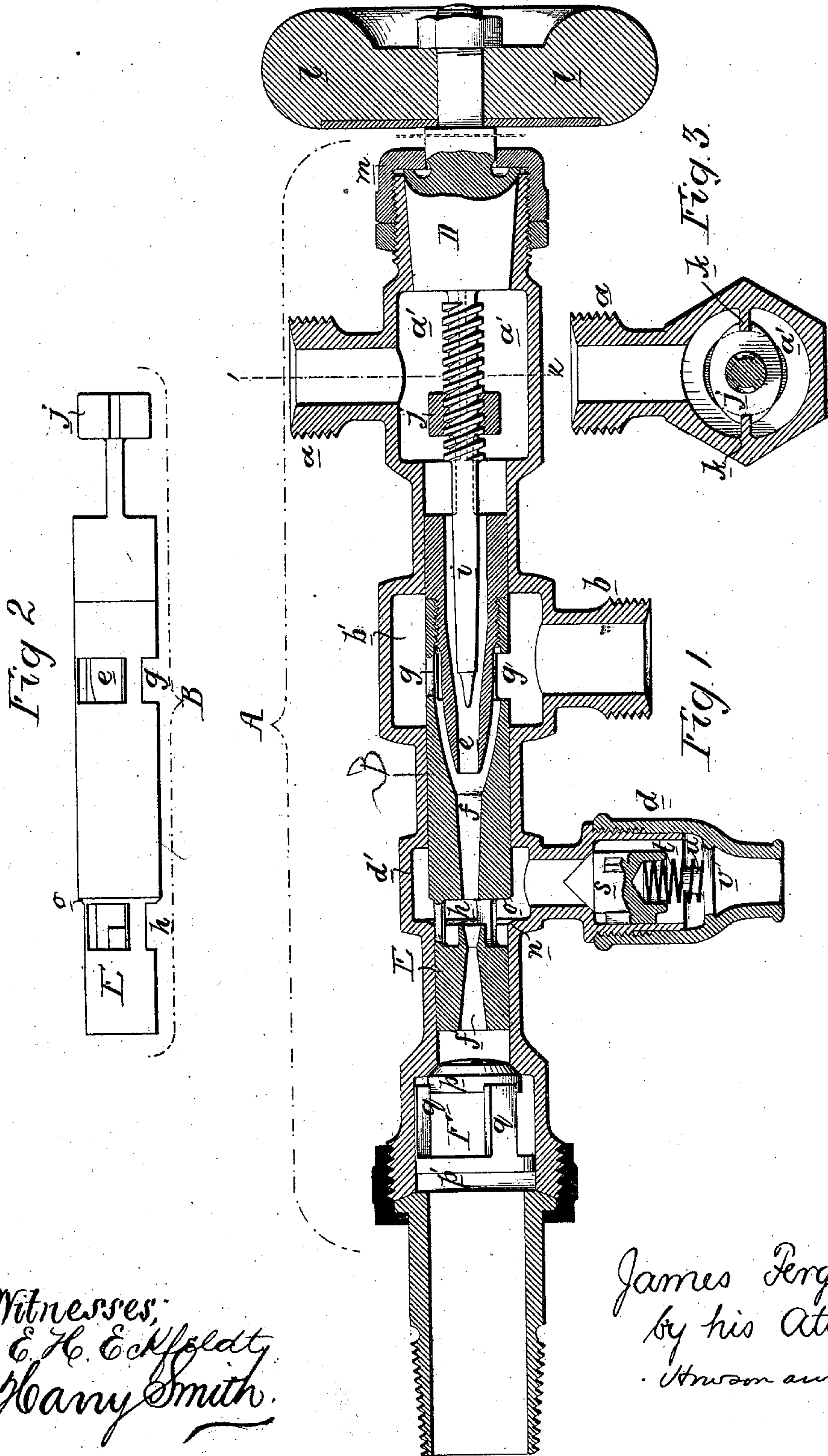


J. FERGUS.  
INJECTORS.

No. 174,509.

Patented March 7, 1876.



Witnesses:  
E. H. Eckfeldt  
Harry Smith.

James Fergus,  
by his Attorneys  
H. W. & W. W.



# UNITED STATES PATENT OFFICE.

JAMES FERGUS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF HIS RIGHT TO JAMES A. BROWN; AND SAID FERGUS AND BROWN ASSIGNORS OF PART OF THEIR RIGHT TO GEORGE H. COLKET, OF SAME PLACE.

## IMPROVEMENT IN INJECTORS.

Specification forming part of Letters Patent No. 174,509, dated March 7, 1876; application filed July 2, 1875.

*To all whom it may concern:*

Be it known that I, JAMES FERGUS, of Philadelphia, Pennsylvania, have invented certain Improvements in Injectors, of which the following is a specification:

The main object of my invention is to so construct an injector that the operating parts can be readily removed from the body, for purpose of cleansing, repairs, &c.; and this object I attain in the manner which I will now proceed to describe, reference being had to the accompanying drawing, in which—

Figure 1 is a vertical section of my improved injector; Fig. 2, an exterior view of part of the injector detached from the exterior casing; and Fig. 3, a transverse section on the line 1 2, Fig. 1.

