

(Model.)

2 Sheets—Sheet 1.

I. R. LAUX.
INJECTOR.

No. 543,554.

Patented July 30, 1895.

Fig. 1.

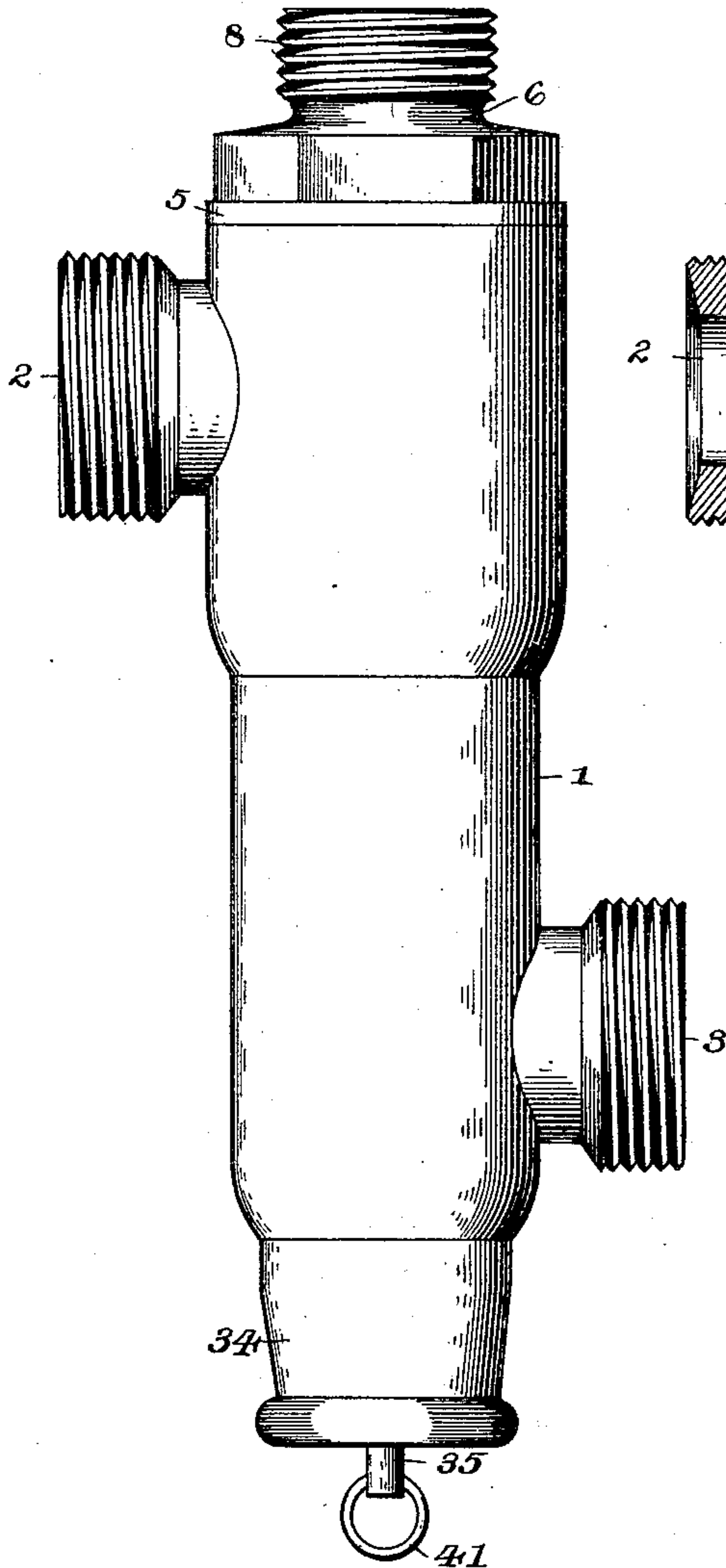


Fig. 3.

