W. H. NEWELL.

INJECTOR.

No. 191,773. Patented June 12, 1877.

Fig.1.

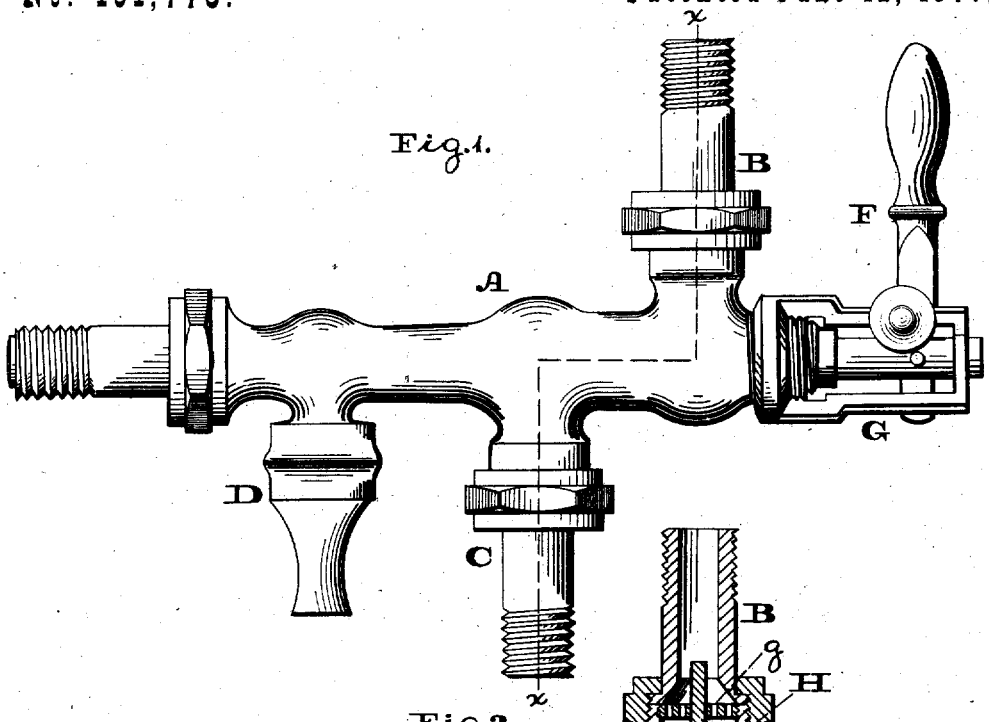
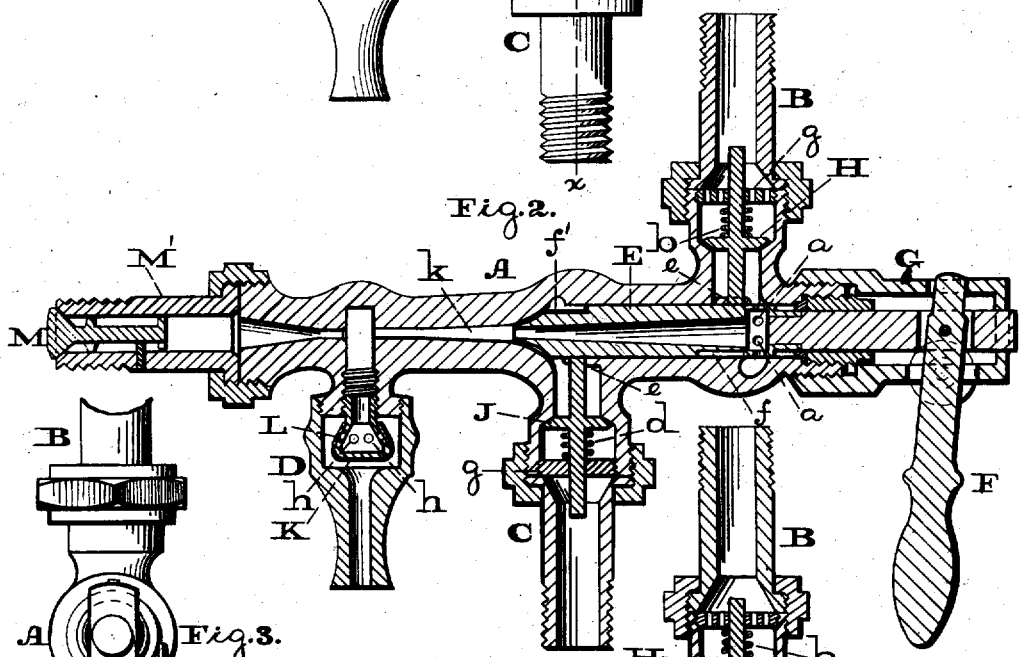


