(Model.)

E. G. FELTHOUSEN & D. L. VOLKER.

INJECTOR.

No. 283,229. Patented Aug. 14, 1883.

Fig. 1.

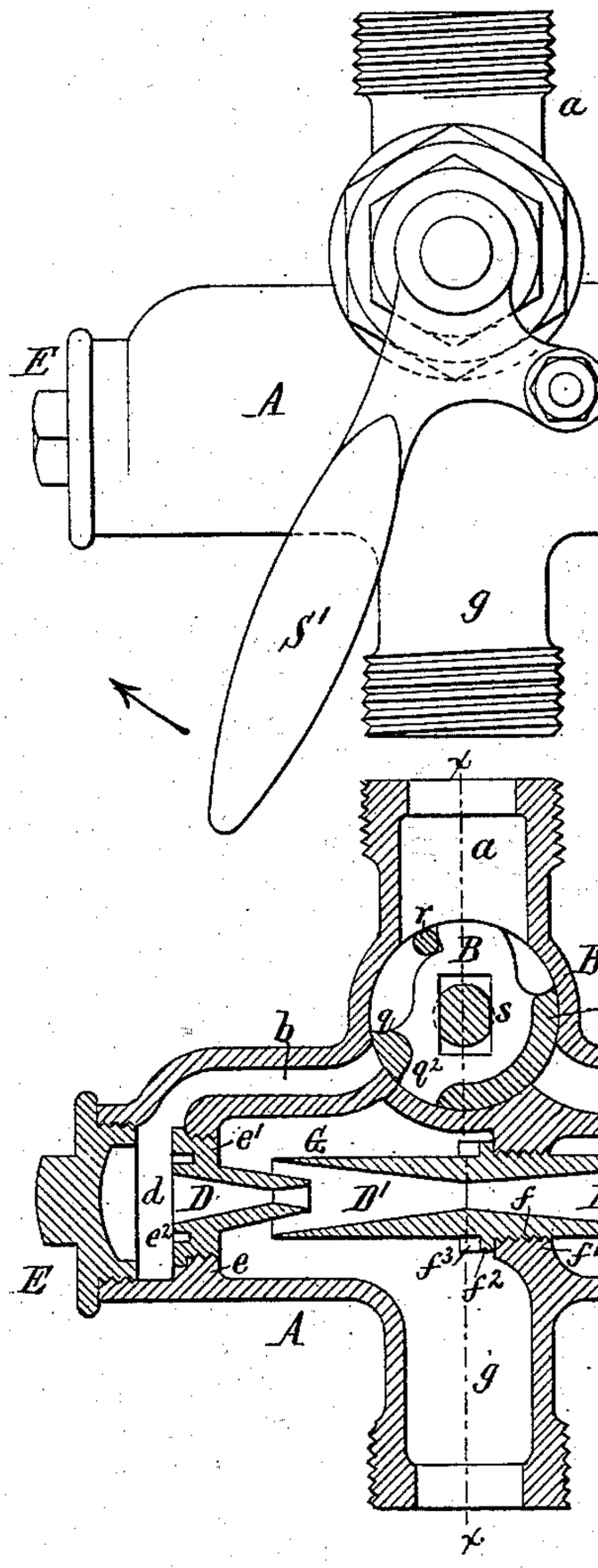


Fig. 6.

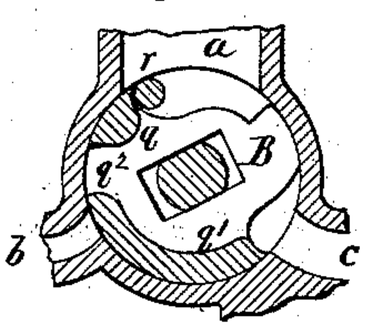


Fig. 5

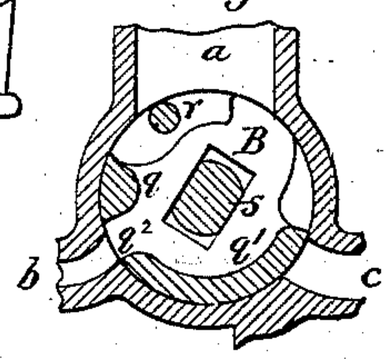


Fig. 2.

