No. 759,320. PATENTED MAY 10, 1904.

L. SCHUTTE.

JET NOZZLE.

APPLICATION FILED DEC. 26, 1901.

NO MODEL. 2 SHEETS—SHEET 1.

FIG. 1.

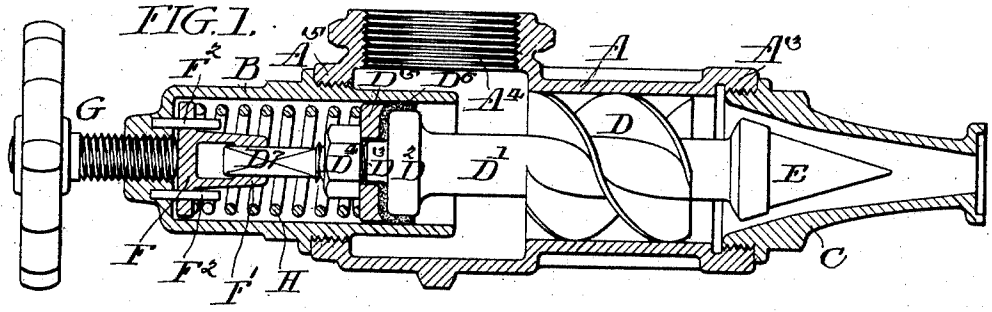


FIG. 2.

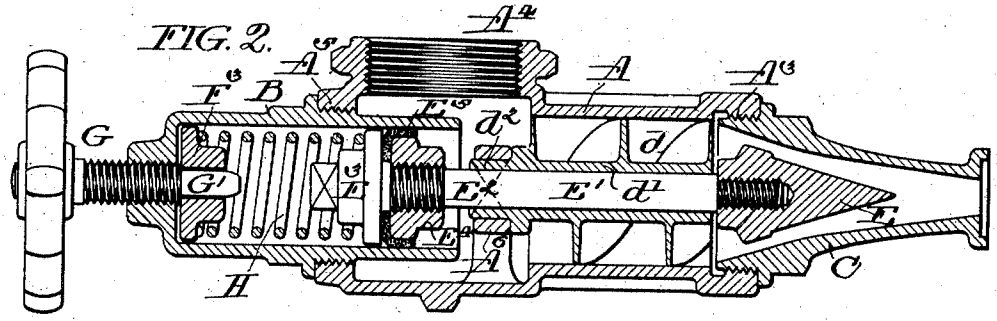


FIG. 3.

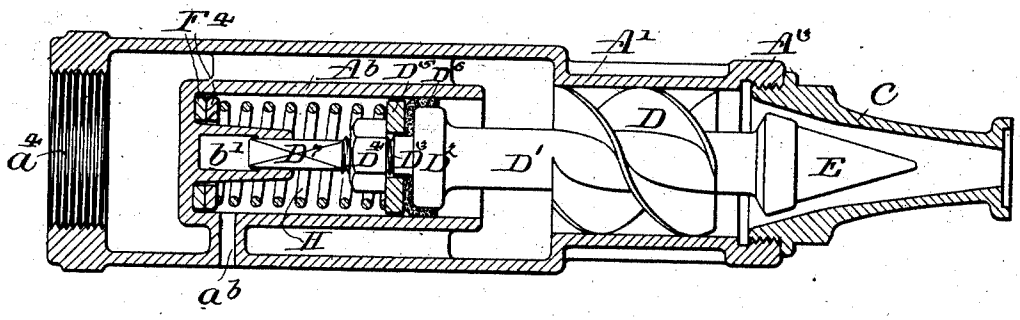
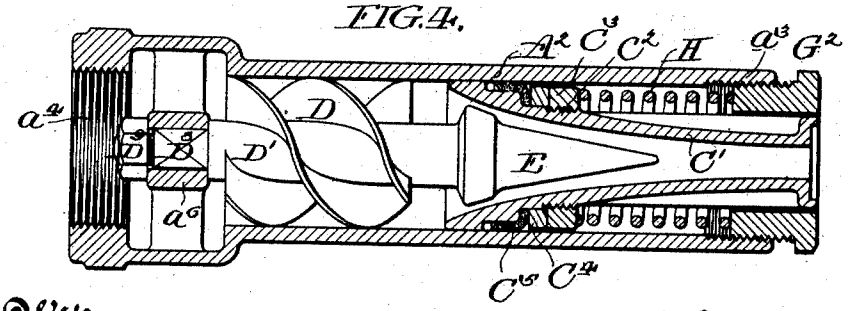


FIG. 4.



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NO MODEL. 2 SHEETS—SHEET 2.