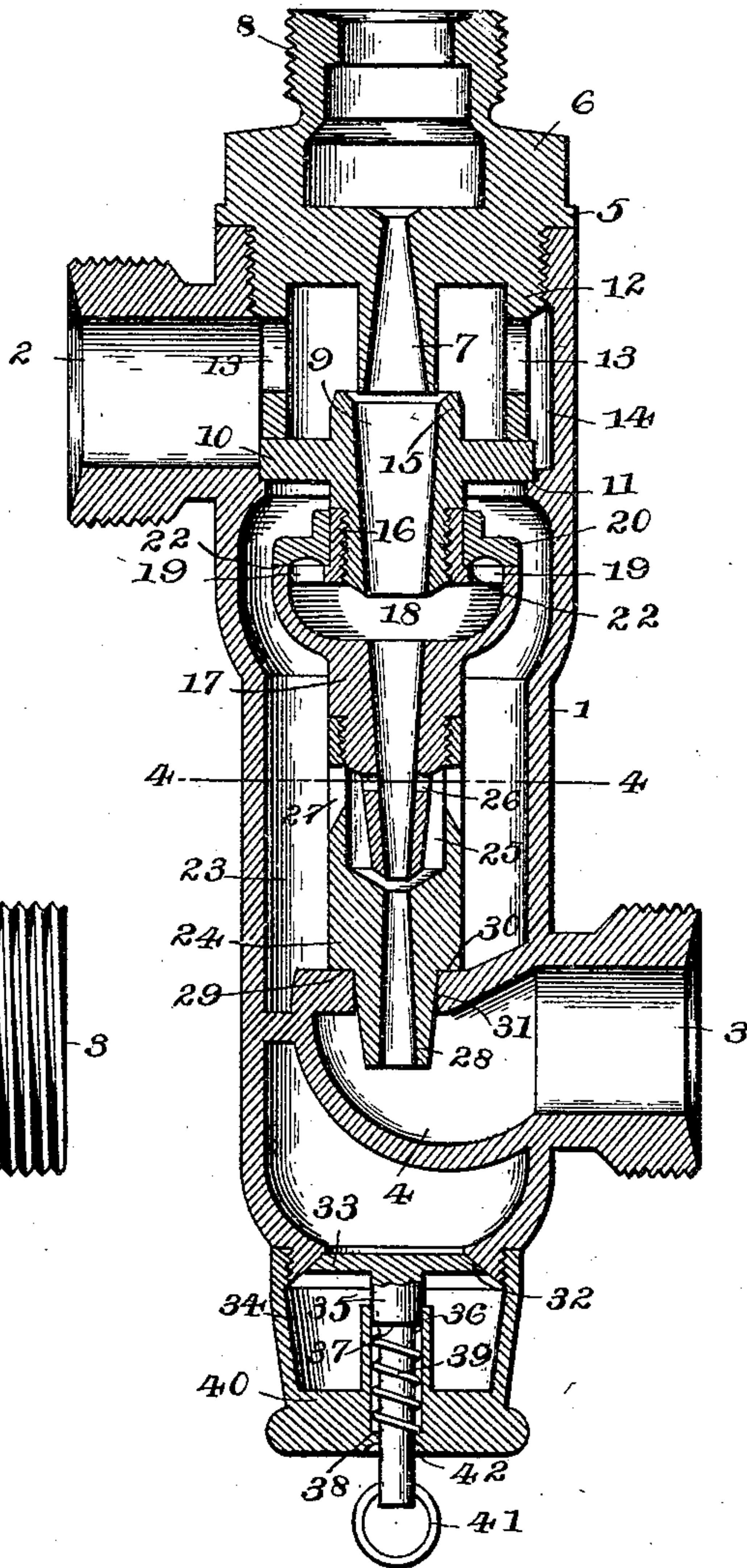
