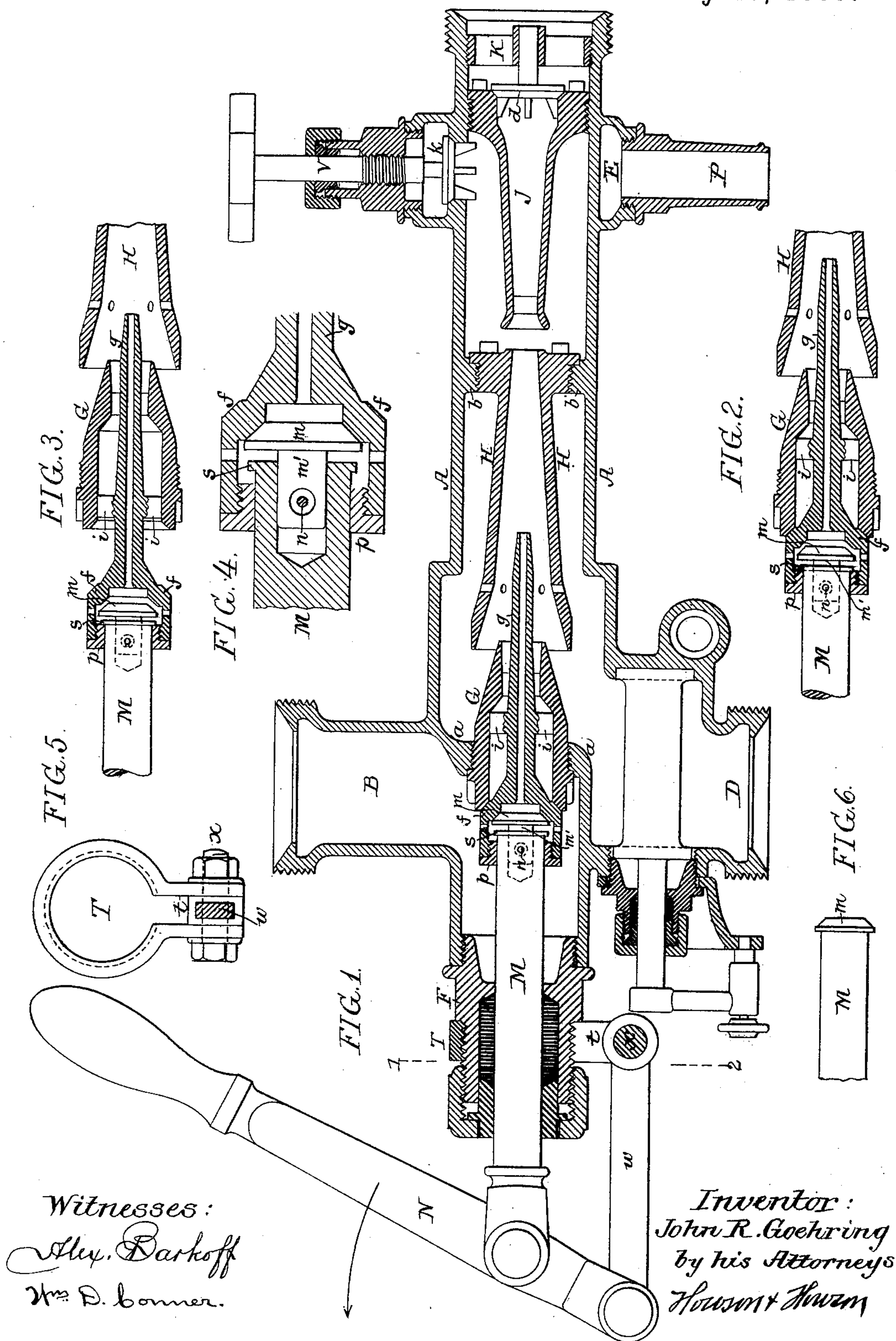


(Model.)

J. R. GOEHRING.
INJECTOR.

No. 407,197.