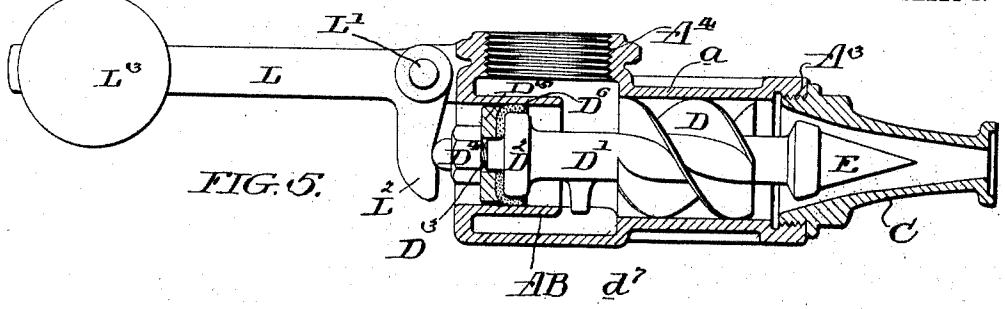

FIG. 5.

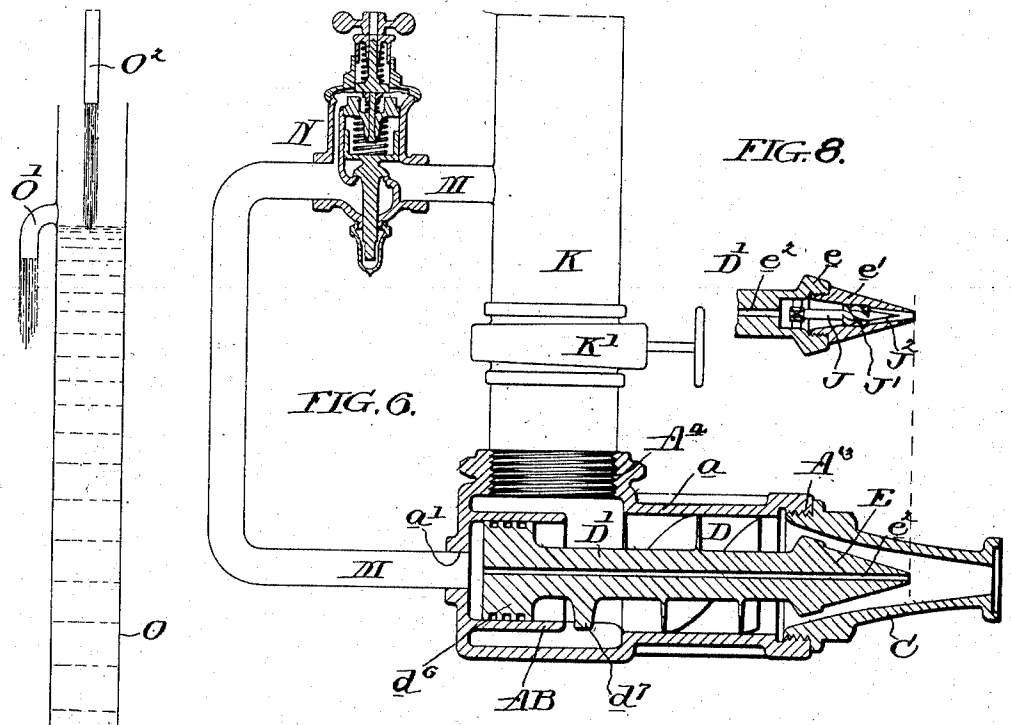

FIG. 6.

FIG. 8.

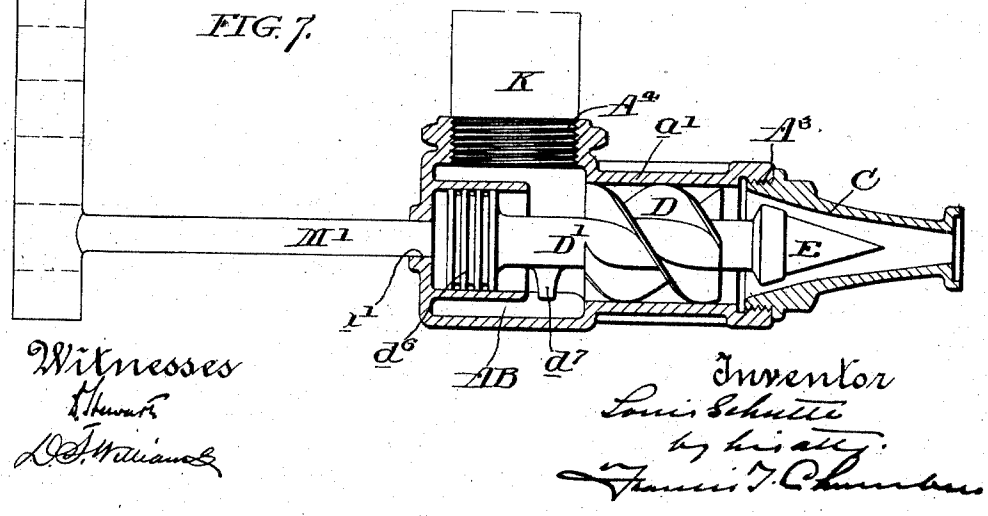

FIG. 7.