Fig.2.



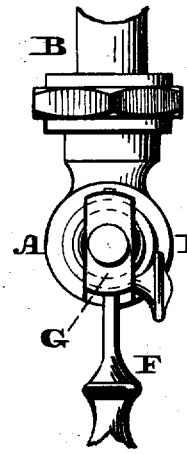


Fig.3.

Fig.4.

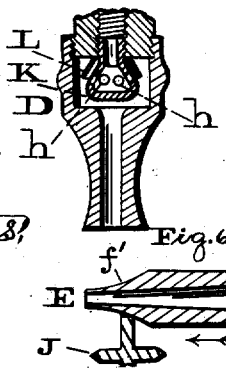


Fig.5.

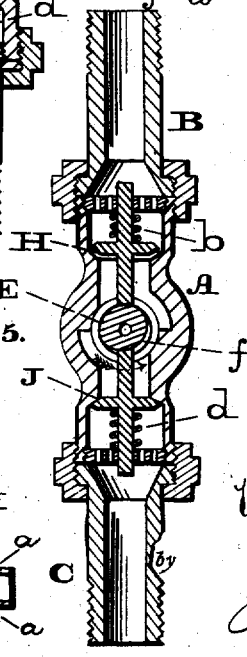
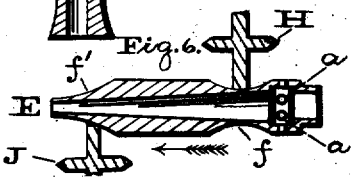


Fig.6.



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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN INJECTORS.

Specification forming part of Letters Patent No. **191,773**, dated June 12, 1877; application filed November 3, 1876.

To all whom it may concern:

Be it known that I, WILLIAM H. NEWELL, of the city and county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Injectors; and I do hereby declare the following to be a clear and exact description of the nature thereof, sufficient to enable others skilled in the art to which my invention appertains to fully understand, make, and use the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a side elevation of the injector embodying my invention. Fig. 2 is a central longitudinal vertical section thereof. Fig. 3 is an end view thereof. Fig. 4 is a central section of the overflow. Fig. 5 is a transverse section in line *x x*, Fig. 1. Fig. 6 is a longitudinal section of a modification of the movable steam-spindle.

Similar letters of reference indicate corresponding parts in the several figures.

My invention consists of a spindle, which is adapted to open the steam and water valves for allowing water of condensation to pass from the boiler, and then admitting steam and water, whereby the water may be injected into the boiler. It also consists of the overflow valve, formed of a plug, whose head is perforated and encircled by a sleeve, which automatically covers and uncovers the perforations of the head, so as to permit the escape of the overflow water, and when the injector is working to close the valve and prevent the indraft of air. It also consists of strainers in the steam and water pipes for preventing the admission of obstacles to the injector, and also serving as guides for the stems of the valves.

Referring to the drawings, A represents a shell or tubular structure, with the bore of which communicate the steam-connection B, water-connection C, and overflow-chamber D. Within the bore of the shell there is fitted a hollow spindle, E, one end of which projects outside of the shell, and has connected to it a lever, F, which is pivoted to a yoke, G, for imparting sliding motions to the spindle, and said yoke is fitted to the shell A, so as to be capable of rotation, whereby rotary motions may be imparted to the lever F and the spindle E, when so desired. A series of openings, *a*, are formed in the spindle E, and they occupy a position at the mouth of the steam-connection B, whereby, by means of said openings and the bore of the spindle, the steam-connection B communicates with the bore of the shell.