Fig. 3

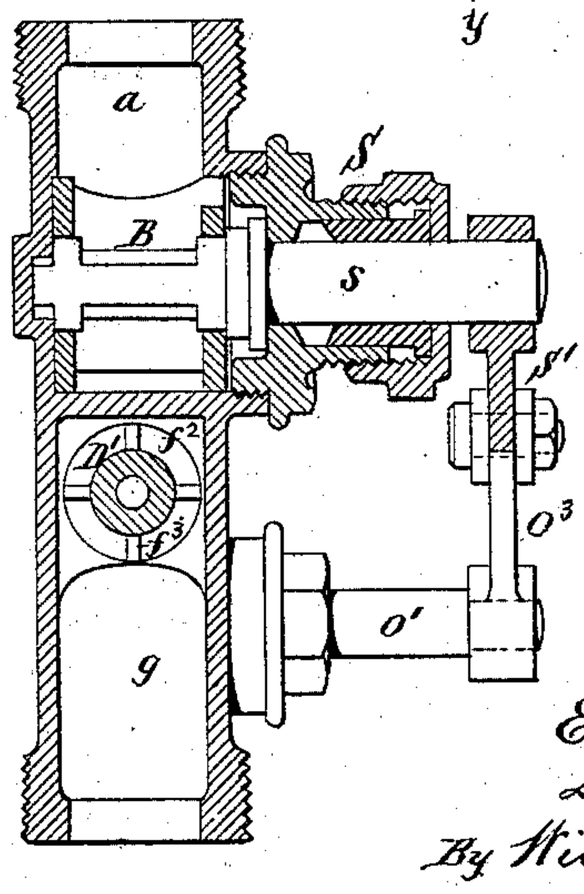


Fig. 4.

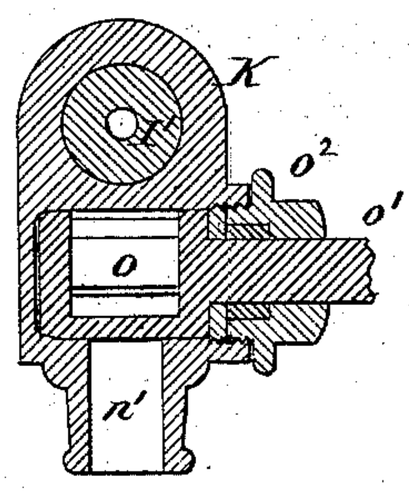


Fig. 8.

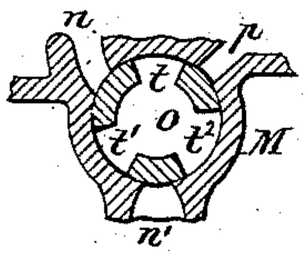
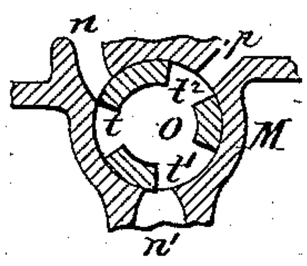


Fig. 7.



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UNITED STATES PATENT OFFICE.

EDWARD G. FELTHOUSEN AND DANIEL L. VOLKER, OF BUFFALO, N. Y.

INJECTOR.

SPECIFICATION forming part of Letters Patent No. 283,229, dated August 14, 1883.

Application filed May 18, 1883. (Model.)

To all whom it may concern:

Be it known that we, EDWARD G. FELTHOUSEN and DANIEL L. VOLKER, of the city of Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Injectors, of which the following is a specification.