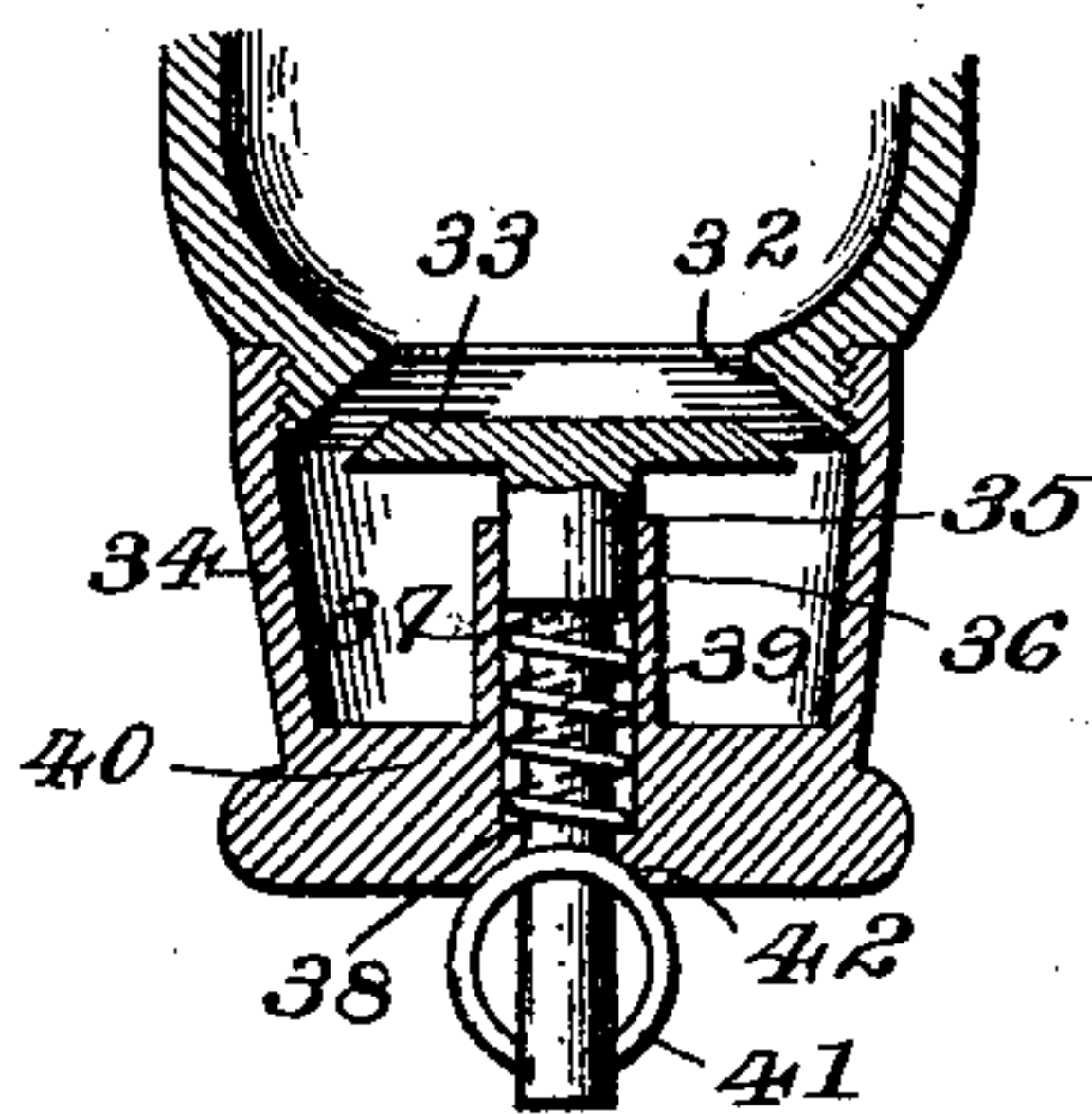


