A. FRIEDMANN.

Injector.

No. 213,648. **Patented Mar. 25, 1879.**

Fig. 1

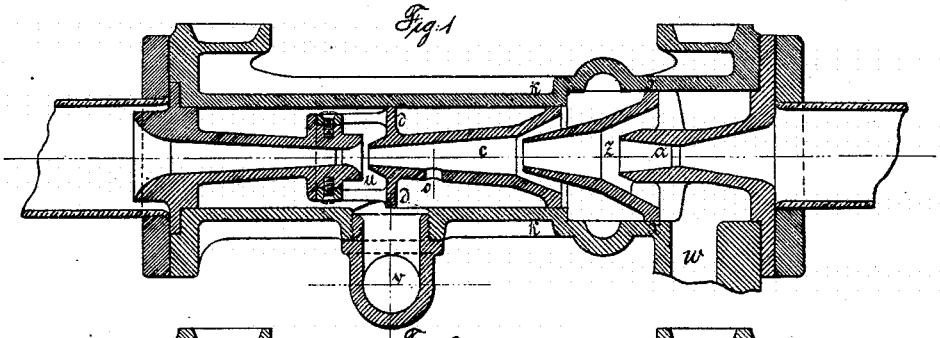


Fig. 2.

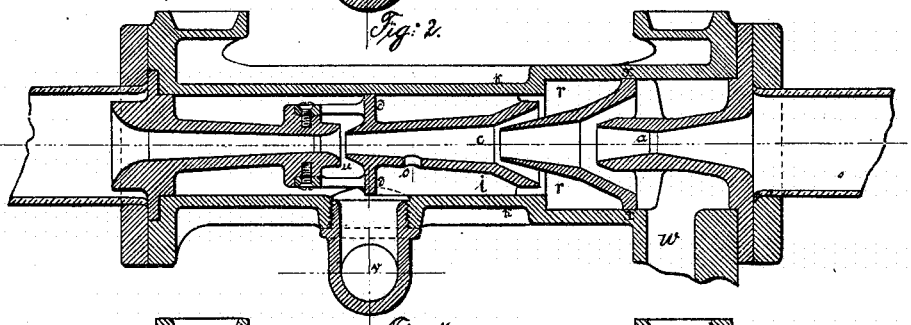


Fig. 3.

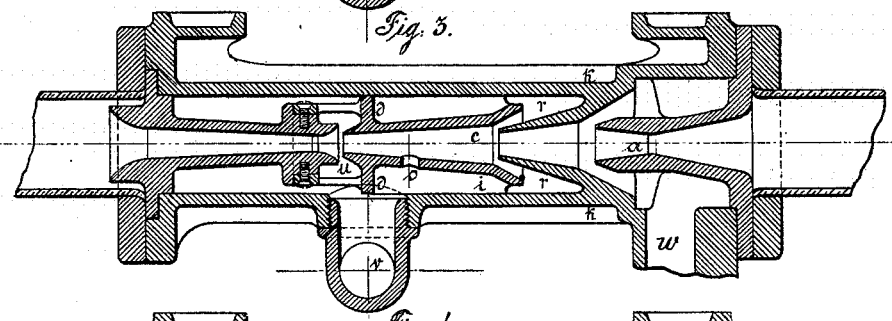


Fig. 4.

