(Model.)

2 Sheets—Sheet 1.

T. J. SWEENEY.

STEAM INJECTOR.

No. 407,499. Patented July 23, 1889.

Fig. 1.

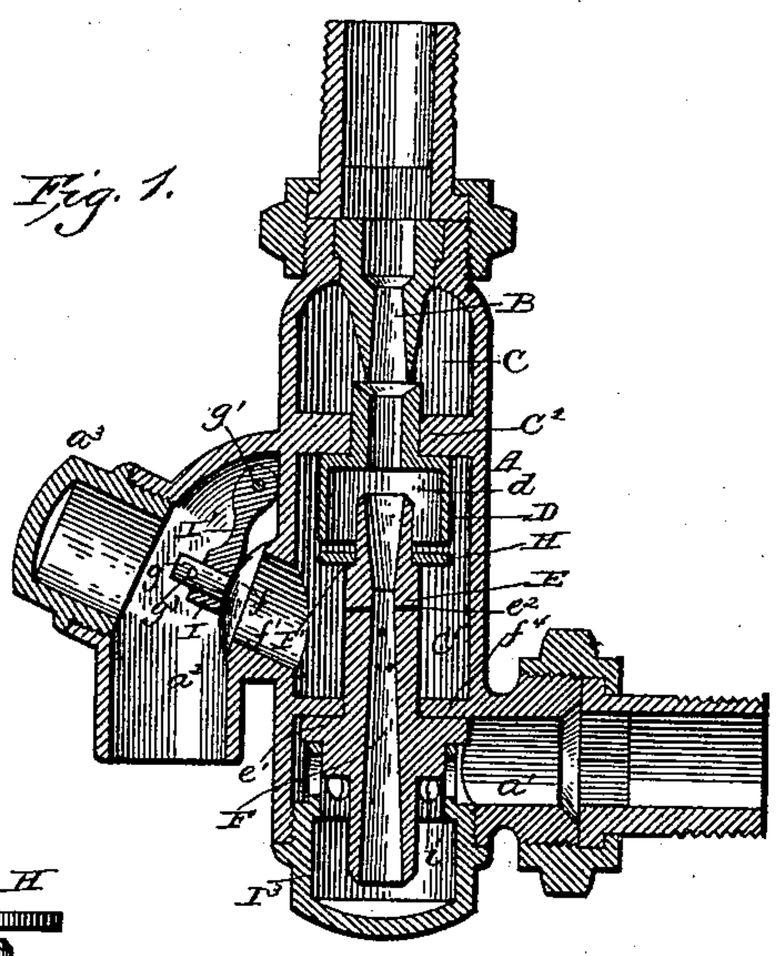


Fig. 3.

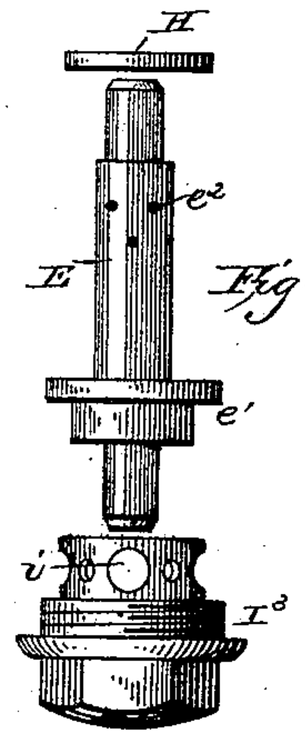
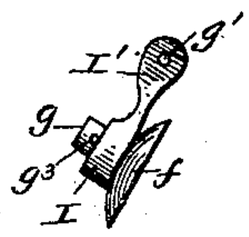


Fig. 4.



Witnesses:
John Enders Jr.
Paul A. Stevens

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N. PETERS, Photo-Lithographer, Washington, D. C.

(Model.) 2 Sheets—Sheet 2.