The body A of the injector is provided with the usual steam-branch *a*, water-branch *b*, and overflow-branch *d*, the said body A being enlarged in diameter where each of these branches communicate with it, so as to form a steam-chamber, *a'*, water-chamber, *b'*, and overflow-chamber, *d'*. Throughout the entire length the body A has a central opening, into which is fitted the detachable tube B, and in the latter are formed the steam-nozzle *e* and the usual passages *f* and *f'*, openings *g* and *h* serving to establish communication between the interior of the tube B and the water-branch *b* and overflow-branch *d*.

The admission of steam to the nozzle *e* is regulated by the position of the said nozzle in respect to the valve-spindle *i*, which projects from a tapering plug, D, adapted to a tapering seat in the end of the body A.

The spindle *i* is threaded throughout a portion of its length, and to this threaded portion is adapted a nut, *j*, secured to the end of the tube B, the nut being slotted at its opposite sides, and adapted to ribs *k* formed on the opposite sides of the casing of the water-chamber *a'*, so that, by turning the said spindle *i* by means of its handle *l*, the tube B may be advanced or retracted and the steam-space enlarged or contracted at pleasure.

The plug D is confined to its seat by the nut *m*. The nozzle *e* and the opening *g* of the

tube B are so arranged in respect to each other that when the former is closed by the valve-spindle *i*, the latter will be closed, or nearly closed, by the rear edge of the water-chamber *b'*, so that the admission of both steam and water will be gradually increased as the tube B is moved forward, until both passages are fully open.

The outer end of the tube B is reduced in diameter at E, as shown more clearly in Fig. 2, and this reduced portion E is adapted to a correspondingly reduced portion of the opening in the body A of the injector, on the edge of which portion is formed a valve-seat, *n*, adapted to a valve, *o*, formed on the body of the tube B around the edge of the opening *h*, so that when the tube is moved forward to its full extent, the valve will bear on its seat, and the opening *h* and overflow-branch will be closed.

The openings *g* and *h* are so arranged in respect to each other, however, that when the latter is closed the former will be open, or partly open, and steam can pass back around the nozzle *e*, through the openings *g* and through the branch *b* into the feed-tank, thus serving to heat the water in the same, this being of especial advantage in injectors for locomotive-boilers, as it prevents the freezing of the water in the feed-tank.

I provide the check-valve F in the discharge-passage of the injector with a disk or valve, *p*, and a ring, *p'*, the two being connected together by arms *q*, which guide the valve perfectly, while the disk *p* and ring *p'* offer a firm bearing for the valve at the ends, and effectually prevent its displacement, while, by dispensing with the usual guiding-bridge, the passage for the water is enlarged, and the back pressure of steam to close the valve has its full effect.

The valve *s* of the overflow-branch, instead of having a stem embraced by a spring, as usual, has a socket formed in its lower portion, in which fits the upper end of the operating-spring, *t*, the lower end of which embraces a pin, *u*, on a bridge, *v*, extending across the overflow-branch, so that, on the depression of the valve *s*, the spring *t* will be contained with-



in the socket of the same, and will be protected from the injurious effects of steam or hot water passing through the tube.

It will be evident that by employing a detachable tube in which are combined the steam-jet, water-passages, &c., the work upon these parts can be much more easily and accurately performed than if they formed part of the body itself, while the making of repairs or remedying of accidents can be effected with greater facility and at less cost than attends the repairing of ordinary injectors.

A prominent advantage resulting from the detachability of the tube B is this, that the body of the injector, when said tube is removed, can be used as a feed-pipe for filling the boiler, the area of the opening in the body being sufficient for this purpose, thus dispensing with the separate arrangement ordinarily used.

In some instances in which it is desirable that the tube B, though removable, shall not reciprocate, said stem may be secured in proper position within the body, by means of a set-screw or other fastening, and a movable valve-spindle may be employed.

I claim as my invention—

1. The combination, with the body of an injector, of a removable tube, B, adapted to a longitudinal opening in said body, and provided with a steam-nozzle, and inlet and outlet openings, the whole being combined with

a fixed or movable valve-stem, as herein set forth.

2. The combination of a body, A, and its chambers *a'*, *b'*, and *d'*, and the fixed valve-spindle *i*, with the movable tube B, its nozzle *e*, passages *f* *f'*, and openings *g* and *h*, and with devices for operating the said tube.

3. The combination of the tapering plug D, and its projecting valve-stem *i*, partly threaded, as described, with the tube B and its nut *j*, the recessed edges of which are adapted to ribs *k* on the body of the injector, as described.

4. The combination of the water-chamber *b'* and overflow-chamber *d'* of the injector with the openings *g* and *h* in the tube B, said openings being arranged in respect to each other as and for the purpose herein set forth.

5. The combination of the valve *o*, opening *h*, and contracted portion E of the tube B with the contracted portion of the body A and its valve-seat *n*, and with the overflow-branch, all substantially as and for the purpose herein set forth.

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

JAMES FERGUS.

Witnesses:

E. H. ECKFELDT,  
HARRY SMITH.