It is now desired to start the injector. The operator turns the handle G in a direction to  
75 unscrew the stem G'. The piston-valve F<sup>2</sup> slides in the socket f without opening the passage into the steam-jet F; but the seated valve E<sup>2</sup> immediately moves off from its seat, opening  
80 the passage into the steam-jet E. Steam passing therethrough lifts the water through C and drives the same forward through the lifting-tube E' into the water-passage C'. Here  
85 it overflows through the passage h<sup>3</sup> and out through the overflow-orifice C<sup>3</sup>. A little farther turn of the handle opens the valve E<sup>2</sup> still wider and brings the cylindrical sleeve h<sup>2</sup> of the valve H into the cylindrical opening  
90 h<sup>3</sup>, thus closing the overflow through this passage and compelling the water to pass upward through C' into the force-tube F', and passing through this force-tube it escapes through the passage C<sup>2</sup> and around the inclined seat h, through the passage h', and  
95 down and out from the overflow-passage C<sup>3</sup>. Now a little farther turn of the handle will open slightly the steam-valve F<sup>2</sup>, permitting steam to enter through its jet F, and so accelerates the water through the force-tube F'.  
100 The passage h<sup>3</sup> will still be closed, while the passage through the valve-seat h' will yet re-

main partly open sufficiently to permit the necessary overflow through  $C^3$ . Now, the water having been fairly accelerated through the force-tube  $F'$ , the handle  $G$  is farther turned, so as to fully open the valve  $F^2$ . This operates at the same time to close the valve  $H$  upon the seat  $h'$ , which cuts off communication with the overflow-passage  $C^3$ . The pressure of water, overcoming the boiler-pressure, lifts the check-valve  $D'$  and passes on to the boiler. The flow through the injector is thus fully established. The strainer  $K$  is shown only in the steam-passage. It is apparent, however, that it may be also located in the water-inlet passage, if desired. This construction produces an injector of great utility and simplifies very materially the construction of the mechanism controlling the overflow-passages, while at the same time these passages and the valve governing the same are readily accessible by simply removing the plug or cap  $J$ .

It will be observed that the overflow-valve is so constructed that the piston-valve  $h^2$  will set into and practically close the orifice  $h^3$ ; but in order to make a perfectly tight fit the final turn of the valve-stem causes the edge of the orifice  $h^3$  to seat upon the inclined face  $h$ , and this seat can be ground to a fit should leakage occur.

What I claim is—

1. The combination, with a lift-tube and a force-tube with independent water-passages at their discharge ends, of two discharge-orifices, one leading from each of said passages to the overflow, and two valves located on the same valve-stem, one for each of said openings and adapted to close the opening corresponding with the lift-tube in advance of that opening corresponding with the force-tube, substantially as and for the purposes described.

2. In an injector, the combination, with a lifting-tube and a force-tube, each having independent water-passages at their discharge ends, of two valve-openings, one leading from each of said passages to the overflow, and two valves located upon the same valve-stem, one being a piston-valve and one a seating-valve, the former adapted to close the opening from the lift-tube water-passage and the latter adapted to subsequently close the opening from the force-tube water-passage, substantially as described.

3. In an injector, the combination, with a lifting-tube and a force-tube, each having an independent water-passage at its discharge end communicating with the overflow, of two overflow-openings, one from each of said passages, and two valves located upon a single valve-stem, one being a piston-valve adapted to close the opening from the lifting-tube water-passage and the other being a seating-valve adapted to subsequently close the opening from the force-tube water-passage, said valves swiveled on the end of the valve-stem, whereby they may be readily conformed to their seats, substantially as and for the purposes described.

4. In an injector, the combination, with the water-passages leading from the lifting-tube and the force-tube, their respective openings into the overflow-passage, and the piston and seating valves, as described, swiveled upon a common stem, of means whereby the swiveled valves may be engaged with a tool for grinding them upon the seats and a removable plug or cap for exposing the end of the said valves, substantially as and for the purposes described.

5. In an injector, the combination, with the seating-valve  $E^2$  and piston-valve  $F^2$ , of the lifting-tube  $E'$  and force-tube  $F'$ , the water-passages  $C'$   $C^2$ , and the valve-openings  $h'$   $h^3$ , leading to the overflow, and in connection therewith the seating-valve  $h$  and piston-valve  $h^2$ , adapted to close the opening  $h^3$  in advance of the opening  $h'$ , all said valves engaged with and actuated by the same screw-stem  $G'$ , substantially as and for the purposes described.

6. The combination, with an injector, of a lifting-tube, a force-tube, the water-passages  $C'$   $C^2$ , an over-flow-passage  $C^3$ , and the valve-openings  $h'$   $h^3$ , and in connection therewith a piston-valve and a conical valve upon the same stem, the piston-valve adapted to close one of said orifices, and the conical valve adapted to subsequently come to a seat in both said orifices, substantially as and for the purposes described.

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

JOHN TRIX.

Witnesses:

M. A. REEVE,  
WELLS W. LEGGETT.