This invention relates to an improvement in that class of injectors which are provided with two jet devices, one of which is designed to draw the water from the well or other point of supply and deliver the water to the second jet device, which latter serves to force the water into the steam-boiler.

The object of our invention is to render the injector simple and more compact in its construction and more efficient and convenient in its operation than heretofore; and our invention consists of the improvements in the construction of the injector, which will be hereinafter fully set forth, and pointed out in the claim.

In the accompanying drawings, Figure 1 represents a side elevation of our improved injector. Fig. 2 is a longitudinal section thereof. Fig. 3 is a cross-section in line *x x*, Fig. 2. Fig. 4 is a cross-section in line *y y*, Fig. 2. Figs. 5 and 6 represent different positions of the steam-valve. Figs. 7 and 8 represent different positions of the overflow-valve.

Like letters of reference refer to like parts in the several figures.

A represents the tubular shell or body of the injector, and *a* the steam-inlet pipe, which is connected with a steam-supply pipe by any suitable means.

B represents a rocking valve, which is arranged in a chamber, B′, communicating with the steam-inlet pipe *a*, and whereby the steam is directed to the jet apparatus of the condenser and excluded therefrom at desire.

b represents a steam passage or port leading from the steam-chamber B′ to the primary jet apparatus, whereby the water is drawn from the well or other supply, and *c* is a similar steam passage or port leading from the valve-chamber B′ to the secondary jet apparatus, which receives the mingled water and steam from the primary jet apparatus and forces it into the boiler.

D represents the steam-cone, D′ the combining-tube, and D^2 the diverging discharge-tube, of the primary jet apparatus. The cone D and tubes D′ D^2 are arranged about in axial line of the tubular shell A of the injector. The steam-port *b* communicates with a space or chamber, *d*, in which the open receiving end of the steam-cone D is arranged, and which is closed by a screw-cap, E, which is seated in a screw-threaded opening in the end of the tubular shell A of the injector. The steam-cone D is secured by a screw-thread in a threaded opening formed in a partition or diaphragm, *e*, whereby the steam-space *d* is separated from the water-space of the primary jet device.

The tubes D′ D^2 are formed in one piece and provided with an external screw-threaded portion, *f*, which is secured in a screw-threaded opening formed in a partition, *f′*, of the body of the injector.

The collar *e′* of the steam-cone D and the collar f^2 of the tubular part D′ D^2 are provided, respectively, with openings or recesses e^2 and f^3, to which a wrench can be applied for turning these parts in securing and unscrewing them.

g represents the water-inlet passage formed in the lower side of the body A, and communicating with the water-space G, which surrounds the inner end of the steam-cone D and the combining-tube D′.

H represents a passage or chamber formed in the body A of the injector, and leading from the diverging discharge-tube of the primary jet device to the combining-tube of the secondary jet device. The latter is composed of a steam-cone, I, a combining-tube, I′, and a diverging discharge-tube, I^2.

The steam-cone I is constructed with an external screw-thread, *i*, and a collar, *i′*, by which it is secured in a threaded opening in a partition, *j*, formed in the body A of the injector, so that the receiving end of the steam-cone I communicates with the steam-port *c*.

The combining-tube I′ and discharge-tube I^2 are formed of one piece, which is provided with an external screw-thread, *k*, and collar *k′*, whereby this tubular piece is secured to a partition, K, formed in the body A.

L is a screw-collar or tubular sleeve, secured in the discharge end of the body A of the injector, and provided with a central passage, in which a check-valve, *l*, is seated.

The collar *i'* of the steam-cone I and the collar *k'* of the tubular piece I' I² are provided, respectively, with openings or recesses *i²* *k²*, to which a suitable wrench can be applied for turning these parts in their screw-threads. The passage H communicates with a chamber, *m*, which surrounds the discharge end of the steam-cone I and the receiving end of the combining-tube I', as clearly shown in Fig. 2.

n represents an overflow-passage which leads from the chamber *m* to a valve-chamber, M, in which is arranged a rocking valve, O, whereby this passage is opened or closed.

n' is a discharge-passage which leads from the valve-chamber O to the exterior atmosphere.