Patented July 16, 1889.



Witnesses:
Alex. Parkoff
Wm. D. Bonner.

Inventor:
John R. Goehring
by his Attorneys
Housman & Housman

UNITED STATES PATENT OFFICE.

JOHN R. GOEHRING, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO
HENRY BELFIELD AND T. BROWN BELFIELD, OF SAME PLACE.

INJECTOR.

SPECIFICATION forming part of Letters Patent No. 407,197, dated July 16, 1889.

Application filed December 3, 1888. Serial No. 292,492. (Model.)

To all whom it may concern:

Be it known that I, JOHN R. GOEHRING, a citizen of the United States, and a resident of Philadelphia, Pennsylvania, have invented certain Improvements in Injectors, of which the following is a specification.

The objects of my invention are to simplify and cheapen the construction of the injector, to provide for the successive operation of the lifting and forcing jets by the movement of one handle, and to permit the ready adjustment of said handle to the most convenient position. These objects I attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal section of an injector constructed in accordance with my invention, the valves being in such position that steam is cut off from both the lifting and forcing jets. Fig. 2 is a detached view of the valve mechanism, showing the parts in position for admitting steam to the lifting-jet. Fig. 3 is a similar view showing the valves in position for admitting steam to both the forcing and lifting jets. Fig. 4 is an enlarged sectional plan view of the valves. Fig. 5 is a transverse section on the line 1 2, Fig. 1.

A is the casing of the injector, with steam-inlet branch B, water-inlet branch D, and annular overflow-chamber E, the whole being cast in one piece and having an internally-threaded end for the reception of the cap F. A partition *a* separates the steam and water chambers, and has an internally-threaded opening for the reception of the forcing-jet tube G, the combining-tube H, having a flanged end threaded for adaptation to an internally-threaded annular rib *b* in the casing, and the delivery-tube J, likewise having a threaded flange for adaptation to an internal thread in the casing, while beyond the delivery-tube the casing is again threaded for the reception of a spider K, having a guide for the stem of the check-valve *d*, which closes the end of the delivery-tube. By this means expensive joints in the casing of the injector are entirely dispensed with, and said casing is adapted for the reception of the various internal parts of the injector by the comparatively cheap and simple oper-

ations of boring and threading the casing at the points where these internal parts are to be fitted thereto, the combining-tube, delivery-tube, and spider being introduced from the forward or delivery end of the casing and the forcing-jet tube from the rear end.

The rear or steam-receiving end of the forcing-jet tube G forms a seat for a valve *f*, which is tubular and has a forwardly-projecting tube *g*, hereinafter termed the "lifting-jet tube," this tube being suitably guided by wings *i*, adapted to the bore of the forcing-jet tube G.

The enlarged tubular rear end of the valve *f* has an internal seat for the reception of a valve *m*, which is secured to or forms part of a stem *m'*, the latter being adapted to an opening in the end of the operating-spindle M, and having a slight longitudinal play on said spindle, this play being in the present instance restricted by a transverse pin *n*, carried by the spindle and adapted to an opening of somewhat greater diameter in the stem of the valve, as shown more clearly in Fig. 4.

The spindle M passes through a stuffing-box on the cap F of the injector and has at its inner end a flange *s*, which by contact with a cap *p*, closing the open rear end of the tubular valve *f*, causes rearward movement of said valve.

In the valve *f*, around the chamber in which the valve *m* works, are openings, so that steam always has free access to the chamber behind the valve *m*, the pressure of steam always tending to keep the valves *f* and *m* to their seats, except when they are positively withdrawn by the action of the spindle M. It will therefore be seen that when the handle N, to which the spindle M is connected, is first drawn back in the direction of its arrow, Fig. 1, the effect will be to open the valve *m* and permit steam to enter the lifting-jet tube *g*, as shown in Fig. 2, the fine jet of steam from said tube escaping into the combining-tube and forming therein and in the water-chamber of the supply-pipe of the injector a partial vacuum, so that the water will rise in said supply-pipe and fill the water and overflow chambers of the injector, the water escaping from the usual overflow-nozzle P, com-