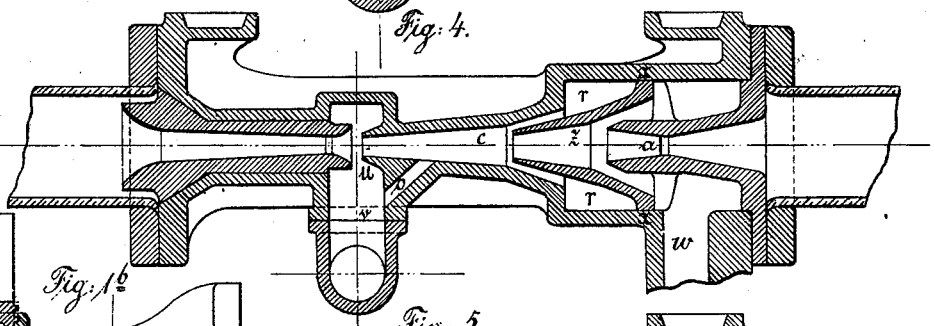


Fig. 1b

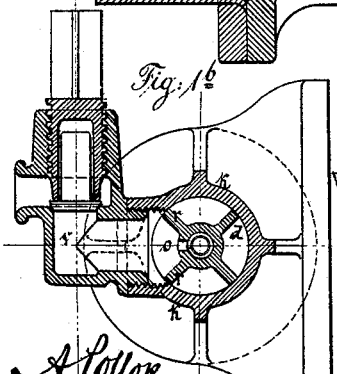
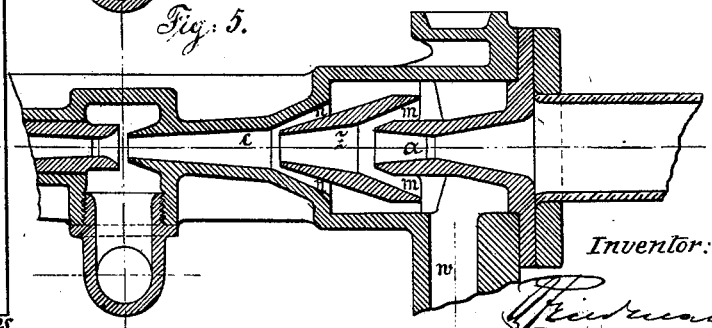


Fig. 5.



Witnesses.
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Inventor:
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UNITED STATES PATENT OFFICE.

ALEXANDER FRIEDMANN, OF VIENNA, AUSTRIA.

IMPROVEMENT IN INJECTORS.

Specification forming part of Letters Patent No. **213,648**, dated March 25, 1879; application filed February 5, 1879; patented in England, December 24, 1877.

To all whom it may concern:

Be it known that I, ALEXANDER FRIEDMANN, of Vienna, Austria, have invented a certain new and useful Improvement in Injectors, which improvement is fully set forth in the following description.

This invention relates to injectors which serve to supply boilers with water by the direct action of steam under pressure; and it consists in certain improvements on my own well-known form of injector, the same involving new constructions, combinations, and arrangements of parts, as hereinafter more fully set forth.

What these my said improvements are, and the manner in which the same are or may be carried into effect, will be readily understood from the following description and the accompanying drawings, which form a part thereof, in which, for the purpose of comparison and more ready comprehension of the invention, the old form of the injector, as well as the improved, is set forth.

Figures 1, 2, 3, and 4 of the drawings represent longitudinal central sections of injectors made in accordance with this invention; Fig. 1^b, a cross-section on lines *x x*, Figs. 1, 2, and 3; Fig. 5, a longitudinal section of my old form of injector.

Between the nozzle for the entering steam, *a*, and the condensation-chamber *c*, is an intermediate tube, *z*, which latter had the effect in my old injector (see Fig. 5) of dividing the water which enters the injector by the port W into two parts, so that one portion passed through the opening *m* between the steam-nozzle and intermediate tubes, and the other through the opening *n* between the intermediate tube and the walls of the condensation-chamber.

In injectors constructed according to one part of my present improvement the intermediate tube *z* is otherwise constructed and arranged. It no longer divides the inflowing water; but on the contrary all the water passes through the opening between the steam-nozzle *a* and intermediate tube *z*. This result is obtained by making a tight joint between the inlet end of said tube and the envelope or surrounding portion *x* of the body of the injector, as in Figs. 1, 2, and 4, or, which is preferred, by forming it, by casting or otherwise, in one piece with the body of the injector *k*, as shown in Fig. 3. In either construction there is a chamber, *r*, surrounding it, which is closed on the side on which the water enters, but communicates with the condensation-chamber *c* through the opening between the walls of the latter and the intermediate tube. At about midway of the condensation-chamber is a hole, *o*, through which communication is established with the space *i* on the side of the pipe of the overflow-valve *v*, as shown in Figs. 1, 2, and 3, or directly with the said pipe, as in Fig. 4. This space *i* is formed, as plainly shown in Fig. 1^b, by the outside of the condensation-chamber, the inner surface of the body of the injector *k*, the strengthening-ribs *r'* of the condensation-chamber, and the diaphragm *d*.

