

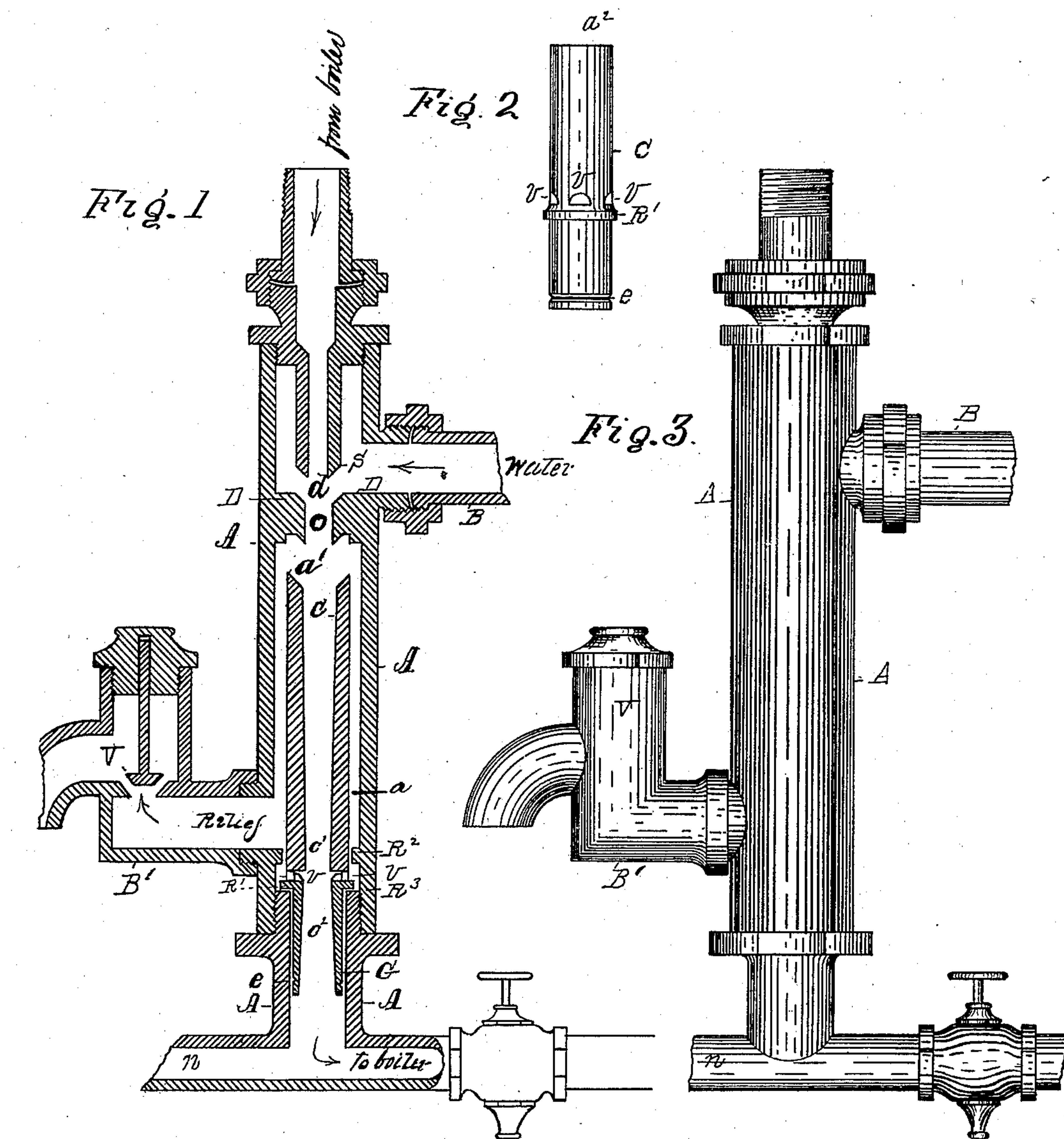
(Model.)

J. LOFTUS.

INJECTOR.

No. 290,693.

Patented Dec. 25, 1883.



Witnesses

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UNITED STATES PATENT OFFICE.

JOHN LOFTUS, OF ALBANY, ASSIGNOR OF ONE-HALF TO TIMOTHY HOLLAND,
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INJECTOR.

SPECIFICATION forming part of Letters Patent No. 290,693, dated December 25, 1883.

Application filed August 24, 1883. (Model.)

To all whom it may concern:

Be it known that I, JOHN LOFTUS, of the city of Albany, county of Albany, and State of New York, have invented a new and useful Improvement in Injectors, of which the following is a specification.

My invention relates to injectors—a class of devices that are used to feed water to boilers against the pressure of the latter by means of a steam-jet supplied therefrom; and the object and purpose of my invention are to make such devices automatically adjustable as between its capacities to raise and force water against variable pressure.

My invention consists, as will hereinafter be more fully detailed, in the combination of a steam-jet to supply actuating-steam to the device; a water-jacket connected with a supply-pipe, which jacket surrounds said steam-jet pipe, and a diaphragm-plate having a central opening, with said plate arranged within the injector-inclosure between the inner end of the steam-jet pipe and the end of the combining-tube; a combining-tube constructed with piston ways and stops in the injector-inclosure; lateral vents in the combining-tube; a relief-valve connected with the water-jacket surrounding the combining-tube, and the sub-combination of the foregoing factors where performing specific function, as will be designated in the claims.

In the accompanying drawings, forming a part of this specification, there are shown three figures illustrating my invention, with the same designation of parts by letter-reference used in all of them, of which—

Figure 1 is a central vertical section; Fig. 2, a side elevation of the combining-tube, shown as removed from the device and as shortened in length, and Fig. 3 a side elevation of the injector.

