

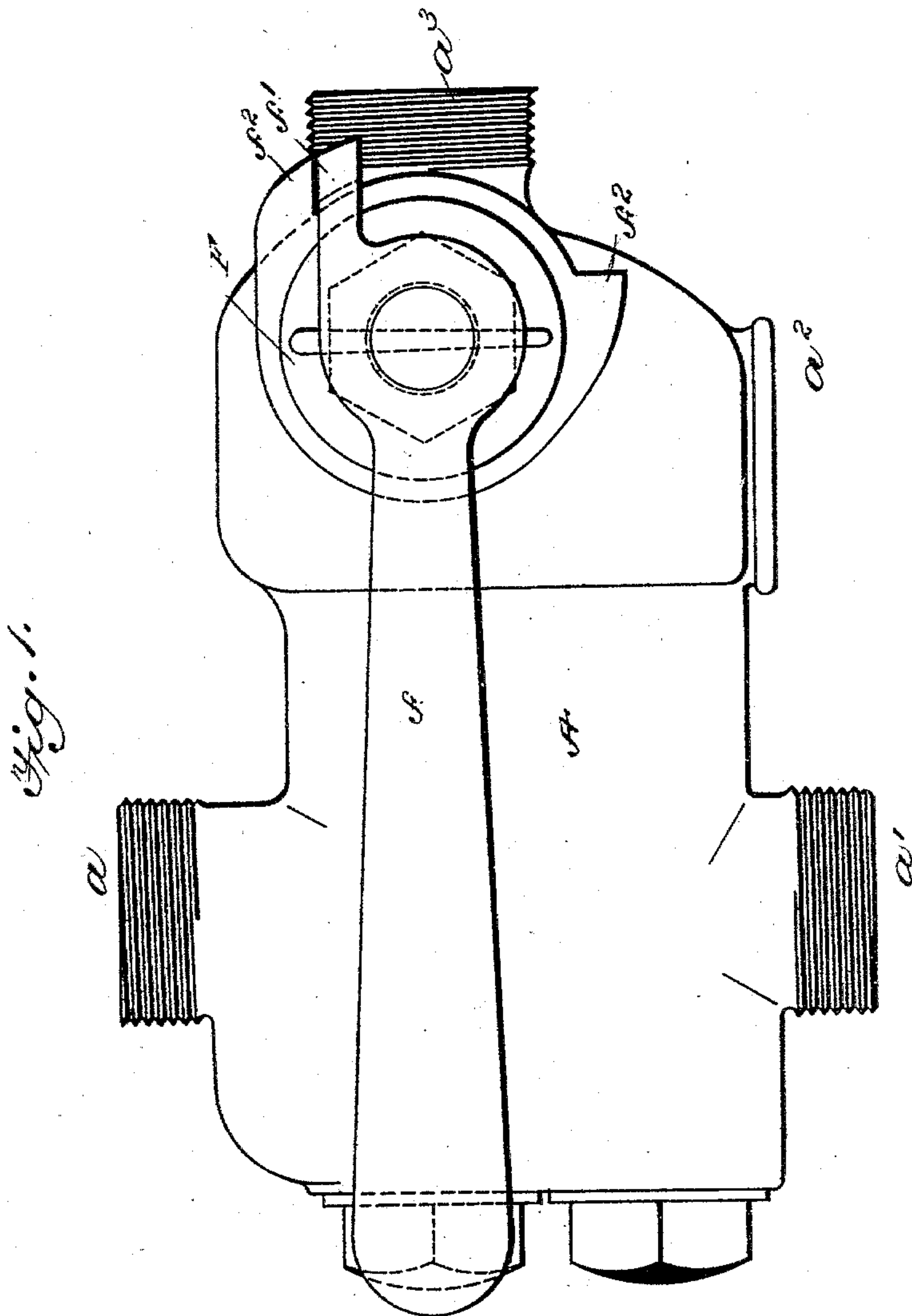
(Model.)

2 Sheets—Sheet 1.

P. BROWNLEY.
STEAM INJECTOR.

No. 571,718.

Patented Nov. 17, 1896.



WITNESSES:

Julius C. Drucklieb
Charles A. Drucklieb

INVENTOR

Patrick Brownley

BY

J. H. M. Hill

ATTORNEY.