municating with said overflow-chamber. A further movement of the operating-handle N in the direction of the arrow causes the opening of the valve *f*, as shown in Fig. 3, and steam will then be admitted also to the forcing-jet tube G, from the front end of which it will escape into the combining-tube around the casing of the lifting-jet tube *g*. This additional volume of steam thus admitted to the combining-tube imparts such impulse to the water therein as to overcome the back-pressure in the boiler, open the check-valve *d*, and force the stream of mingled water and steam through the delivery-tube and into the boiler.

It will be observed on reference to Fig. 1 that that portion of the lifting-jet tube *g* which is contained in the delivery end or nozzle of the forcing-jet tube G is tapered, being gradually reduced in thickness from rear to front, so that as the valve *f* and its lifting-jet tube are retracted the area of the annular space for the escape of steam from the nozzle of the forcing-jet tube will be gradually increased to accord with the increased flow of steam into said forcing-jet tube as the valve *f* is opened wider and wider.

In order that the operating-handle N of the injector may be adjusted to the most convenient position for manipulation irrespective of the position at which the casing of the injector is supported, the hanger-link *w* for said handle is pivoted at its forward end between the projecting wings *t* of a split clamp T, which embraces the cap F of the injector, and is tightened thereon by the same bolt *x* which serves to pivot the hanger-link of the handle to the wings of the clamp, so that the latter, before being tightened, can be adjusted to any circumferential position on the cap which the desired location of the operating-handle may suggest.

The casing of the annular overflow-chamber of the injector is preferably extended at the top, so as to provide a bearing for a screw-stem V, which may be caused to bear upon the check-valve *k*, which governs the communication between the interior of the injector and the annular overflow-chamber, so that by closing this valve to its seat and holding it there the passage of water into the an-

nular overflow-chamber may be prevented and the steam from the lifting-jet tube thus caused to pass from the water-chamber of the injector down through the supply-pipe and into the tank for heating purposes.

By permitting the valve *m* to have a slight longitudinal play in respect to the spindle M, as shown and described, the full pressure of the steam is exerted upon said valve to keep it closed to its seat, without risk of any restraining influence being exerted upon the valve by the spindle M, this feature being of importance, as it is desirable in injectors of the class described to prevent leakage into the lifting-jet tube when the injector is not in service.

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

1. The combination of the forcing-jet tube of the injector, the operating stem or spindle, the valve closing the rear end of the forcing-jet tube and having a projecting lifting-jet tube, and a valve closing said lifting-jet tube, both valves having a slight longitudinal play in respect to the operating stem or spindle, substantially as specified.

2. The combination of the forcing-jet tube, the valve closing the same, and having a projecting lifting-jet tube, and a chamber closed at the rear by a detachable cap, the operating stem or spindle having a flange contained in the chamber of the valve and free to move longitudinally therein to a slight extent, and a supplementary valve closing the lifting-jet tube of the main valve, and also free to move longitudinally to a slight extent independently of the operating spindle, substantially as specified.

3. The combination of the injector-cap, a split clamp embracing the same, the handle-hanger, and a bolt serving to tighten the clamp and also as a pivot for the handle-hanger, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN R. GOEHRING.

Witnesses:

WILLIAM D. CONNER,
HARRY SMITH.

It is hereby certified that the name of the last-mentioned assignee in Letters Patent No. 407,197, granted July 16, 1889, upon the application of John R. Goehring, of Philadelphia, Pennsylvania, for an improvement in "Injectors," was erroneously written and printed "T. Brown Belfield;" that said name should have been written and printed *T. Broom Belfield*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 23d day of July, A. D. 1889.

[SEAL.]

CYRUS BUSSEY,

Assistant Secretary of the Interior.

Countersigned:

C. E. MITCHELL,

Commissioner of Patents.