(Model.)

A. SIMPSON & M. SPEICHER.

INJECTOR.

No. 490,590. Patented Jan. 24, 1893.

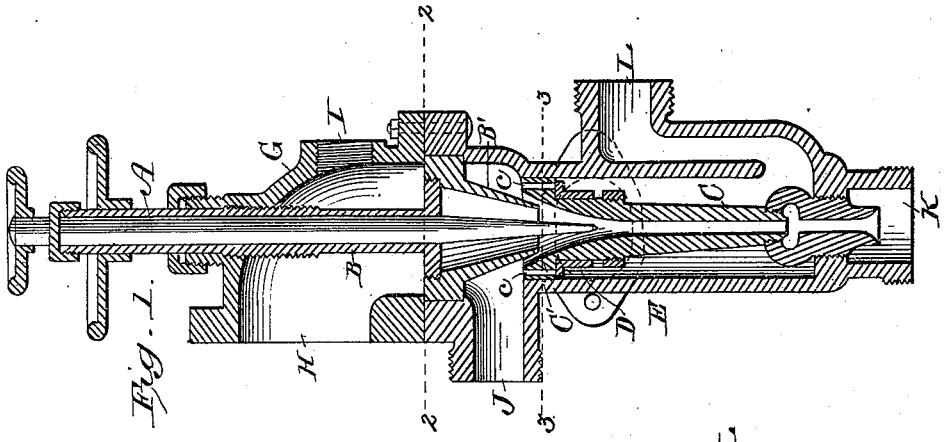

Fig. 1.

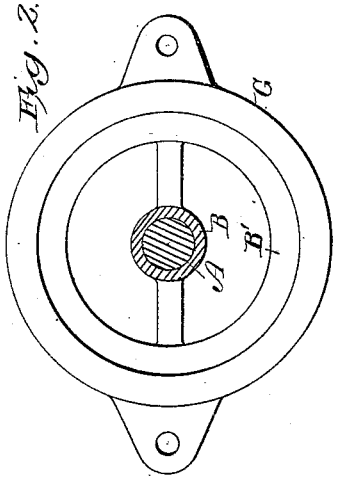

Fig. 2.

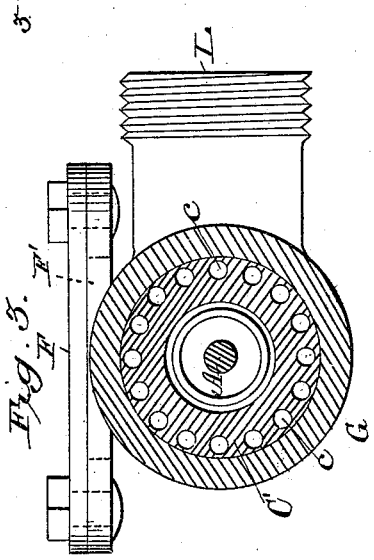

Fig. 3.

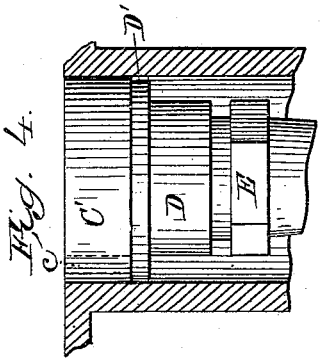

Fig. 4.

Witnesses
A. J. Schwartz
John Cullen

Inventors:
Alexander Simpson
and
Mathias Speicher.
by J. Frank Reily
their Attorney.

UNITED STATES PATENT OFFICE.

ALEXANDER SIMPSON, OF SCRANTON, AND MATHIAS SPEICHER, OF ARCHBALD, PENNSYLVANIA.

INJECTOR.

SPECIFICATION forming part of Letters Patent No. 490,590, dated January 24, 1893.

Application filed July 19, 1892. Serial No. 440,524. (Model.)