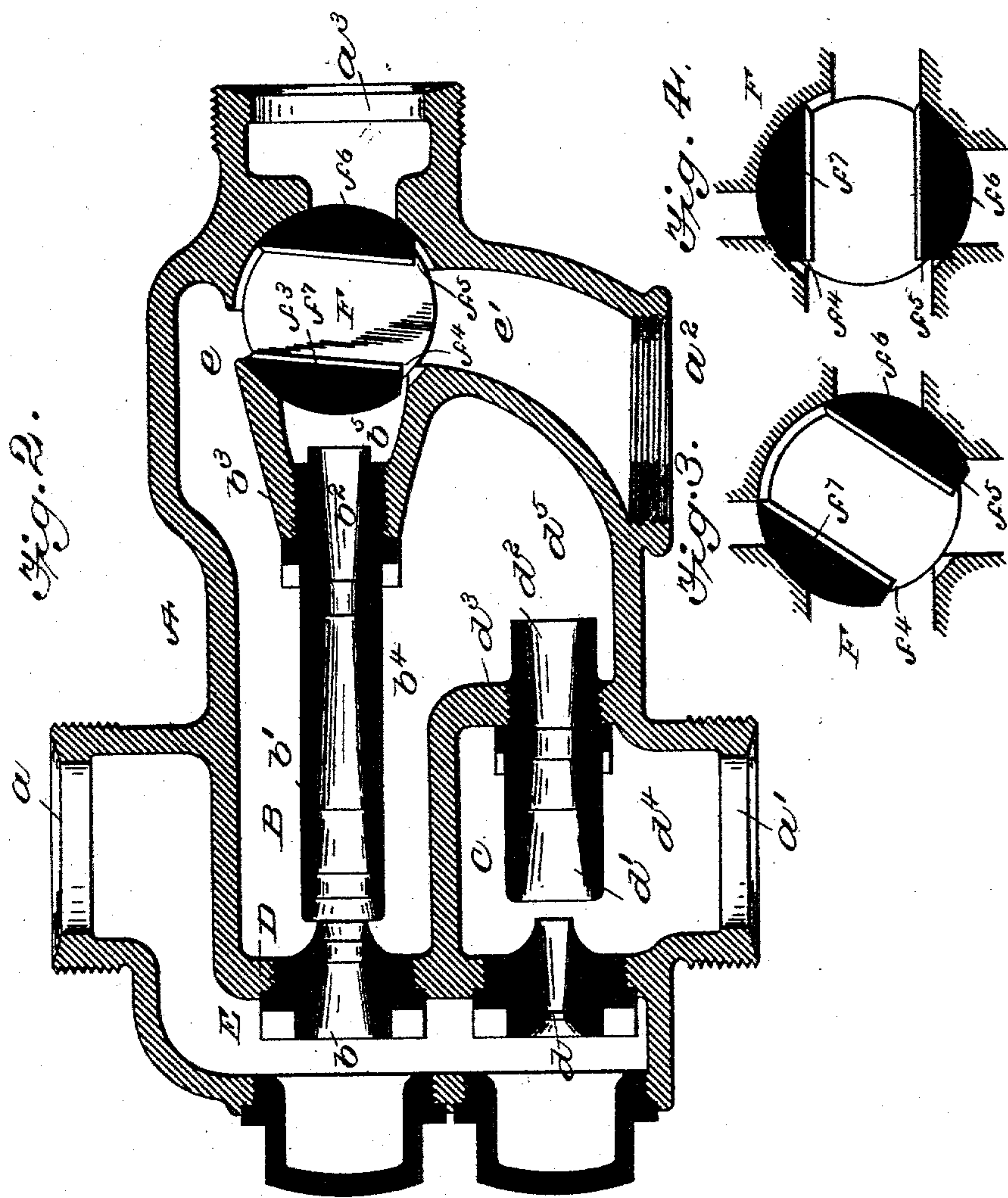
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UNITED STATES PATENT OFFICE.

PATRICK BROWNLEY, OF NEW YORK, N. Y.; ASSIGNOR TO THE BROWNLEY MANUFACTURING COMPANY, OF NEW JERSEY.

STEAM-INJECTOR.

SPECIFICATION forming part of Letters Patent No. 571,718, dated November 17, 1896.

Application filed April 17, 1896. Serial No. 587,928. (Model.)

To all whom it may concern:

Be it known that I, PATRICK BROWNLEY, of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Steam-Injectors; 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.

This invention contemplates certain new and useful improvements in steam-injectors, having special reference to that class known as "lifters" and "forcers."