Fig. 5.



Witnesses

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Inventor

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(Model.)

2 Sheets—Sheet 2.

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Fig. 2.

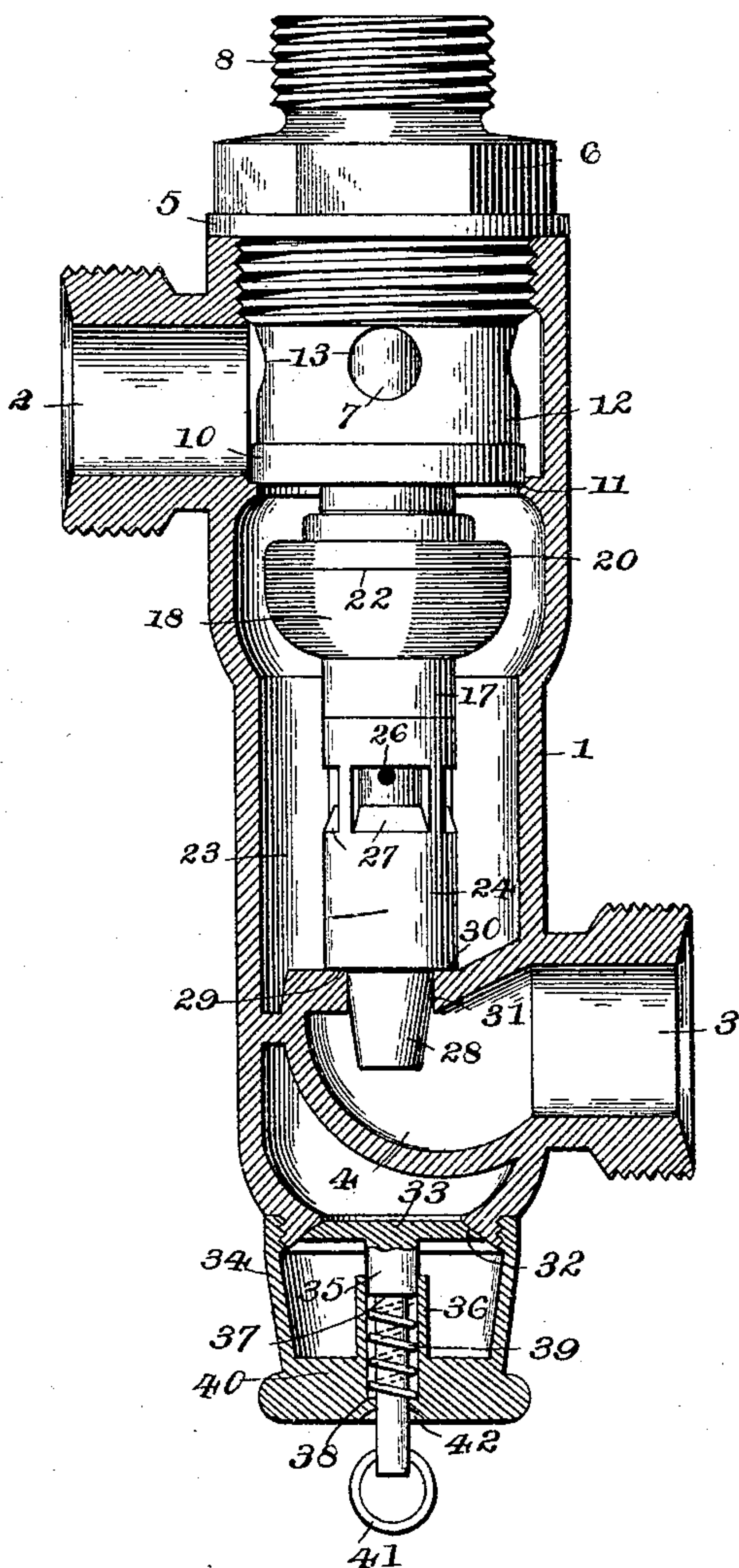


Fig. 4.

