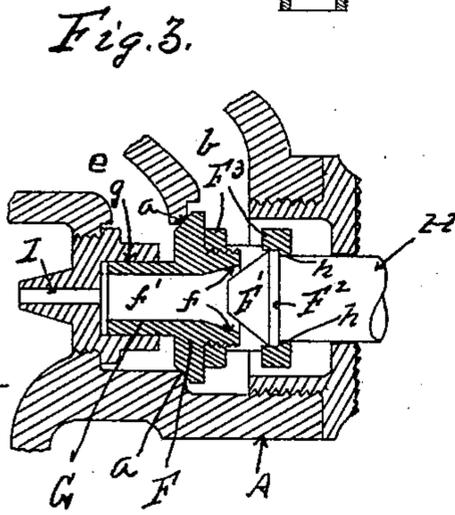
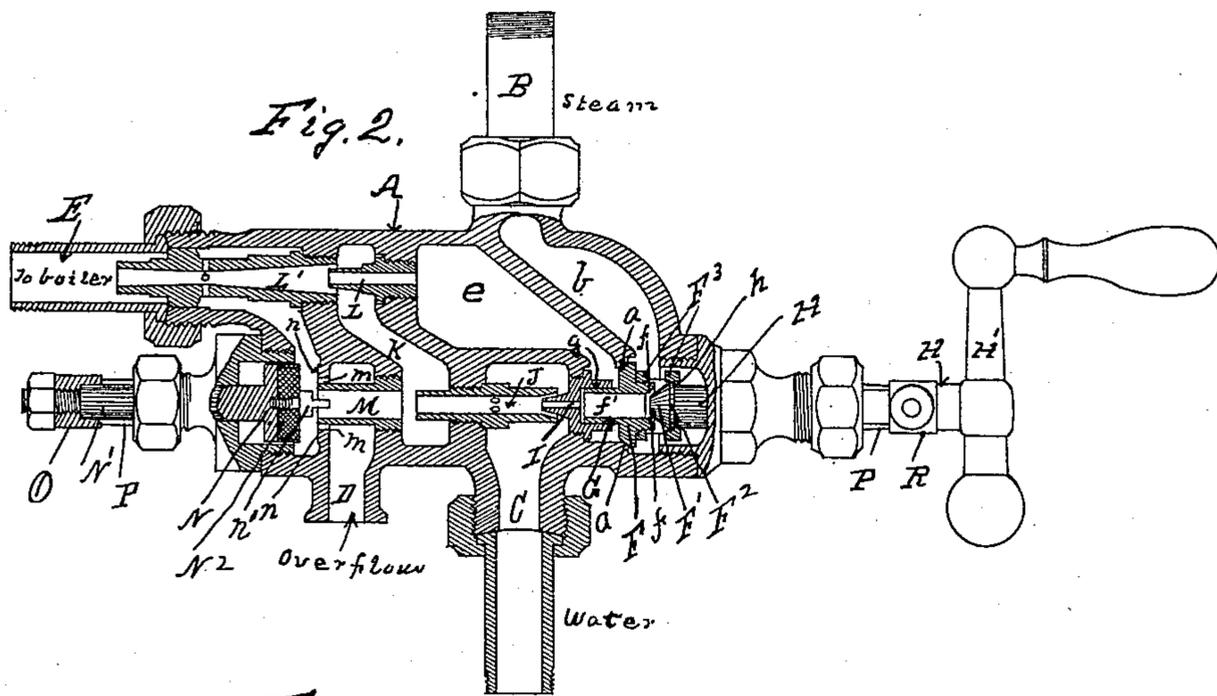
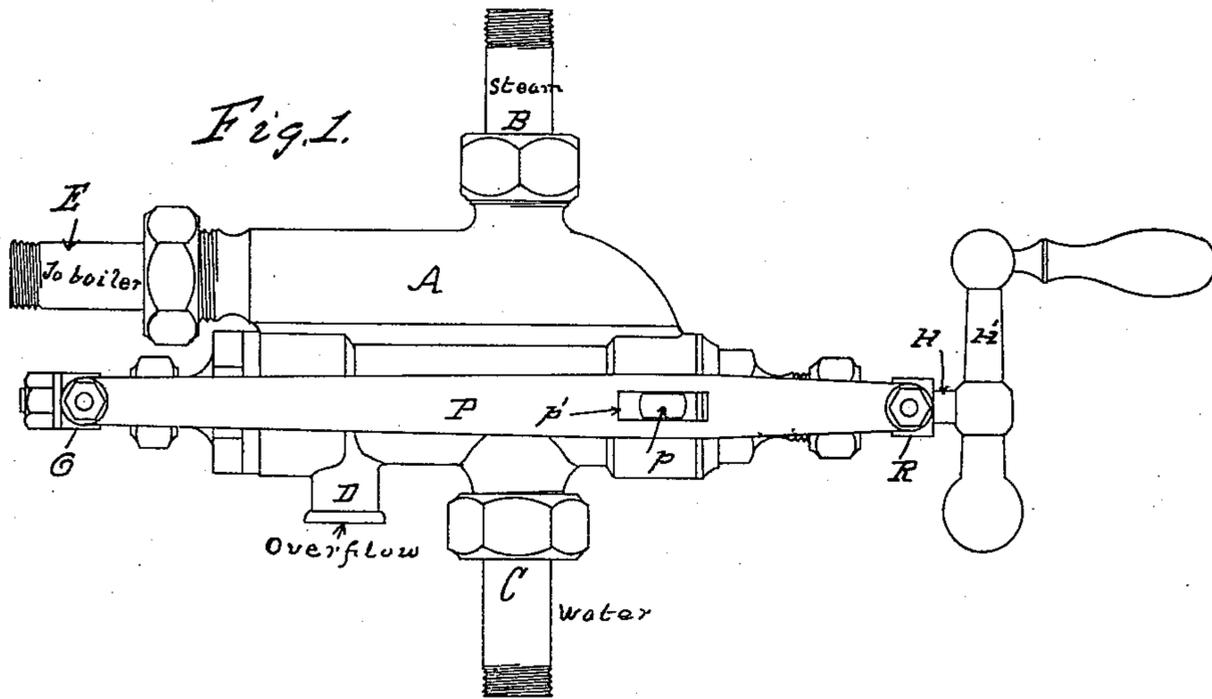


