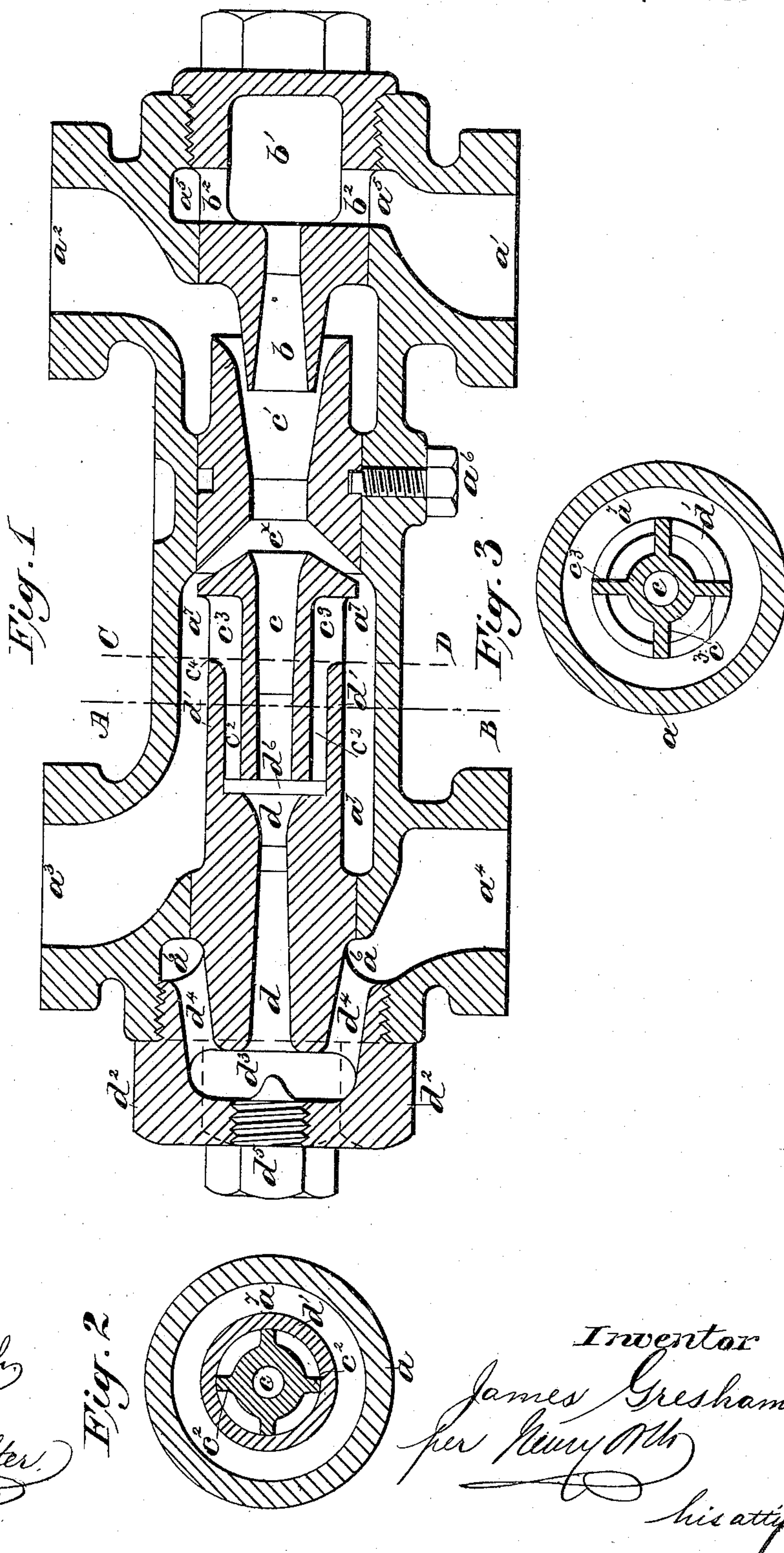


(Model.)

J. GRESHAM.
INJECTOR.

No. 331,193.

Patented Nov. 24, 1885.



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UNITED STATES PATENT OFFICE.

JAMES GRESHAM, OF STRETFORD, NEAR MANCHESTER, COUNTY OF LANCASTER, ENGLAND.

INJECTOR.

SPECIFICATION forming part of Letters Patent No. 331,193, dated November 24, 1885.

Application filed June 19, 1885. Serial No. 169,208. (Model.) Patented in Eng'land July 23, 1884, No. 10,475.

To all whom it may concern:

Be it known that I, JAMES GRESHAM, a citizen of Great Britain, residing at Stretford, near Manchester, in the county of Lancaster, England, have invented certain new and useful Improvements in Injectors, (for which I have made application for a patent for Great Britain, dated the 23d day of July, 1884, No. 10,475;) and I do hereby 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 letters or figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in what are termed "restarting-injectors," for which purpose injectors have been proposed in which the exterior of the discharging cone or tube is made as a piston, or is made to slide in the casing or in a bush therein. Such injectors are liable to get out of order, so as not to work, if the water used is dirty or should leave a deposit which would accumulate upon the parts and prevent the free movement of the discharging cone or tube or the piston upon its exterior in the casing, and where springs are used in this construction of injectors they are objectionable.

In my improved restarting-injector the discharging-cone is a fixture; no spring is required; the jet, when temporarily interrupted, restarts almost instantly and with very little waste of steam or liquid from the overflow, and it will operate effectively under great ranges in the pressure of the steam.