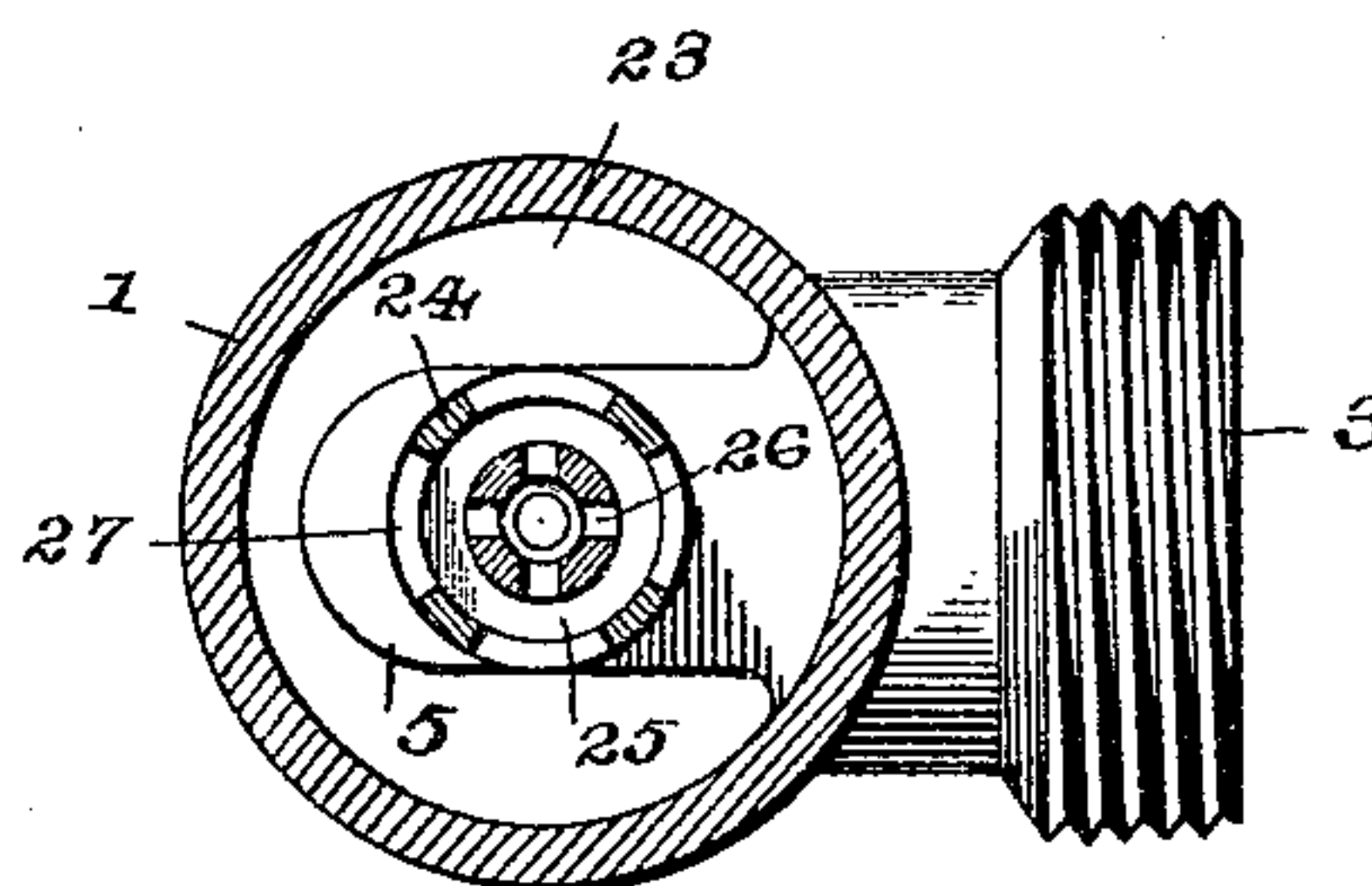
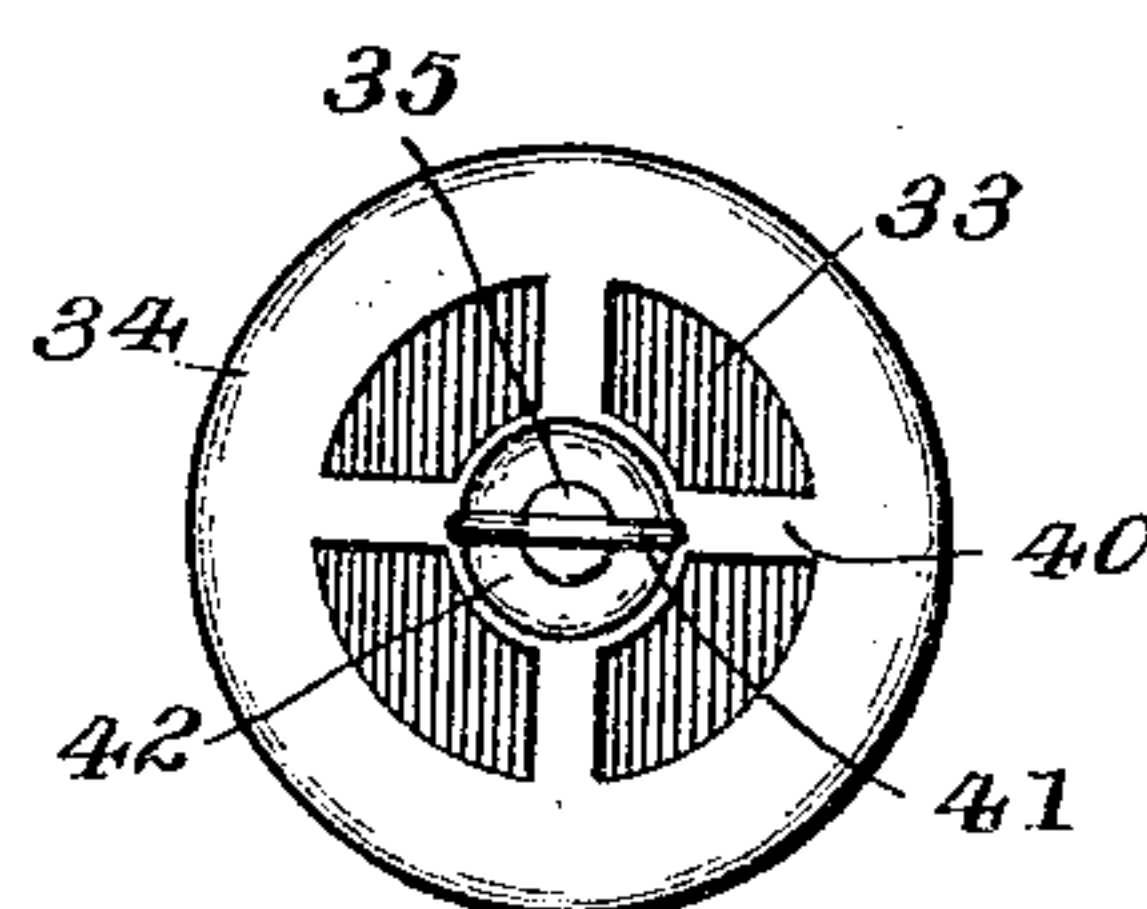