The object is to increase the starting and working capacity of a double-tube injector. This I accomplish by doubling the lifting power of the injector by making the set of tubes constituting the forcer serve equally with the other or lifter set of tubes in raising water into the injector. Steam is supplied simultaneously to both sets of tubes, whereby the injector can be started and maintained at a very low pressure, at a maximum degree of high pressure, or at any intermediate pressure. These results are obtainable because the only pressure to be overcome in starting the injector is that of the atmosphere, since no check-valve for the primary overflow is employed. In lieu I use a cock substantially of the character shown and described in Letters Patent No. 513,378, granted to me January 23, 1894, said cock having ports which, in starting the injector, open up direct communication between the delivery-chamber of the lifter and forcer with the overflow-opening, and when the column of steam and water is established will instantly cut off the overflow of the lifter and gradually cut off that of the forcer, at the same time opening up direct communication between the latter and the outlet to the boiler. Heretofore in injectors of this class steam could not be admitted through the forcer in starting the injector, as it would tend to create back pressure on the first or primary overflow-valve, or at least form an equilibrium, preventing the starting of the injector, and have the effect of forcing the steam back into the suction-pipe; but by allowing the initial flow of steam through both the forcer

and lifter to pass direct to the atmosphere a vacuum is instantly created and both sets of tubes serve to raise the water into the injector. Thus a maximum boiler supply can be constantly maintained.

The invention will be hereinafter fully set forth, and particularly pointed out in the claims.

Figure 1 is a view in side elevation of my improved injector. Fig. 2 is a vertical longitudinal sectional view thereof. Fig. 3 is a detail sectional view showing the position occupied by the cock after water is lifted into the injector. Fig. 4 is a similar view showing the position of said cock when the injector is working.

Referring to the drawings, A designates the casting or casing; a , the steam-inlet; a' , the water-inlet; a^2 , the overflow-opening, and a^3 the delivery-outlet leading to the boiler.

B designates the forcer and C the lifter. Of the former, b is the steam-tube, b' the combining-tube, and b^2 the delivery-tube, the two latter tubes being integral. Said delivery-tube is secured in a tapering or conical wall or partition b^3 , which divides the water-chamber b^4 from the delivery-chamber b^5 of the forcer, said latter chamber being in line with the delivery-outlet a^3 . By thus extending the combining-tube out in the water-chamber and elongating the same the water in said chamber will insure better condensation in starting and the same will be heated by said tube when the injector is working, thus preventing too great condensation upon the water intermingling with the steam. Of the lifter, d is the steam-tube, d' the combining-tube, and d^2 the delivery-tube, said latter tubes being integral and secured in partition d^3 , separating the water-chamber d^4 from the discharge-chamber d^5 . The latter chamber opens direct into the water-chamber b^4 of the forcer. The steam-tubes b and d are mounted in a wall or partition D of a steam-chamber E, into which the steam-inlet a opens, said steam-chamber being common to both of said steam-tubes, so that steam is supplied simultaneously to both sets of tubes, no valve being employed for cutting off the supply of steam to the forcer in starting the injector. The outlet for the overflow from the lifter is

through a passage-way e , surrounding the delivery-chamber b^5 , and substantially diametrically opposite the outlet end of this passage-way is the inner channel e' of the overflow-opening a^2 . Hence, if extended, the passage-way e and overflow-channel e' would intercept the delivery-chamber b^5 and boiler-outlet a^3 .

F is a cock located transversely of the machine, so as to intercept the delivery-chamber b^5 , the outlet a^3 , the overflow passage-way e of the lifter, and the channel of the overflow-opening. To one end of this cock is connected an operating-handle f , by which it can be easily and quickly turned, the movement of said handle being limited by a finger f^1 and stops f^2 . This cock is constructed, in the main, as shown and described in the before-mentioned patent. It is provided with a wide transverse opening f^3 and opposite cut-aways f^4 and f^5 , forming overflow-ports for the delivery-chamber of the forcer. In starting the injector the wide opening of the cock assumes the position shown in Fig. 2, thus establishing direct communication between the passage-way e and the overflow-opening a^2 , the side f^6 of said cock closing the delivery-outlet a^3 , leading to the boiler. Hence the use of a check-valve to prevent back pressure from the boiler interfering with the injector is rendered unnecessary. When the cock is in this position, the port formed by the cut-away f^4 establishes communication between the delivery-chamber b^5 of the forcer and the overflow-opening a^2 . As soon, however, as the water has been lifted and the column of steam and water is being established the operator turns the cock F, causing the side f^7 thereof to entirely cut off the overflow of the lifter through the passage-way e . (See Fig. 3.) As this is being done any further overflow from the forcer is allowed to pass through the port formed by the cut-away f^5 to the overflow-opening a^2 , the further movement of the cock cutting off or closing this overflow and establishing direct communication between the delivery-chamber of the forcer and the outlet to the boiler. (See Fig. 4.)