To all whom it may concern:

Be it known that we, ALEXANDER SIMPSON, residing at Scranton, and MATHIAS SPEICHER, residing at Archbald, county of Lackawanna, State of Pennsylvania, citizens of the United States, have invented certain new and useful Improvements in Injectors; and we do 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 appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

Our invention consists in a combined exhaust- and live-steam injector; which comprises, among other novel and valuable features, an adjustable automatic overflow valve: and the invention will be hereinafter fully described and claimed.

Referring to the accompanying drawings; Figure 1 is a central longitudinal sectional view of our injector; Fig. 2 is a transverse sectional view, taken on line 2—2, Fig. 1; Fig. 3 is a transverse sectional view taken on line 3—3, Fig. 1; Fig. 4 illustrates in detail the automatic, adjustable, overflow valve.

The same letters of reference indicate corresponding parts in all the figures.

Referring to the several parts by their letters of reference; the shell or outer casing of our injector is formed at its upper end with the flanged exhaust-steam opening H; and on the opposite side of the upper end of the casing G is formed the threaded live-steam opening I; the opening H being suitably connected to receive the exhaust-steam through a conducting-pipe, having a cock, and the opening I being connected to receive the live steam through a conducting-pipe having an ordinary cock; so that by this construction and arrangement the injector can be worked either by exhaust- or live- steam, as may be desired.

B indicates the steam jet or tube, through which extends the threaded adjustable steam or dividing spindle, A; the pointed end of which extends down through the conical lower end, B′, of the steam-tube B into the conical upper end of the suction and combining jet or tube C. The suction and combining tube C extends down from a point in line with the bottom of the water supply opening, J, of the shell down to the lower end of the shell, where the delivery opening, K, to the boiler is formed. Through the upper flanged end, C′, of the tube are formed the annular series of openings *c*, extending around the upper flanged end of the tube as shown, and communicating with the annular space surrounding the tube C below its upper end. The overflow opening, L, is arranged as shown.

Upon the upper part of the tube C, just beneath its flanged end, the exterior of the tube is formed cylindrical, instead of tapering like the remainder of the tube, and on this cylindrical portion *d* an annular valve, D, is mounted having the flanged operative upper end, D′, of such size that when the valve rises it will close the series of openings *c* in the upper end of tube C, as will be readily seen. The lower part of the cylindrical portion *d* is formed with an exterior screw-thread, and an adjusting nut, E, is mounted thereon. An opening, F, is formed in the side of the shell G opposite this nut to give access thereto for adjusting it up or down to regulate the play of the valve, this opening being normally closed by a cap-piece, F′, bolted in position as shown. It will now be seen that by this construction the valve D will close automatically to prevent the backflow of steam, the injector working perfectly under a variation of from twenty pounds up and also that it will work evenly and regularly even with sixty pounds pressure at the engine against one hundred pounds pressure at the boiler. The degree of movement of the automatic valve D is easily adjusted by turning the adjusting-nut E up or down on the threaded end of the part *d;* access to the nut being obtained through the opening F, as previously described; and the valve acts automatically and instantly to prevent the overflow of water.

This injector can be used on locomotives as well as on stationary engines.

Having thus described our invention, what we claim and desire to secure by Letters Patent is:

1. The herein-described injector, comprising the shell formed with the openings for both exhaust and live steam, the water-sup-

ply opening, the delivery opening, and the overflow, the steam jet or tube, the dividing spindle, the suction and combining tube having the annular series of openings formed in its flanged upper end, and the automatic valve arranged to automatically close the said series of openings, substantially as and for the purpose set forth.

2. The herein-described injector, comprising the shell formed with the openings for both exhaust and live steam, the water-supply opening, the delivery opening, the overflow, and the opening F having the removable cap-plate, the steam jet or tube, the dividing spindle, the suction and combining tube having the annular series of openings formed in its flanged upper end, and having the cylindrical part *d* threaded at its lower end, the automatic annular valve arranged as specified, and the adjusting-nut E working on the threaded lower end of the part *d;* substantially as and for the purpose set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

ALEXANDER SIMPSON.
MATHIAS SPEICHER.

Witnesses:
ELLIS R. SIMPSON,
A. STRANG.