Fig. 6.



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Chas. Knowlton

UNITED STATES PATENT OFFICE.

ISAAC R. LAUX, OF ORRVILLE, OHIO.

INJECTOR.

SPECIFICATION forming part of Letters Patent No. 543,554, dated July 30, 1895.

Application filed November 14, 1894. Serial No. 528,804. (Model.)

To all whom it may concern:

Be it known that I, ISAAC R. LAUX, a citizen of the United States, residing at Orrville, in the county of Wayne and State of Ohio, have
5 invented a new and useful Injector, of which the following is a specification.

My invention relates to injectors of the class known as "restarting" injectors, which are adapted to start automatically when their
10 function is interrupted temporarily through a stoppage of the water or the steam supply.

The objects of the invention are to provide for the escape of steam from the mouth of the lifting-cone into the overflow-cavity to pre-
15 vent back-pressure, the means of escape being closed to prevent drawing from the contents of the overflow-cavity when the proper passage of the water and steam through the apparatus has been established.

20 Further objects and advantages of the invention will appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

25 In the drawings, Figure 1 is a side view of an injector embodying my invention. Fig. 2 is a similar view showing the casing in section. Fig. 3 is a central section of the apparatus. Fig. 4 is a horizontal section on the
30 line 4 4 of Fig. 3. Fig. 5 is a partial longitudinal section showing the lower end of the injector, and illustrating the manner of locking the overflow-valve in its open position. Fig. 6 is a plan view of the lower end of the
35 injector.

Similar numerals of reference indicate corresponding parts in all the figures of the drawings.

40 1 designates the casing, which is substantially cylindrical in construction and is provided near its upper end with a water-inlet port 2 and near its lower end with an outlet-port 3, said outlet-port communicating with an outlet-cavity 4, located within the casing
45 and having no communication therewith, while the water-inlet port 2 is in direct communication with the interior of the casing. Threaded in the upper end of the casing, with its shoulder 5 contiguous to the upper edge
50 thereof, is a cap 6 provided with a reduced nozzle or steam-jet 7, said cap being provided with an exteriorly-threaded reduced portion

8 for attachment to a steam-supply pipe. (Not shown.) The nozzle or jet 7 is enlarged toward its lower or outlet end, which is spaced 55 from, while arranged in alignment with, the lifting-cone 9, said lifting-cone being arranged in the casing and having a flange 10 which rests upon a seat 11 therein adjacent to the water-inlet port. The cap is provided within 60 the casing with a perforated flange 12 to bear upon the upper surface of the flange of the lifting-cone, the perforations 13 of said flange 12 being in communication with the water-inlet port, and the casing being counter- 65 bored, as shown at 14, whereby all of said perforations 13 are in communication with the port 2.