(Model.)

F. C. SAPPER.
INJECTOR.

No. 568,797.

Patented Oct. 6, 1896.



WITNESSES.
Fred Einfeldt
J. J. Barrett

INVENTOR.
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UNITED STATES PATENT OFFICE.

FRANK C. SAPPER, OF ERIE, PENNSYLVANIA, ASSIGNOR TO THE SIMS COMPANY, LIMITED, OF SAME PLACE.

INJECTOR.

SPECIFICATION forming part of Letters Patent No. 568,797, dated October 6, 1896.

Application filed June 12, 1895. Serial No. 552,574. (Model.)

To all whom it may concern:

Be it known that I, FRANK C. SAPPER, a citizen of the United States, residing at the city of Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in 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, reference being had to the accompanying drawings, and to the letters of reference marked thereon, forming part of this specification.

My invention consists in the improvements in injectors hereinafter set forth and explained, and illustrated in the accompanying drawings, in which—

Figure 1 is a side view in elevation of my improved injector. Fig. 2 is a longitudinal sectional view of the same. Fig. 3 is an enlarged sectional view of a portion of the same.

My invention consists in constructing a combined ejector and injector so that the opening of the steam-inlet valve operates, first, to let steam into the ejector, and by continuing the opening of the valve steam is afterward let into the injector and at the same time the overflow-valve is automatically closed. I accomplish this result by making the steam-inlet valve in two parts or sections, the first section of which is connected directly to the valve-stem and is seated upon the second section. The second section of the valve is also so connected to the first section that the first section can be moved back from its seat some distance so as to allow steam to pass through a central opening in the second section, but upon moving the first section back farther it engages a collar on the second section and moves that section back from its seat so as to allow the steam to pass outside of the second section, and for moving the overflow-valve links are connected with a cross-arm on the valve-stem and to a cross-arm on the stem of the overflow-valve, so that the overflow-valve moves forward and back in unison with the inward and outward movement of the valve-stem.