The several parts of the apparatus are designated by letter-reference and their function explained as follows: The letter A indicates the cylindrical form exterior of the apparatus, within which and by which the latter is inclosed, and B a side branch-pipe connecting therewith for a water-supply.

The letter B' designates a relief branch pipe connected with the water-jacket of the injector, and on which is constructed the relief-valve V.

The letter C designates the combining tube or cone, the interior of which has the form of two reversing cone-frustums, C' C', with their smaller ends adjacent; and the letters *v* indicate vents or openings, of which there may be one or more to connect the interior of the tube at that point with the annular space or water-jacket *a* surrounding said tube.

Upon the injector-interior there are constructed the ring-flanges R² and R³, and between them, on the exterior of the combining-tube, the ring-flange R', so that the combining-tube, as moving up and down within the injector-interior for automatic adjustment, is stopped in its ascent by the engagement of the ring-flange R' on the tube with the ring-flange R² on the injector-interior, and in its descent by the engagement of the ring-flange R' with the flange R³ on the interior of the injector-cylinder. The lower end of the combining-tube exterior is constructed to be parallel with the interior surface of the injector-cylinder A, so as to make a piston engagement therewith, and, if desired, the tube may be adapted to receive packing, as indicated at *e*.

The operation of the injector thus constructed is as follows: The water-branch B being connected with a water-supply by means of a suction-pipe and a current of steam allowed to enter the injector through the steam-jet pipe S, the steam finding relief through the jacket and valve V creates by its passage a vacuum in the suction-pipe which raises the water therein to the injector. When the vacuum has been thus made and the water entering supply-current established, the valve on the pipe leading from the injector to the boiler is opened and the volume and velocity of the steam-jet issuing from the jet-pipe S slightly increased. Until the out-current to the boiler is established the back-pressure of the water from the boiler, when passing through the upwardly and inwardly tapering tube C to reach the vents, and valve V, forces the said tube C upwardly until its upper end, *a'*, is nearly in contact with the diaphragm-plate D. When the combining-tube has been thus raised, the steam-jet, entering the injector through the pipe S, becomes active and establishes a current from the injector to the boiler. The space between the upper end of the combin-

ing-tube and the opening O in the diaphragm-plate D is increased as the pressure of the motor-jet issuing from the pipe S is nearer to the pressure of the boiler, which the motor-jet has to overcome, and the distance decreases as the difference between the motor-pressure at S and the boiler-pressure increases, and the tube C adjusts itself automatically to the varying differences of pressure between that of the motor-jet and the boiler. The diaphragm-plate D, constructed with the opening O, has the effect to concentrate the action of the jet impetus by confining the water between the jet and the edge of the opening, and thus give it greater velocity. If from any cause, such as a blow or sudden jar, the feed-current from the injector to the boiler be broken up and the return-pressure from the boiler becomes active within the injector, such pressure finds a passage-way through the relief-vents *v* and valve V, and gives notice of the fact. Not only this occurs, but this relief allows the tube C to readjust, so as to again start the feed-current. The diaphragm-plate D makes a partial division laterally of the injector, as between the entering steam-motor jet and the receiving end of the combining-tube, which greatly facilitates the raising and forcing power of the injector, for the initial action of the entering motor-jet above the diaphragm-plate serves to lift, and the jet thereof confined to pass through the opening O gives an additional velocity to the water carried with its impetus to produce the feed-current, so that both the raising and forcing operations of the injector are made positive in their action.

I am well aware that in the older Sellers injector the steam-cone or jet-pipe and the combining-cone were arranged within a receiving-cone, and the exterior of the combining-cone made to form a piston engagement with the interior of the injector-cylinder, and so as to separate the water-jacket space from the overflow. In my device the combining-tube is made to adjust toward or from an opening in a diaphragm-plate located between said combining-tube and the motor-jet pipe with such adjustment, produced by a piston engagement between the injector-cylinder interior and the exterior of the combining-tube, no equivalent for the receiving-cone being used. With the diaphragm-plate D and opening O arranged between the motor steam-jet and the combining-tube it answers a better purpose

than a receiving-cone in concentrating the velocity of the jet impact, and permits communication to exist between the water-intake, the combining-tube, and the overflow, which did not occur in the older Sellers device before named.

I am also aware of the fact that the combining-tube of an injector has been made adjustable to or from the steam-cone or motor-jet pipe by means of a rack and pinion; and I am also aware that two interiorly-arranged reversing cone-frustums have been used in injectors, with their smaller ends in contact, and that such a construction, broadly considered, is not new.

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

1. In an injector, the combination of a transversely-arranged diaphragm-plate constructed between the discharge end of the steam-motor jet-pipe and the receiving end of the combining cone or tube, an opening in said diaphragm-plate in line with the opening in the discharge end of the steam-motor pipe, and the receiving end opening of the combining cone or tube, and a combining-tube below said diaphragm-plate constructed to adjust automatically to the opening in said plate by a piston engagement with the interior of the injector-inclosing cylinder, in the manner and for the purposes set forth.

2. In an injector, the combination of the steam-motor jet-pipe S, the diaphragm-plate D, provided with and to the opening O, the combining-tube C, constructed and arranged to operate as shown and described, and the exterior inclosing-cylinder, A, as and for the purposes set forth herein.

3. In an injector, the combination of the inclosing-cylinder A, the connected branch pipes B B', the steam-motor jet-pipe S, the diaphragm-plate D, provided with the opening O, the relief-valve V on said branch pipe B', and the combining-tube C, constructed with lateral vents leading into the water-jacket and adapted to make a piston engagement with injector interior, in the manner and for the purposes set forth.

JOHN LOFTUS.

Witnesses:

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