The lifting-cone extends at its upper or enlarged end slightly above the plane of the 70 flange 10 to form a lip 15, and is exteriorly threaded at its lower end for engagement with a reduced collar 16 at the upper end of the combining-cone 17. This combining-cone is provided with an enlarged chamber 18 near 75 its upper end, the top of said chamber being perforated, as shown at 19, and the perforations being normally closed by means of an annular gravity-valve 20, which is guided by 80 the lower exterior portion of the lifting-cone. This valve is provided with a concave lower surface and upon opposite sides of such concavity with annular inner and outer bearing-surfaces 21 and 22. When the valve 20 is 85 open, the interior of the combining-cone is in communication with the annular overflow-cavity 23.

Threaded at its upper end upon the combining-cone at an intermediate point, is the 90 discharging-cone 24, having an enlarged upper cavity 25, into which projects the lower reduced end of the combining-cone, said reduced end of the combining-cone being provided with outlet perforations 26, which com- 95 municate with said cavity 25 and are opposite outlet-openings 27 in the walls of the cavity, said openings 27 communicating with the overflow-cavity 23. The nozzle 28 at the lower end of the discharging-cone is increased 100 in diameter toward its lower end and extends into the outlet-cavity 4, which is in communication with the outlet-port 3, said outlet-port being adapted to be connected by suitable tubing with the boiler. (Not shown.) The

discharging-cone is provided with an exteriorly annular shoulder 29 to rest upon a seat 30 surrounding an opening 31 in the upper wall of the outlet-cavity 4.

5 In the bottom of the overflow-cavity 23, and below the plane of the outlet-port 3, is a seat 32 for a downwardly-opening valve 33 arranged in the outlet-nozzle 34, which is screwed upon the lower end of the casing. The stem
10 35 of the overflow-valve is fitted in a tubular-guide 36 arranged axially in the nozzle 34, said stem being provided with a shoulder 37, and the guide being provided with a seat 38, between which and within the guide is arranged a coiled spring 39 to normally hold
15 the overflow-valve seated. The lower end of the overflow-nozzle is open, with the exception of the radial webs 40, which support the guide 36, and attached to the lower exposed
20 end of the valve-stem is a swinging ring 41 adapted, as shown in Fig. 5, to be arranged in an upright position and engaged with an annular depression 42 at the lower end of the
25 guide to hold the overflow-valve in its depressed position while the casing is being drained.

It will be understood that in operation the valve which closes the relief-openings 19 in the top of the enlarged chamber of the combining-cone provides for the free escape of
30 steam which is discharged from the mouth of the lifting-cone to prevent back-pressure in said lifting-cone before the proper flow of water is established. This free escape of the
35 steam allows the formation of a vacuum by condensation, and thus operates through the water-inlet port to elevate the water from a depressed source. This valve 20 also provides for the escape of surplus water into the
40 overflow-chamber until the proper velocity of movement through the combining-cone is attained, when the valve will close by gravity and exclude any air which may be present in the body of the injector. Said valve prevents
45 the vacuum that is formed by the velocity of the water between the mouth of the lifting-cone and the upper end of the combining-cone from acting upon the contents of the overflow-cavity. Hence, when there is an interruption
50 in the water-supply there is no delay in the restarting of the injector.

It should be observed that the lifting, combining, and discharging cones are connected together by screw-joints, the shoulder 29 of the discharging-cone and the flange 10 of the
55 lifting-cone being arranged upon seats within the casing, and that the cap is provided with a depending flange 12 to bear upon the flange 10 and thus lock all of the removable parts of
60 the injector in place within the casing. Inasmuch as the said lifting, combining, and discharging cones are secured together independently of the casing their proper alignment is assured, and they can be removed
65 from the casing without difficulty and without separation, simply by the removal of the retaining-cap.

When the overflow-valve is locked in its open position by means of the swinging-ring 41, in order to drain the casing when the in- 70
jector is not in use the admission of steam, when it is desired to again use the injector, causes a depression of the overflow-valve, and hence the release of the ring 41, which drops
75 to the position shown in Figs. 1, 2, and 3.

A further advantage of the improved injector resides in the fact that the lifting, combining, and discharging cones are detachably but rigidly connected and are held in place
80 in the casing solely by the removable cap 6, which is threaded in the upper end of the casing, and therefore when it is necessary to clean the parts of the apparatus the interior construction may be removed by disconnect-
85 ing said cap and thereby releasing the connected cones.

