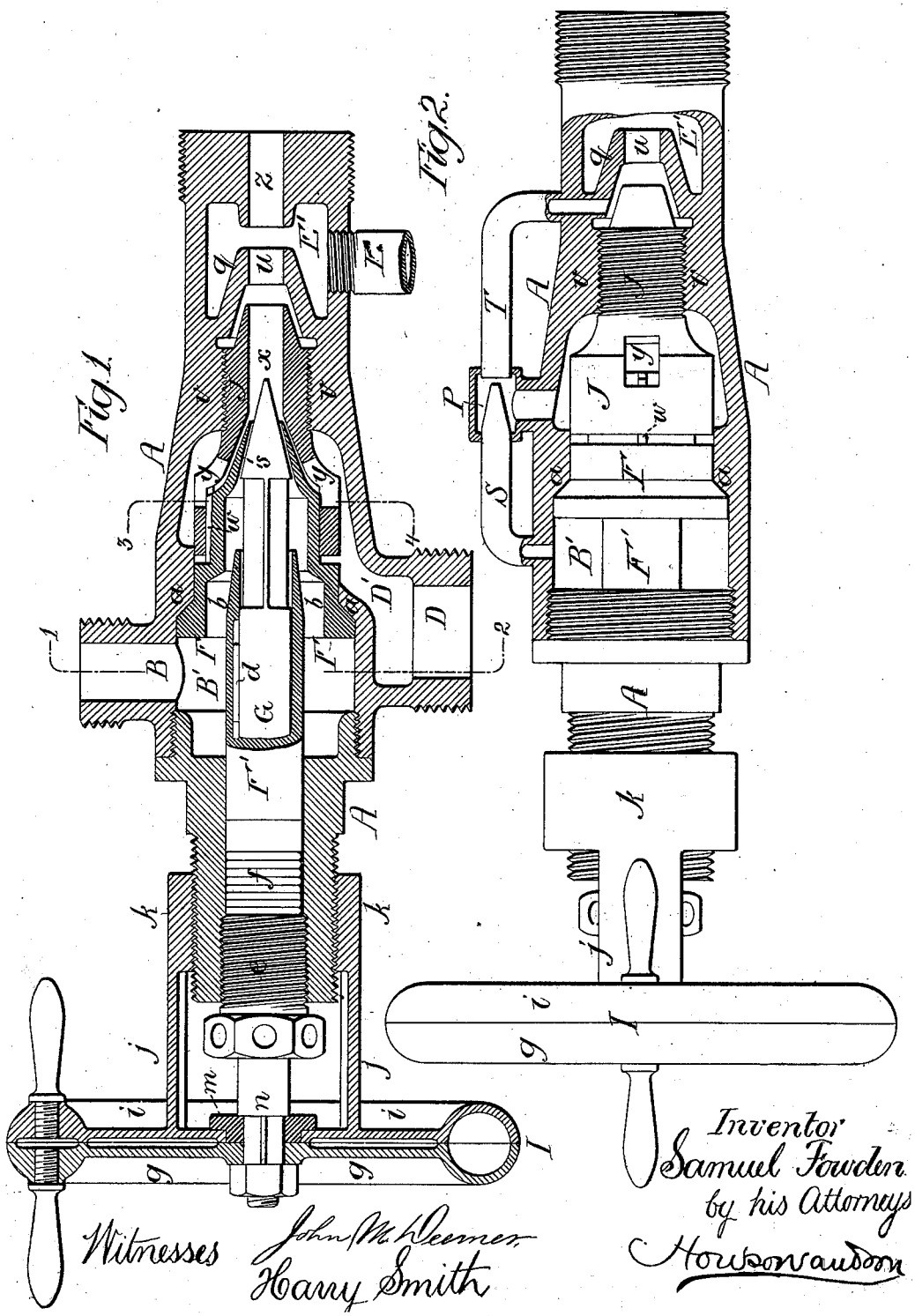
2 Sheets—Sheet 1.