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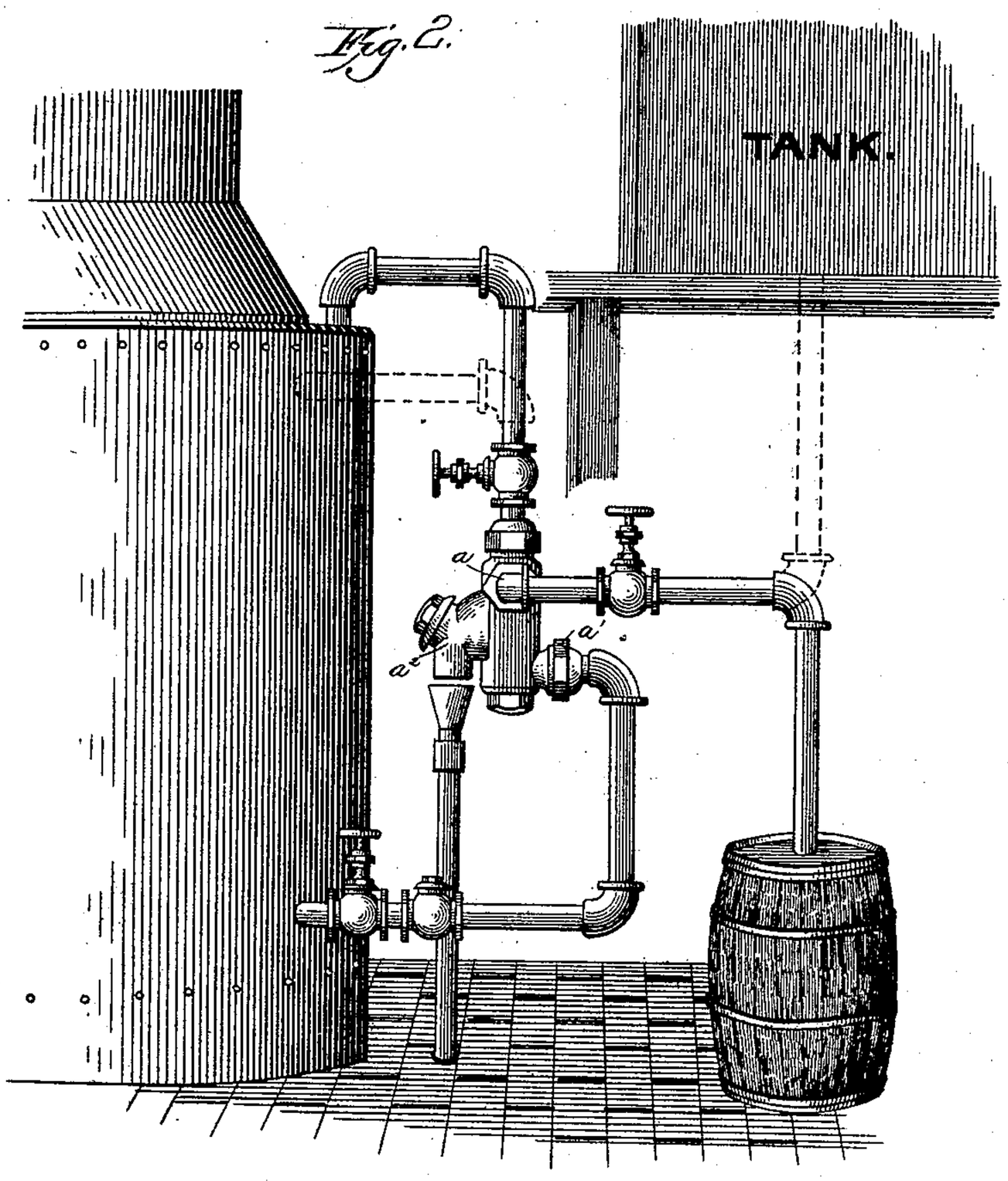
STEAM INJECTOR.

No. 407,499. Patented July 23, 1889.

Fig. 2.



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Thomas J. Sweeney
per
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Attorneys.

N. PETERS. Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

THOMAS J. SWEENEY, OF DETROIT, MICHIGAN, ASSIGNOR TO THE PEN-BERTHY INJECTOR COMPANY, OF SAME PLACE.

STEAM-INJECTOR.

SPECIFICATION forming part of Letters Patent No. 407,499, dated July 23, 1889.

Application filed February 9, 1889. Serial No. 299,238. (Model.)

To all whom it may concern:

Be it known that I, THOMAS J. SWEENEY, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Steam-Injectors, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention is directed to certain improvements in steam-injectors, having for its object to simplify construction and promote convenience in cleaning the spill holes or apertures in the combining-tube, as also to effect the seating of the valve wholly by the action of the vacuum in the lifting-tube in lieu of operating it by the force of the water acting thereon, thus dispensing with the use of a sleeve hitherto employed to support the valve, and to provide a water chamber or jacket around the combining-tube for the direction of the water against the valve.

The invention therefore consists, principally, in supporting the valve directly upon the combining-tube in close proximity to the lower edge of the lifting-tube or chamber, a slight space, however, being provided between said valve and tube or chamber, all as will more fully appear from the following description and the accompanying illustration, in which—

Figure 1 is a vertical sectional view of my invention. Fig. 2 is a side elevation of the same as applied for use. Figs. 3 and 4 are detail views thereof.

In carrying out my invention I employ a tubular casting or casing A, having arms a a' a^2. The arm a has suitable pipe-connection with the source or supply of water, and the arm a' has similar connection with the boiler to be supplied with water. In the branch or arm a^2 is disposed the overflow-valve, more fully referred to further on.

B is the steam-jet pipe arranged in that end of the casting or casing A connected with the steam-chamber of the boiler, the passage of which is preferably of the contour shown in Fig. 1, being more or less contracted or tapering upward to a certain point below its upper end.

C is the water-supply chamber, and C′ is the overflow water-chamber, separated by an apertured partition C^2.