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No. 759,320. Patented May 10, 1904.

UNITED STATES PATENT OFFICE.

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JET-NOZZLE.

SPECIFICATION forming part of Letters Patent No. 759,320, dated May 10, 1904.

Application filed December 26, 1901. Serial No. 87,183. (No model.)

To all whom it may concern:

Be it known that I, LOUIS SCHUTTE, a citizen of the United States of America, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented a certain new and useful Improvement in Jet-Nozzles, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to jet-nozzles, and particularly to spray jet-nozzles such as are used for throwing a sprayed jet of water.

The object of my invention is to provide a nozzle of this kind which will automatically adapt itself to variations in the volume of water passing through it, imparting to the water in all cases an approximately equal issuing velocity and where spraying is desired breaking it into spray with little change in efficiency. This I accomplish by forming my nozzle with two relatively movable parts, forming between them the escape-orifice, and so shaped as to vary the effective area of this orifice as their position is shifted without at any time closing said orifice. I further construct these movable parts so that they will move apart under increased pressure and provide the nozzle with resilient means whereby the said parts are moved together.

The general nature of my invention and the particular ways in which I have adapted it for practical use will be best understood as described in connection with the drawings in which it is illustrated, and in which—

Figures 1, 2, 3, 4, 5, 6, and 7 are each longitudinal sectional elevations showing seven modifications of my invention, and Fig. 8 is a sectional view of a modified construction of cone-plug.

In Fig. 1, A indicates the body of the nozzle, having a threaded portion A^3 at its outer end and a lateral opening A^4 for the attachment of the supply-pipe, A^5 indicating a threaded rear opening into which screws the cylinder B, C being a conical terminal nozzle screwing into the end A^3 of the body A. D is a device for imparting rotary motion to the water passing through the nozzle A, consisting, as shown, of a series of screw-like flanges secured to a central stem D′ and fitting in the barrel of the nozzle. The stem D′ is enlarged at D^2 to form the body of a piston working in the cylinder B, the stem being continued for a short distance beyond the piston D^2 in threaded form, as indicated at D^3, and beyond the threaded portion further continued in square shape, as indicated at D^7. D^4 indicates a nut screwing on the threaded portion D^3 and acting against a washer D^5, which clamps between it and the piston enlargement D^2 the piston-packing, (indicated at D^6.) As shown in Fig. 1, also, the stem D′ has secured to its opposite end the conical plug E, fitting in the conical terminal nozzle C. F is the plate of metal fitting in the rear end of the cylinder B and held from rotating by pins F^2 F^2, passing through it and secured in the rear end of the cylinder B. The plate F has extending from it the hollow projection F′, with a square orifice, into which fits the square terminal D^7 of the rod D′. G is an adjusting-screw working through a threaded perforation in the end of the cylinder B and against the plate F, and H is a spring situated between the plate F and the collar D^5. In operation it will readily be seen that the spring H, acting on the piston D^2, thrusts the stem D′ and the plug E forward, so as to contract the effective escape area for the fluid. It will also be obvious that the pressure of the fluid admitted to the nozzle through the opening A^4, acting on the piston D^2, will tend to thrust it and its attached portions backward, increasing the escape-orifice, and obviously any increase in pressure on the piston will result in a further withdrawal of the plug E; but in an apparatus of this kind the pressure in the main body of the nozzle depends mainly upon the volume of fluid fed to it, and practically this device acts to preserve a uniform speed of exit for the fluid irrespective of its variation in volume.

In the modification shown in Fig. 2 the general construction of the main body A, cylinder B, and nozzle C is the same as in Fig. 1, except that a standard A^6 is provided in the

body A, with a squared orifice in the center line of the barrel. In this construction the screw-like flanges for giving rotative movement to the fluid are indicated at d and extend out from a hollow stem d', a squared end d^2 of which rests in the orifice of the standard A^6. The conical plug E in this construction is secured on the end of a rod E', moving through the hollow stem d' and having an enlarged threaded portion E^2 and in the rear of it a piston E^3, the nut E^4 serving to clamp the piston-packing E^5 between it and the piston, as shown. The spring H, acting against the piston, has its rear end supported on a flange of a perforated plate, (indicated at F^3,) and the adjusting-screw G is in this construction provided with a terminal extension G', extending through the plate F^3. It will readily be seen that in this modification the plug is shifted in the terminal nozzle C in exactly the same way as it is in the construction of Fig. 1, the only practical difference being that the rotative device is stationary instead of movable with the plug.