S. Fowden.
Injector.

No. 199,530. **Patented Jan. 22, 1878.**



Witnesses
John McNeemes
Harry Smith

Inventor
Samuel Fowden
by his Attorneys
Howson & Sons

2 Sheets—Sheet 2.

S. Fowden.
Injector.

No. 199,530. Patented Jan. 22, 1878.

Fig. 4.

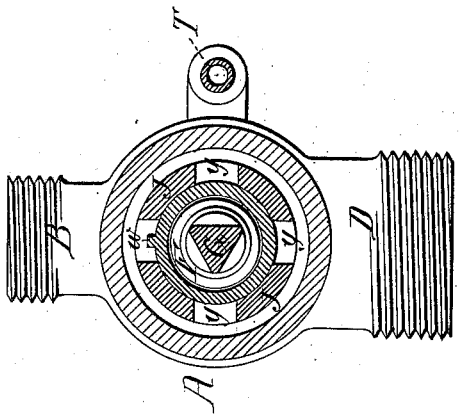
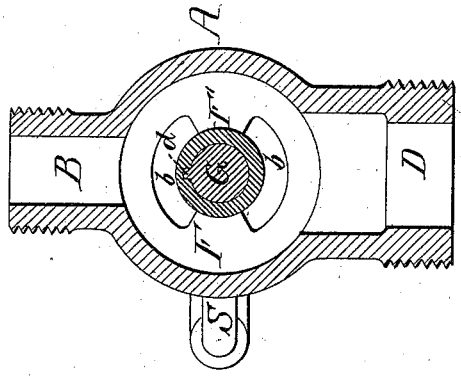


Fig. 3.



Witnesses
John M. Clemmer
Harry Smith

Inventor
Samuel Fowden
by his Attorneys
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UNITED STATES PATENT OFFICE.

SAMUEL FOWDEN, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN INJECTORS.

Specification forming part of Letters Patent No. **199,530**, dated January 22, 1878; application filed November 26, 1877.

To all whom it may concern:

Be it known that I, SAMUEL FOWDEN, of Philadelphia, Pennsylvania, have invented a new and useful Improvement in Injectors, of which the following is a specification:

The main object of my invention is to so construct an injector that the flow of water and steam can be regulated independently by the operation of a single stem—an object which I attain in the following manner, reference being had to the accompanying drawings, in which—

Figure 1, Sheet 1, is a longitudinal vertical section of the injector; Fig. 2, a sectional plan of the same; Fig. 3, Sheet 2, a transverse section on the line 1 2, Fig. 1; and Fig. 4, a transverse section on the line 3 4.

A is the casing of the injector, having the usual steam-inlet B, water-inlet D, and overflow-pipe E, communicating, respectively, with the steam, water, and overflow chambers B′, D′, and E′, formed in the said casing A. F is a hollow plug, adapted to a seat, *a*, formed in the casing, and this plug serves to prevent direct communication between the steam-chamber B′ and the water-chamber D′, communication between the interior of the plug and the steam-chamber, however, being permitted by openings *b*. (See Fig. 3.) The plug F has a rearward extension, F′, adapted to the tubular rear end of the casing A, and having a central opening for the reception of a stem, G, which can slide in, but cannot turn independently of, the plug, owing to a key, *d*, carried by the stem and adapted to a slot cut in the said plug. The rear end of the casing A is provided with a follower, *e*, which compresses a series of packing-rings, *f*, against the rear end of the extension F′ of the plug F, and thus serves the twofold purpose of preventing leakage around the stem G, and of maintaining the plug F in contact with the seat *a*. To the extreme rear end of the stem G is adapted a wheel, I, halved transversely, so as to form an outer section, *g*, and an inner section, *i*, each capable of turning independently of the other.

The outer section *g* of the wheel is secured to the stem G, and serves to turn the same when necessary; but the inner section *i* turns loosely on a sleeve or collar, *m*, adapted to the stem G, and bearing against a shoulder, *n*, formed on the same. The inner section *i* of the wheel I is connected by arms *j* with a nut, *k*, adapted to a thread formed on the rear end of the casing A.