Figure 1 is a longitudinal section, and Fig. 2 is a cross-section at A B, Fig. 1, of my improved injector.

a is the casing, from which are junctions or branches for pipes for steam, a' , water, a'' , overflow, a''' , and discharge, a^4 . The steam-cone b is formed in a hollow screw-plug, b' , having ports b^2 , to admit steam from the junction a' to the annular space a^5 round the screw-plug b' . The combining-cone c , or the large end of it, (sometimes called the "lifting-cone,") when arranged in two parts, is fitted into the casing a , and secured by the point of a set-screw, a^6 , on passing through the side of the casing.

The smaller part of the combining-cone c is made with exterior webs or ribs, c^2 c^3 , (seen best in Fig. 2,) which keep it central with the discharging-cone d , the webs or ribs c^2 c^3 fitting and sliding freely in a tubular extension, d' , from the part in which the discharging-cone d is formed, which part also forms a screw-plug, d^2 , to screw into the end of the casing a , as shown, in which screw-plug d^2 there is a chamber, d^3 , from which there are passages d^4 , connecting it with an annular space, a^6 , communicating with the discharge-branch a^4 . The webs or the ribs of the combining-cone are of different diameter, as shown at c^2 c^3 in Fig. 1, thus forming a shoulder, c^4 , on each rib, that abuts against the front face of the tubular portion d' of the discharging-cone d , to limit the movement of the combining-cone toward the axial passage of the said discharging-cone, for purposes hereinafter described. There is also a screw-plug, d^5 , at the end of the hollow screw-plug d^2 , to give access for examination or for removing obstructions.

At the larger end of the movable part of the combining-cone c is a convex cone, and at the smaller end of the combining-cone c' is a concave cone; but these cones are not of the same angle. The outer edges only come in contact and close the escape-space when the cone c moves toward the cone c' , when the jet is established and the injector is working; but the area for escape at the outer edges between the concave and convex cones, when in the position shown in Fig. 1, is as great as, if not greater than, the area of the smallest part of the passage for fluid in the lifting-cone c' .

It will be seen that when the moving part c of the combining-cone is in the position shown in Fig. 1 the ends of the wide part of the ribs c^2 c^3 rest against the end of the tubular part d' from the part in which the discharging-cone d is formed, so that there is a space, d^6 , left for the ordinary overflow below the small end of the combining-cone c , and between it and the receiving end of the discharging-cone d , and the overflow can thus pass on the exterior of the combining-cone c , between the ribs upon it, and along the space between the exterior of the combining-cone c and the interior of the tubular part d' . Both overflows pass into the annular space a^7 , and then out

at the overflow-branch a^3 . If desired, a series of holes may be made round the tubular part d' through its sides and opposite the space d^6 , between the combining-cone c and discharging-cone d .

When the steam is turned on, it passes through the cone b , draws the water, and can freely escape both at the space c^x and the ordinary overflow-space, d^6 , and the moment the jet is established the cone c moves toward the fixed cone c' and closes the space c^x .

Having now described my invention, what I claim as new is—

1. In an injector for steam-engines, the combination, with a steam-cone, a discharging-cone, and a lifting-cone having a convex or hollow conical seat formed at its discharge end, of a combining-cone arranged to slide between the discharging and lifting cones, and having a concave or conical bearing formed at its inlet end, substantially as and for the purpose specified.

2. In an injector for steam-engines, the combination, with a steam-cone, a discharging-cone, and a lifting-cone, the latter having a convex or hollow conical seat formed at its discharge end, of a combining-cone arranged to slide between the said cones and having a concave or conical bearing formed at its inlet end, the angles of said seat and bearing of the steam and combining cones differing from each other, substantially as and for the purpose specified.

3. In an injector for steam-engines, the combination, with a steam-cone, a lifting-cone, and a discharging-cone, the latter having a tubular extension, of a combining-cone fitted in said extension to form an overflow-space between the two, and adapted to slide toward and from the lifting-cone, and the inlet-orifice of the discharging-cone, and a stop to limit the movement of said combining-cone toward said inlet-orifice of the discharging-

cone, substantially as and for the purpose specified.

4. In an injector for steam-engines, the combination, substantially as hereinbefore described, with the steam-cone, the lifting-cone, and the discharging-cone having a tubular extension formed at one end, of a combining-cone fitted and sliding in said extension, and provided with ribs c^2 c^3 , of varying diameter, to form abutments to limit the movements of the lifting-cone in one direction within the discharging-cone, for the purpose specified.

5. In an injector, the combination, substantially as herein described, with a steam-cone, a lifting-cone, c' , having a hollow convex or conical seat, c^x , and a discharging-cone, d , provided with a tubular extension, d' , of the combining-cone c , fitted and sliding within said extension, and terminating in a concave or conical head or bearing, for the purpose specified.

6. The combination, substantially as herein described, with the casing of an injector for steam-engines, having branches a' a^2 a^3 a^4 , of the steam-cone b' , screwed in one end of said casing, the discharging-cone d , closed at one end and screwed in the opposite end of the casing, and having a tubular extension, d' , a lifting-cone, c' , detachably connected with the casing and having a concave or hollow conical seat, and the combining-cone c , provided with ribs c^2 c^3 , and terminating in a convex or conical head or bearing, said cone c being fitted and arranged to slide in the tubular extension of the discharging-cone, for the purpose specified.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES GRESHAM.

Witnesses:

ALFRED L. SACRÉ,
W. JAMES HIGGS.