It will be understood that in practice various changes in the form, proportion, and minor details of construction may be resorted
90 to without departing from the spirit or sacrificing any of the advantages of this invention.

Having thus described my invention, I claim—

1. An injector having lifting, combining, and discharging cones, the combining cone 95
being provided at the mouth of the lifting cone with an enlarged cavity which is larger in diameter than the exterior of the lifting cone, and is provided with overflow openings in its upper side, in combination with an an- 100
nular upwardly opening valve slidably mounted upon the contiguous portion of the lifting cone and adapted to be actuated by gravity to close said overflow openings, where-
105 by an excess of pressure within the combining cone acts upon the said valve parallel with the direction of its movement to allow escape of fluid through the overflow openings, said valve having a concaved under surface,
110 substantially as specified.

2. The combination with an injector casing having an overflow cavity and provided at one end with a removable cap, of lifting, combining, and discharging cones detachably con- 115
nected together independently of and seated within the casing, and being held therein by said cap, whereby they may be removed from the casing without disconnection the upper
120 end of the lifting cone being in communication with a water inlet port, the lower end of the discharging cone being in communication with a discharge port, and the combining cone being provided with valved overflow
125 openings, substantially as specified.

3. The combination with an injector casing 125
having an overflow cavity, of a cap removably fitted in one end of the casing and provided with an integral nozzle or jet, lifting, combining, and discharging cones detachably
130 connected together independently of and being seated within the casing, and being held therein by said cap which is provided with a flange to bear upon a lateral flange of the lifting cone with said nozzle or jet inserted in

the upper end of said cone, whereby the cones may be removed from the casing without disconnection, the upper end of the lifting cone being in communication with a water inlet port, the lower end of the discharging cone being in communication with a discharge port, and the combining cone being provided with valved overflow openings, substantially as specified.

4. The combination of an injector casing having water inlet and discharge ports and contiguous seats 11 and 30, rigidly connected lifting, combining, and discharging cones, the former being provided with a flange which is fitted upon the seat 11 and the latter of which is provided with a shoulder fitted upon the seat 30, a cap removably fitted in the upper end of the casing and provided with a depending perforated flange to bear upon the flange of the lifting cone, and also provided with a steam jet which is arranged in axial alignment with the connected cones, said combining cone having an enlarged cavity provided with overflow openings communicating with an overflow chamber surrounding the cones, a gravity closed valve arranged to control said overflow openings, and a valved outlet opening at the lower end of the overflow chamber, substantially as specified.

5. The combination with an injector casing having an overflow chamber provided with a valved outlet, of connected lifting, combining, and discharging cones, arranged in axial alignment with the steam jet and in communication at opposite ends with water inlet and discharge ports, the combining cone being provided with valved overflow openings communicating with the overflow chamber, and the discharging cone being provided with openings in registration with perforations in a reduced lower portion of the combining cone, the reduced lower portion of the combining cone extending below said openings in the discharging cone, substantially as specified.

6. The combination with an injector casing having an overflow chamber provided with a valved outlet, of connected lifting, combining, and discharging cones arranged in axial alignment with a steam jet and connecting water inlet and discharge ports, the combining cone being provided with valved overflow openings arranged in the upper side of an enlarged cavity of said cone, said cavity being located adjacent to the mouth of the lifting cone, the discharging cone being provided with an enlarged chamber provided in its side walls with outlet openings, and the combining cone being provided with a reduced downwardly tapered portion which extends axially within the enlarged cavity of the discharging cone and is laterally perforated to communicate with the openings in the walls of the discharging cone, substantially as specified.

7. The combination with an injector casing having an overflow chamber provided at its lower end with an outlet opening, water inlet and discharge ports, an axial steam jet, and connected lifting, combining, and discharging cones, of an overflow nozzle in communication with the outlet opening of the overflow chamber, a valve seated contiguous to and adapted to close said outlet opening and provided with a stem arranged in a suitable guide, a spring for actuating and normally holding the valve seated, and a ring connected to an exposed extended portion of the valve stem and adapted to be engaged with a depression contiguous to the stem to hold the valve in its unseated position, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

ISAAC R. LAUX.

Witnesses:

H. H. STRAUSS,
S. N. COE.