P represents a chamber which is arranged in the body A of the injector around the discharge end of the diverging discharge-tube I², and *p* is a drain-passage which leads from the inner end of the chamber P to the valve-chamber M.

The rock-valve B is provided with a portion, *q*, which is adapted to cover the port *b*, a portion, *q'*, which is adapted to cover the port *c*, and an opening, *q²*, arranged between the portions *q* *q'*, and designed to register with the port *b* when it is desired to open said port. The portion *q'* is made so long that it will keep the port *c* closed when the port *b* is opened, and that it will not open the port *c* until the port *b* is closed.

r represents a stop arranged in the valve-case for limiting the rocking movement of the valve B.

s represents a rock-shaft, upon the inner end of which the valve B is mounted, and whereby the valve is actuated. The shaft *s* extends through a stuffing-box, S, and is provided at its outer end with a hand-lever, S', whereby it is turned. The overflow-valve is provided with a stem, *o'*, which extends outwardly through a stuffing-box, *o²*, and is provided with an arm, *o³*, which latter is connected with the hand-lever S' by a rod, S², so that both the steam-valve B and the overflow-valve O are adjusted simultaneously by moving the hand-lever S'.

The overflow-valve O is constructed in the manner of a three-way cock, with an aperture, *t*, adapted to register with the overflow-passage *n*, an aperture, *t'*, adapted to register with the outlet *n'*, and an aperture, *t²*, adapted to register with the drain-passage *p*. The solid portions of the valve O, between the apertures *t* *t'* *t²*, are so arranged that the overflow *n*, the drain *p*, and the outlet *n'* are open when the valve B closes the ports *b* and *c*, as represented in Fig. 2.

When the hand-lever S' is turned a short distance in the direction of the arrow, Fig. 1, the steam-port *b* is opened, while the port *c* remains closed, as represented in Fig. 5, thereby admitting steam to the primary jet device, and causing the water to be drawn through the inlet *g* into the chamber G, and to be moved through the tubes D' D², chamber H, and overflow *n*. When the water has been fairly set in motion and caused to fill these passages, the valve B is further moved by turning the handle S' in the same direction, thereby closing the port *b* and opening the port *c*, as represented in Fig. 6. The overflow-valve O is moved at the same time, so as to close the overflow-passage *n*, while the drain *p* and outlet *n'* remain open. The water is now driven by the steam-jet of the secondary jet device through the tubes I' I² and the chamber P into the boiler, the drain *p* operating as a relief-passage, whereby the first impact of the moving liquid is reduced. When the secondary jet apparatus has begun to operate satisfactorily, the handle S' is further turned in the same direction, so as to open the port *c* fully, whereby at the same time the overflow *n*, the drain *p*, and the outlet *n'* are closed, as represented in Fig. 8. The parts remain in this position while the apparatus remains in operation. The primary jet device serves to draw the water from the well and delivers the same to the secondary jet device, whereby the water is injected into the boiler.

As represented in the drawings, the steam-valve B is so constructed that the steam is shut off from the primary jet device when the steam is admitted to the secondary jet device; but, if preferred, the steam-valve B may be so constructed that the port *b* remains open when the port *c* is opened, thereby operating both jet devices simultaneously and obtaining the cumulative effect of both in drawing and forcing the water. This is readily accomplished by shortening the part *q'* of the steam-valve B or increasing the width of the opening *q²*.

We claim as our invention—

The combination, in an injector, of two jet devices, D D' D² and I I' I², arranged substantially in line with each other, a connecting chamber or passage, H, a rock-valve, B, and steam-ports *b* and *c*, leading from the valve-chamber to said jet devices, substantially as set forth.

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