

(Model.)

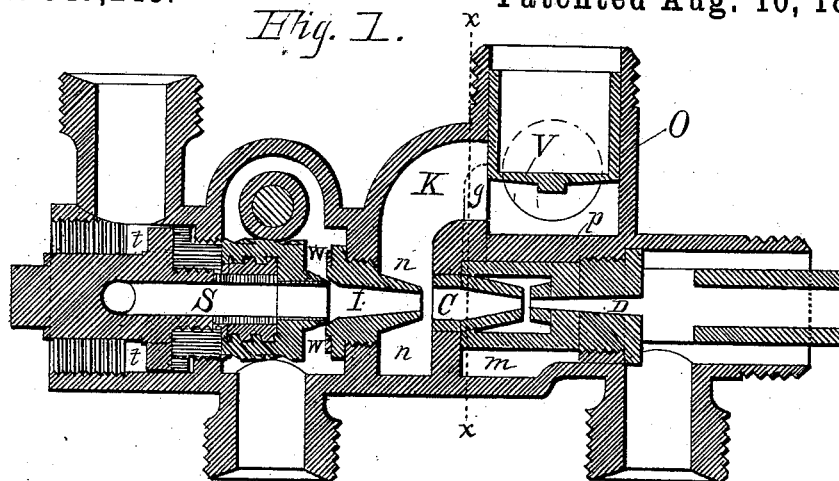
J. JENKS & T. J. HART.

INJECTOR.

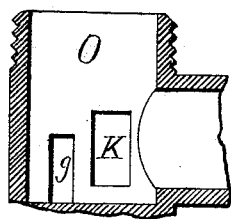
No. 347,245.

Patented Aug. 10, 1886.

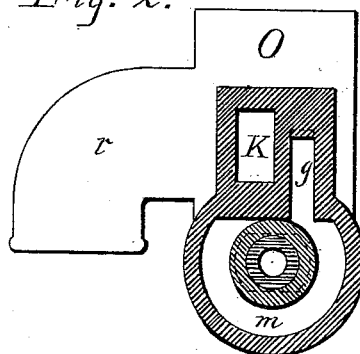
*Fig. 1.*



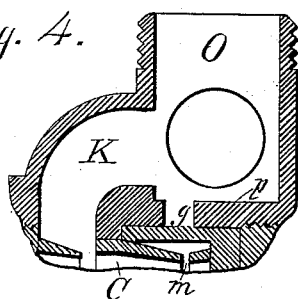
*Fig. 3.*



*Fig. 2.*



*Fig. 4.*



WITNESSES:

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# UNITED STATES PATENT OFFICE.

JAMES JENKS AND THOMAS J. HART, OF DETROIT, MICHIGAN.

## INJECTOR.

SPECIFICATION forming part of Letters Patent No. 347,245, dated August 10, 1886.

Application filed September 4, 1885. Serial No. 176,181. (Model.)

*To all whom it may concern:*

Be it known that we, JAMES JENKS and THOMAS J. HART, citizens of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented a new and useful Improvement in Injectors, which Improvement is fully set forth in the following specification.

This invention relates to that class of feed-water injectors for feeding boilers that have an automatic relief valve or valves, and particularly to the manner of operating the same, which will be more readily understood from the following description, and the drawings which form a part thereof.

Figure 1 is a longitudinal central section. Fig. 2 is a cross-section at the line X X. Fig. 3 shows an internal elevation of the overflow-pipe, showing especially the ports opening into it. Fig. 4 shows a modified form of our invention.

Fig. 1 shows the form of injector to which we apply our improvement; and it consists of a steam-nozzle, S, discharge-tube C, an intermediate tube, I, between the steam-nozzle S and tube C, said intermediate tube being fitted closely within or made in one piece with the surrounding body of the injector, a diaphragm surrounding the tube C, and between it and the body of the injector, the delivery-tube D, the steam-chamber *t*, water or suction chamber *w*, and relief-chambers *n* and *m*. An upright overflow-pipe, O, is connected with the body of the injector, and has fitted to the interior a plug or slide valve, V. Across the bottom of the overflow-pipe is a diaphragm, *p*, closing direct communication with the interior of the injector. In the side of the overflow-pipe is a port communicating by the passage K with the chamber *n*, and is arranged in reference to the opening from the chamber *m*, so that the port leading to the passage K will be closed by the valve V before the port to the passage *g* shall be entirely closed. This result is attained by making the port to the passage K with its lowest point some distance above the diaphragm *p* across the bottom of the overflow-pipe, while the port to the passage *g* has its lowest point coincident with the bottom, or at least below the lowest point to which the valve V is allowed

to descend. Close contact between the lower surface of the valve V and the diaphragm *p* is prevented by a suitable projection on one of the surfaces, or by any equivalent which will keep the two surfaces sufficiently apart to allow steam from the passage *g* to enter between the two and raise the valve. An escape-pipe, *r*, (shown by Fig. 2,) allows the surplus water to pass away.

We prefer to make the relative position of the two ports as specifically described—that is, so that the extreme lower part of the port from the passage K will be somewhat below the extreme lower part of the port from the passage *g*, inasmuch as when working with a low pressure of steam much better results are obtained than when the ports are closed simultaneously. With a high pressure the result of a difference of elevation of the lower extremity of the ports is not so noticeable.

A modified form of our invention is shown in Fig. 4, in which the passage *g* has its opening through the diaphragm *p*, instead of into the side of the overflow-pipe.

It will be seen that our invention consists in so arranging the ports leading from the chambers *n* and *m* that they can be closed successively by a single slide-valve, V.

Having thus described our invention, what we claim as novel, and desire to have secured to us by Letters Patent, is—

1. In an injector, the combination of a tube C, having a diaphragm surrounding it, and interposed between it and the surrounding body of the injector, and an overflow-pipe having two inlet-ports, one of which communicates with the space at the side of said diaphragm nearest the delivery-tube, and the other of which communicates with the space at the opposite side, with a valve to close the ports, the said inlet-ports being so arranged with respect to each other that the one communicating with the space at the side of said diaphragm nearest the delivery-tube shall remain open or partially open for a period of time after the other opening shall have been fully closed by the valve.

2. An injector having a steam-nozzle, an intermediate tube between said nozzle and the discharge-tube, the said intermediate tube being fitted closely within or made in one

piece with the surrounding body of the injector, a discharge-tube having a diaphragm surrounding it and interposed between it and the body of the injector, the spaces formed  
5 by said diaphragm, the discharge-tube, and the body of the injector being both in communication with the overflow-pipe by means of ports closed by a valve in said overflow-pipe, one of which ports is so situated with

respect to the other as to be entirely closed by said valve, while the other remains open or partially open.

JAMES JENKS.  
THOMAS J. HART.

In presence of—

CHARLES F. BURTON,  
MILTON T. DUNCANSON.