D is the lifting-tube, which is rigidly secured in the aperture of the partition C^2, and which is formed with an enlargement in the form of a cylindric chamber d, having its upper or one end in contact with the said partition C^2.

E is the combining-tube, which has a central tapering aperture e, and at its lower end, where said combining-tube is formed integral with the delivery-tube F, are a series of small apertures e^2, termed the "spill-apertures." The delivery-tube F has at its point of conjunction with the combining-tube E an external ring or flange e', the purpose of both which and the spill-apertures will be seen presently. The upper end of the combining-tube projects within the chamber of the lifting-tube within a short distance of the central aperture thereof.

H is a small lifting valve or disk flat on both its upper and lower surfaces. This valve is slipped on the upper end of the narrow combining-tube E, its under side resting on a shoulder F′ on the combining-tube, and when thus resting on the said shoulder of the tube E a small space is left between the upper horizontal face of the valve or disk and the lower edge of the chamber of the lifting-tube D.

The overflow water-chamber C′ has a circular flange f^4 formed at a point immediately adjacent the inner end of the arm or branch a', and against this flange bears the upper surface of the ring or washer e' of the delivery-tube, the same being retained thereat by means of a plug I^3, screwed in the lower portion of the injector, so as to cause its upper edge to bear against the ring or washer. This inner portion of the ring or washer is provided with suitable apertures i, to permit the escape of water from the interior of the plug to the branch or arm leading to the boiler, as will appear further on. Within the lateral curved arm a^2 is disposed the overflow-valve I, the same consisting of a disk f, seated over the overflow hole or opening f', formed in the wall of the casting or casing at this point. The disk has a solid extension or stem g, upon which is passed the apertured end of an arm

I′. The other end of said arm I′ is pivoted by a small cross bar or rod g', secured at its ends in apertured lugs formed upon the upper portion of each side wall of the curved lateral arm a^2. After passing the apertured end of arm I′ on the stem or extension g a small pin g^3 is passed through a transverse aperture in said stem, securing the disk or valve f in place thereon. The outer end of the wall or casing of the overflow hole or opening f' is adapted to enable the valve, when in its normal position, to stand in an outwardly and downwardly inclined position, thus always insuring, principally by gravity, the automatic seating of the valve over the overflow hole or opening. The stem or extension g is slotted in its outer end the same as a screw-head, to receive the bit of a screw-driver for the purpose of reseating the valve at any time. The curved lateral arm a^2 is fitted with a screw-cap a^3, screwing into a screw-threaded nozzle-like opening in said arm, permitting ready access to the overflow-valve.

Steam admitted into the jet-pipe B passes through the tapered passage thereof into the lifting-tube D, thus lifting the water into the supply-chamber C. The water then passes through the lifting-tube and out into the overflow-chamber C′, that, however, entering the combining-tube passing through the spill-apertures e^2 in the lower end of the combining-tube, and thence into the overflow-chamber. The vacuum within the chamber D seats the valve H against the lower edge of the chamber D, thus cutting off the inflow of hot water over the mouth of the combining-tube, enabling the injector to be started with a low pressure of steam.

Upon the injector starting the hot water stops flowing through the spill-apertures e^2 in the combining-tube. In event the valve H should retain its seat upon the chamber D, the steam-jet upon the restarting of the injector will force the valve down upon the shoulder of the combining-tube until removed by the vacuum in the chamber D. The water which passes into the overflow-chamber opens the overflow-valve I and passes off.

The steam and water, when the injector is in action, pass through the delivery-tube and into the hollow plug I^3, and thence through the apertures i of the latter, and finally into the water-chamber of the boiler.

Among other advantages of this invention is to be mentioned the dispensing with the use of a sleeve for supporting the lifting-valve and the avoidance of the use of a separate water chamber or jacket to direct, as heretofore practiced, the water against the valve as a means to aid the closing or seating of the valve, in this invention, as hereinbefore stated, the vacuum wholly lifting the valve. Besides, it permits of ready or easy access to the spill-holes e^2 in the combining-tube to allow of the ready cleaning of the same.

I claim as my invention—

1. The steam-injector having the lifting-valve consisting of a disk having plain upper and lower surfaces, in combination with the combining-tube and vacuum-chamber, said valve normally resting wholly upon a shoulder of the combining-tube and arranged below the vacuum-chamber, a narrów space being provided between said disk or valve and the lower edge of said vacuum-chamber, substantially as shown and described.

2. In a steam-injector, the combination, with the tubular casing having the overflow water-chamber provided at its bottom with an unthreaded circular flange, and the hollow plug arranged in alignment with the overflow water-chamber, provided at its bottom with an unthreaded circular flange, and the hollow plug arranged in alignment with the overflow water-chamber, of the integral combining and delivery tube formed with an unthreaded ring or flange, having its upper side fitting against the under side of the flange of the overflow water-chamber and its lower side resting upon the upper edge of said plug, substantially as set forth.

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

THOMAS J. SWEENEY.

Witnesses:

SOLIN JOHNSON,

JNO. B. CORLISS.