The diaphragm *d*, Figs. 1, 2, and 3, separates the space *u* from the space *i*, so that the former does not form a continuation of the latter, and it is so placed with reference to the overflow-pipe *v* that the water may pass thereinto as well from the space *u* as the space *i*.

The operation of the injector will be readily understood from the foregoing description.

By closing the space surrounding the intermediate tube *z* on the side of the inflowing water, by making the hole *o* in the wall of the condensation-chamber, and by the formation of the space *i* by means of the diaphragm *d*, the injectors are made to feed warmer water than can be done by injectors heretofore known.

The space *i*, formed by means of the diaphragm *d*, although very desirable for the best operation of the injector, is not absolutely essential; and, particularly if it is desired merely to alter my old injectors, a great improvement in operation is effected by the construction represented in Fig. 4, to wit: by making the hole *o* directly from the condensation-chamber into the overflow-pipe *v*, the space *r* being closed on the side of the inflowing water, as before explained.

In the injectors represented in Figs. 2 and 3, the space *r* and the space surrounding the condensation-chamber communicate with each other, so that there is less danger of bursting when exposed to severe cold.

In Fig. 3 there is a disadvantage from the contraction of the space *r;* but the construc-

tion is simpler, the intermediate tube being cast in one piece with the body of the injector. It is very evident, however, that the body of the injector and the intermediate tube may be cast in one piece, while the large size of the space *r* is maintained, and this construction of those parts is therefore preferred.

The diaphragm *d* is shown in the Figs. 1, 2, and 3 as made in one piece of casting with the condensation-chamber, which is the best construction; but it may be otherwise attached to the condensation-chamber, or cast in one piece with or otherwise attached to the body of the injector; or it may be independently secured between the walls of the condensation-chamber and the body of the injector.

I do not therefore wish to limit myself to the details of construction; but,

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

1. In an injector, the condensation-chamber having at a suitable distance from the outlet a hole in its walls and communicating therethrough with the overflow-pipe, substantially as described.

2. In an injector, the condensation-chamber with a hole in the walls at a suitable distance from the exit, in combination with the diaphragm formed in one piece therewith, or otherwise interposed between it and the body of the injector, and an overflow-pipe, substantially as described.

3. The combination, in an injector, with the steam-nozzle, an intermediate tube between said nozzle and the condensation-chamber, the same being fitted tightly within or made in one piece with the surrounding portions of the body of the injector, and the condensation-chamber communicating through a hole at some distance from the outlet with an overflow-pipe, substantially as described.

4. An injector having a steam-nozzle, an intermediate tube fitted tightly within or made in one piece with the surrounding portions of the body of the injector, a condensation-chamber having a hole in its walls at some distance from the outlet, a diaphragm surrounding the end of said condensation-chamber, between it and the body of the injector, and an overflow-pipe, substantially as described.

5. An injector having a steam-nozzle, an intermediate tube between said nozzle and the condensation-chamber, the said tube being fitted closely within or made in one piece with the surrounding body of the injector, a condensation-chamber with a hole in its walls at some distance from its outlet, a diaphragm surrounding said condensation-chamber, between it and the body of the injector, the space or spaces formed by said diaphragm, the condensation-chamber, and body of the injector being in communication with the space surrounding aforesaid intermediate tube, and an overflow-pipe in communication with the spaces on both sides of said diaphragm, into one of which spaces the hole in the walls of condensation-chamber opens, substantially as described.

In testimony whereof I have signed my name to this specification before two subscribing witnesses.

A. FRIEDMANN.

Witnesses:
ROBT. M. HOOPER,
J. ARMENGAUD, Jeune.