Other features of my invention relate to the construction of the injector and are set

forth hereinafter in the specification and claims.

In the construction of my invention illustrated in the accompanying drawings, A is the body of the injector, having a steam-inlet B, a water-inlet C, an overflow D, and a discharge-pipe E, all of which parts are common in injectors.

In the body A, I make a steam-passage *b*, leading to the steam-inlet valve F F'. The first section F' of this valve is secured directly to the inner end of a valve-stem H and is seated on a seat *f* on the second section F of the valve, which section F is seated on a seat *a* in the body A, and is provided with a tubular projection G, which telescopes into the enlarged opening *g* in the end of the ejector-tube I, and through the center of the tubular projection G on the valve-section F there is a central opening *f'*, through which, when the valve-section F' is opened, the steam passes to the ejector-tube I and into the water-lifting tube J, which operate to raise the water up through the water-inlet C and force it up through passage K to the injector-tubes L L', any surplus thereof flowing out through overflow-tube M and the overflow-passages *m* and D. On the valve-section F' is a collar F², and on the valve-section F there is secured a skeleton sleeve F³, having an internal shoulder *h*, with which the collar F² engages when it has been moved back a sufficient distance to remove the valve F' from its seat *f*, and as this movement is continued this engagement moves the valve-section F back from its seat *a*, allowing the steam to pass up through the passage *e* to the injector-tubes L and L' and force the water on through the outlet-pipe E to the boiler. At the rear end of the tube M and the passage *m* is a valve N, which, when the steam-inlet valve F F' is closed, is seated at *n*, so as to close both the rear end of the tube M and the passage *m*. The stem N' of this valve N passes out through the rear end of the body A and has a cross-arm O secured thereto, which projects far enough each way to receive the ends of links P, which are secured to the ends thereof, and extend forward to a like cross-arm R on the valve-stem H, to which cross-arm the other ends of the links

P are secured. This cross-arm is secured to the valve-stem H by means of collars, so that it has no longitudinal movement thereon, though the valve-stem H freely rotates there-
 5 in, and on the sides of the body A are guide-lugs *p*, which operate in slots *p'* in the links P to keep them parallel with each other. It will readily be seen that through the links P the longitudinal movement of the valve-stem
 10 H is communicated to the overflow-valve N, so that its movement toward and from its seat *n* is simultaneous with the outward and inward movement of the valve-stem H.

Having thus fully described my invention
 15 so as to enable others to construct and operate the same, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In an injector and ejector, the combina-
 20 tion, with the casing A provided with steam-passages *b* and *e*, and water-passages C and K; of a lifting-tube J connecting the passages C and K, an injector-tube L projecting from the passage *e* through the passage K, a sta-
 25 tionary ejector-tube I projecting within the tube J, a retractable valve-stem H provided with a valve F' and a collar, and a valve F normally closing the opening between the passages *b* and *e* and provided with a valve-
 30 seat *f*, a tube *f'* slidable in a socket in the ejector-tube I, and an open sleeve engaging

with the collar on the valve-stem H, said valve-stem operating when partially re-
 tracted to permit steam to pass from the pas-
 sage *b*, through the seat *f*, tube I and pipe J, 35
 to the passage K, and operating when fully retracted to permit steam to pass direct from the passage *b*, through the passage *e*, to the tube L, substantially as set forth.

2. In an injector and ejector, the combina- 40
 tion, with the casing A provided with a steam-
 passage *b*, and a water-passage C; of a lift-
 ing-tube J connecting the passage C with the
 water-outlet, a tube M arranged in line with
 the tube J and also communicating with the 45
 water-outlet, an overflow-passage D provided
 with an opening *m* connected with the water-
 outlet, a valve controlling the passage of
 steam from the passage *b* through the tube
 J, a retractable stem H for operating the said 50
 valve, a valve N operating to close the end
 of the tube M and the opening *m* after the
 said valve has been fully opened, and links
 P and connections operatively connecting the
 valve N with the valve-stem H, substantially 55
 as set forth.

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

FRANK C. SAPPER.

Witnesses:

HENRY SIMS,
 II. A. STRONG.