In the steam-connection B there is fitted a valve, H, whose closing motion is effected by a spring, *b*, properly arranged on its stem, and in the connection C there is fitted a valve, J, whose closing motion is effected by a spring, *d*, properly arranged on its stem, the seats of said valves being shoulders or projections on the inner faces of the respective connections.

In order to properly guide the valves in their motions lateral projections *e* are made in the shell A, and they extend partly across the mouths of the steam and water connections, the stems passing through said projections, and coming in contact with the spindle E. Portions of the spindle are cut away at the places of contact with the spindles, so as to leave at said places cam-faces *f f'*, whereby by rotation or forcing in of the spindle motion may be communicated to the valves H, J, one of said faces, being shown in cross-section, Fig. 5, and both faces in the longitudinal section, Figs. 2 and 6. The spindles of the valves are also passed through perforated disks *g*, which are secured within the respective connections B C, and they guide the valve-stems, and also act as strainers to prevent the passage of sticks, leaves, &c., to the injector, and consequently to the boiler.

In the overflow-chamber D there is secured a plug, K, which is of tubular form, and has a conical head, in which is a number of openings, *h*. Surrounding the head is a conical-shaped sleeve, L, which, when in its normal position covers the perforations of the head of the plug, the diameter of the head and sleeve being smaller than that of the overflow-chamber D, the plug closing the chamber, so that access from or to the bore of the shell will be had only through the bore of the plug K and the perforations *h*. M represents the check-valve, which is located in the detachable branch or connection M', leading to the boiler, and it may be of any desired construction.

The end of the spindle E, opposite to the perforations *a*, is of conical shape or pointed, and the adjacent surrounding portion of the bore of the shell is of larger diameter than that of the conical end, so as to leave a space between said end and the shell, with which space the water-connection B communicates, the portion *k* of the bore of the shell, between the conical end of the spindle and the overflow-chamber, constituting the combining-tube of the injector.

The operation is as follows: The parts being in position shown in Fig. 1 the spindle E will be partly rotated or moved in by means of the lever F, so that the cam-face *f* will open the valve H of the steam-connection B. The water of condensation from the boiler will then flow through the openings *a* and the bore of the spindle to the overflow-chamber, and thus pass out. Then return the spindle to its first position, thus closing the valve H, and rotate the lever in the opposite direction, or again move it in, whereby the cam-faces *f f'* will open the two valves H J at the proper moment. Water and steam will now enter the combining-tube of the shell, and reach the overflow-chamber, from whence they pass to the plug K, and, entering the openings *h*, they lift the sleeve L, thus uncovering the openings *h*, whereby the water and steam will pass out. When, however, the combined pressure of steam and water is sufficient to open the check-valve M, the latter will be opened, and the water, passing the overflow-chamber without entering the same, is injected into the boiler, the feeding being thereby occasioned. When the injector is in operation the sleeve L closes on the perforated head of the plug K, and thus prevents an indraft of air to the injector, and consequently to the boiler.

By withdrawing the spindle, or by a rotation of the same so that the deepest portion of the cam-faces of the spindle will come in contact with the stems of the valve, said valves, owing to the springs *b d*, will close on their seats, and the steam and water will be shut off.

By means of the lever F sliding motions may be imparted to the spindle E, and the conical end of the latter adjusted to the mouth of the combining-tube relatively to the pressure of the steam, flow of water, or other existing circumstances.

By placing the check-valve at the outside end of the branch or connection M' leading to the boiler, or removing it as far as possible from the injector, the valve will immediately close when the injector is working, and the injector may be displaced without removing the check-valve, as the latter remains with the branch or connection attached to the boiler.

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

1. In an injector a steam-spindle, with valve-operating cam-faces, substantially as and for the purpose set forth.

2. The rotary yoke G, with lever F, in combination with the spindle E, and valves H J, substantially as and for the purpose set forth.

3. The overflow-chamber D with the plug K and its encircling sleeve L, substantially as and for the purpose set forth.

4. The connections, provided with strainers *g*, in combination with the stems of the valves H J passed through said strainers, substantially as and for the purpose set forth.

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