In the construction shown in Fig. 3 the main body of the nozzle, here indicated by the symbol A', is like the body A in its front end; but its rear section is different, having formed in it a connection a^4 for the supply-pipe and formed integral with it. The cylinder is here indicated by the symbol A^b and connected with the atmosphere through a channel a^b. The cylinder in this construction is also provided with an endwise extension b' from its rear end, having a square perforation in it, into which extends the squared end D^7 of the stem D', which stem and its attachments are similar in all respects to those shown in Fig. 1.

In the construction of Fig. 3 the adjustment of the spring is provided for by washers F^4, which also serve as the rear abutment of the spring H. The operation of the device is practically indentical with the before-described modifications.

In Fig. 4 the casing, here indicated at A^2, has, like the casing A' of Fig. 3, a rear opening a^4 for the connection of the supply-pipe, and near its rear end it is provided with standards a^6, with a square central perforation into which extends a square portion D^8 of the stem D', which is held to the standard a^6 by a nut D^9, screwing on a threaded extension of the stem. The stem D' has attached to it the conical plug E, which in this construction is absolutely stationary. The conical nozzle, here indicated at C', has formed upon it a piston which moves in a cylindrical portion of the casing A^2, the piston-packing being indicated at C^5 and clamped against an enlargement of the nozzle by a washer C^4, held in place by a nut C^3, screwing on a threaded portion C^2 of the nozzle. The nozzle and its piston extension is acted upon and thrust inward by a spring H, abutted against the adjustable plug G^2, screwing in a threaded nut a^3 of the casing, through a central perforation of which the nozzle C' extends. It will be obvious that in this construction the nozzle will be shifted with respect to the plug E precisely as the plug E is shifted with respect to the nozzles in the other modifications illustrated, the effective action of all the devices being essentially the same.

In Fig. 5 the casing indicated at a is formed with an open-ended cylinder A B at its rear end, in which works the piston D^2. The rod D' and the spiral flanges D are prevented from turning by the engagement of a finger d' with the casing, and in place of a spring for thrusting the rod D' and its attachments forward, as in Figs. 1 and 3, I use in this modification a lever L L^2, pivoted at L' and having a weight L^3 attached to its outwardly-extending arm, while its arm L^2 rests against the end of the rod D'. The operation of the device is practically identical with the construction shown in Figs. 1 and 3.

In Fig. 6 the casing a is shown as practically the same as Fig. 5, except that the rear end of the cylinder A B is partly closed and connected with the supply-pipe (indicated at K) by a conduit M, in which conduit is seated a pressure-regulating valve, (indicated at N,) and which may be of any convenient familiar construction. By this construction a pressure less by any determined amount than that in the supply-pipe K is maintained on the rear end of the piston d^6, acting in all respects like the spring and counterweight illustrated in the former modifications. As it is of course desirable that a constant flow should be maintained through the pressure-reducing valve N, I provide a restricted outlet from the cylinder A B, which, as shown and as preferably constructed, consists of a perforation e^2, running through the rod D' and cone E, and where it is desired that the jet of water issuing through this perforation should be given a rotary movement and be issued as spray I construct the cone, as shown in Fig. 8, with an internally-threaded butt portion e, into which screws the conical terminal e', a rod J extending through the opening in the cone and having spiral rings, as indicated at J', attached, and preferably a conical spindle J' at its extreme end.

In the modification illustrated in Fig. 7 the construction is practically identical with that of Fig. 6, except that instead of connecting the rear end of the cylinder A B with the supply-pipe I here show it connected by a pipe M' with a reservoir O, having an overflow-opening O' and a supply-pipe O^2, which feeds water to it. It will be obvious, of course, that in this construction a constant pressure is maintained on the rear of the piston d^6 equal to the height of the column in the reservoir O.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. As a new article of manufacture, a jet-nozzle having two relatively movable parts between which the escape-orifice is formed, said parts being so formed and arranged as to leave the orifice always open and to gradually vary the same when shifted in relative position, in combination with a cylinder and piston arranged so that the piston will at all times be exposed on one side, and for its full area to the pressure of the fluid at the nozzle, said piston under said pressure acting to shift the nozzle-regulating parts to increase the area of the orifice, and resilient means acting to move the regulating parts together and reduce the orifice to its minimum opening.

2. As a new article of manufacture, a jet-nozzle having in combination a conical escape-orifice, a conical regulating-plug situated in said orifice and relatively movable thereto to vary the opening of the effective escape-opening without at any time closing the same, a cylinder and piston arranged so that the piston will at all times be exposed on one side and for its full area to the pressure of the fluid at the nozzle, said piston under said pressure acting to shift the nozzle-regulating parts to increase the area of the orifice, and resilient means acting to move the regulating parts together and reduce the orifice to its minimum opening.

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Witnesses:
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