It will thus be seen that by turning the outer section *g* of the wheel I the stem G, and consequently the plug F, will also be caused to turn, while by turning the inner section *i* of said wheel the stem G will be caused to slide in the plug F without turning.

The front end of the stem G is tapered, and adapted to the interior of the tapering nozzle *s*, formed at the front end of the plug F, so that by moving the said stem backward or forward the annular space between the tapered end of the same and the nozzle *s* may be increased or diminished, and the flow of steam thus regulated.

J is a tube, threaded externally, and adapted to the internally-threaded portion *v* of the casing A, whereby said tube is caused to move backward and forward as it is rotated.

The rotation of the tube J in such a manner as not to interfere with the free backward or forward movement of the same is effected by a key, *w*, on the plug F, (see Fig. 4,) this key being adapted to a slot cut in the rear portion of the tube J, which is enlarged in diameter, as shown in Fig. 1.

The central opening *x* of the tube J communicates with the water-space D′ through orifices *y*, and that portion of said opening *x* adjacent to the orifices *y* is so shaped that, in connection with the exterior of the nozzle *s*, it forms a valve, whereby the forward or backward movement of the tube J is caused to regulate the flow of water in the same manner as the stem G regulates the flow of steam.

Surrounding the tapering front end of the tube J is an annular casing, *q*, conforming in shape to the end of said tube J, and attached to or forming part of the casing A, so that its opening *u* always occupies a fixed position longitudinally in respect to the discharge-opening *z* of the injector. This casing, in combination with the tube J, forms the combining-tube of the injector, the advantage of this mode of construction being that the drawing back of the tube J to regulate the flow of water does not affect the relation of the front or discharge end of the combining-tube in re-

spect to the discharge-opening *z*, thus enabling me to overcome that objectionable spreading of the jet in its passage from the mouth of the combining-tube to the discharge-opening which, in other injectors, is caused by the increased distance between these two points when the combining-tube is retracted.

In order to provide for raising a volume of water sufficient to fill the injector prior to the starting of the same, I form on the casing A a projection inclosing a chamber, P, which communicates with the water-chamber D′ and with two tubes, S and T, the opposite ends of which communicate, respectively, with the steam-chamber B′ and the front end of the combining-tube.

The end of the tube S projects within the chamber P, and is contracted so as to form a nozzle, from which steam admitted to the tube issues in the form of a jet, thus causing a partial vacuum to be formed in the chambers D′ and P, and inducing water to rise into and fill the same, the jet also forcing water through the tube T into the overflow-chamber and combining-tube.

It will be seen from the foregoing description that as the longitudinal movement of the tube J is dependent upon the rotation of the plug F, the flow of water may be controlled by turning the outer half of the wheel I, so as to turn the stem G and plug F, while the flow of steam can be regulated by turning the inner half of the wheel I, so as to cause the sliding of the said stem G.

I claim as my invention—

1. The combination of the casing A, having a threaded portion, *v*, with the plug F, the combining-tube J, and the key *w*, substantially as described.

2. The combination of the plug F, adapted to a seat in the casing, and having an extension, F′, with the stem G, follower *e*, and packing-rings *f*, the latter bearing against the rear end of said extension F′, all as specified.

3. The combination of the stem G with the halved handle I, constructed and arranged substantially as described, so as to either rotate the said stem or move the same longitudinally.

4. The combination of the chamber P, communicating with the water-space of the injector, the jet-pipe S, communicating with the steam-space, and the pipe T, communicating with the combining-tube, all as set forth.

5. The combination of the movable tube J with the fixed annular casing *q*, having an opening, *u*, which forms a continuation of the opening *x* of the tube J, all as and for the purpose set forth.

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

SAMUEL FOWDEN.

Witnesses:
RICHARD L. GARDINER,
HARRY SMITH.