The operation is as follows: The cock being positioned as shown in Fig. 2, closing the outlet to the boiler and opening up communication between the passage-way e and overflow-opening a^2 , steam admitted to the steam-chamber E will pass simultaneously through both sets of tubes and out to the overflow. Upon overcoming the atmospheric pressure and reaching the overflow-opening a vacuum is instantly created, not only in the water-chamber of the lifter, but also in the chamber of the forcer or body of the casing, causing the immediate lifting of water, which, passing through the combining and delivery tubes of the lifter, will pass from the discharge-chamber of the latter through the passage-way e and opening f^3 of cock F to the overflow-opening a^2 , and the overflow of the forcer passes

to said opening a^2 through the cut-away f^4 . As soon as the column is established, or about to be, the cock is turned, cutting off immediately the overflow of the lifter and gradually that of the forcer, (see Fig. 3,) and the now established column of steam and water will pass through the opening in the cock on to the boiler, said cock being turned to the position shown in Fig. 4.

The advantages of my invention are apparent to those skilled in the art. No check-valve for the overflow of the lifter being employed and only the atmospheric pressure having to be overcome, and steam being admitted simultaneously to both sets of tubes, the forcer also acts as a lifter, thus doubling the capacity of the apparatus. The injector can be started at a low pressure and can be continuously operated at such a pressure or at a very high pressure of steam, or at any intermediate pressure. There is a decided advantage in the employment of a cock for controlling the operation of the injector, since the cock being of substantially conical or cylindrical form and extended transversely through the injector at right angles, so to speak, to the line of travel of the steam and water there is but little, if any, pressure to be overcome in turning said cock. It will also be noted that the overflow of the forcer is only gradually cut off, thus allowing any additional overflow from the latter, after the closing of the overflow of the lifter, to pass to the opening a^2 .

An injector constructed as herein described is extremely simple and inexpensive and, being composed of but few parts, is not liable to readily get out of order. The single cock employed for controlling the working of the injector being positive in its action is not affected by any clogging of foreign or gritty substances, as frequently occurs with loosely-mounted valves.

I claim as my invention—

1. A double-tube injector having direct communications for the forcer and lifter with the overflow-opening, means for positively closing the boiler-passage in starting the injector and a single steam-chamber common to both said lifter and forcer whereby steam is supplied simultaneously thereto in starting the injector, as set forth.

2. A double-tube injector having separate overflows for the lifter and forcer, a cock for quickly closing the overflow of the lifter and gradually closing that of the forcer and a steam-chamber for supplying steam simultaneously to both the lifter and forcer in starting the injector, whereby the forcer will also act as a lifter, as stated.

3. A steam-injector of the character herein specified having overflow-passages for the lifter and forcer and a cock intercepting said overflows having three ports, one of said ports allowing of the gradual closing of the overflow of the forcer after the overflow of the lifter is closed, as stated.

4. A steam-injector of the character herein specified having overflow-passages for the lifter and forcer, and a cock having a main opening or port extending transversely there-
5 through, and two smaller ports for the overflow from the forcer, as set forth.

5. A steam-injector of the character herein specified having overflow-passages for the lifter and forcer, and a cock having a main
10 opening or port extending transversely there-through, and two opposite cut-aways forming ports for the overflow from the forcer, as set forth.

6. The herein-described steam-injector
15 having two sets of tubes forming a forcer and

a lifter, a steam-chamber for supplying steam to both of said sets of tubes simultaneously, an overflow-passage from said lifter and the delivery-chamber of said forcer intercepting one another, a cock located at such intercep- 20
tion and having a main port, and two additional overflow-ports, and a lever for operating said cock, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscrib- 25
ing witnesses.

PATRICK BROWNLEY.

Witnesses:

LOUIS O. VAN DOREN,
WILLIAM S. SMITH.