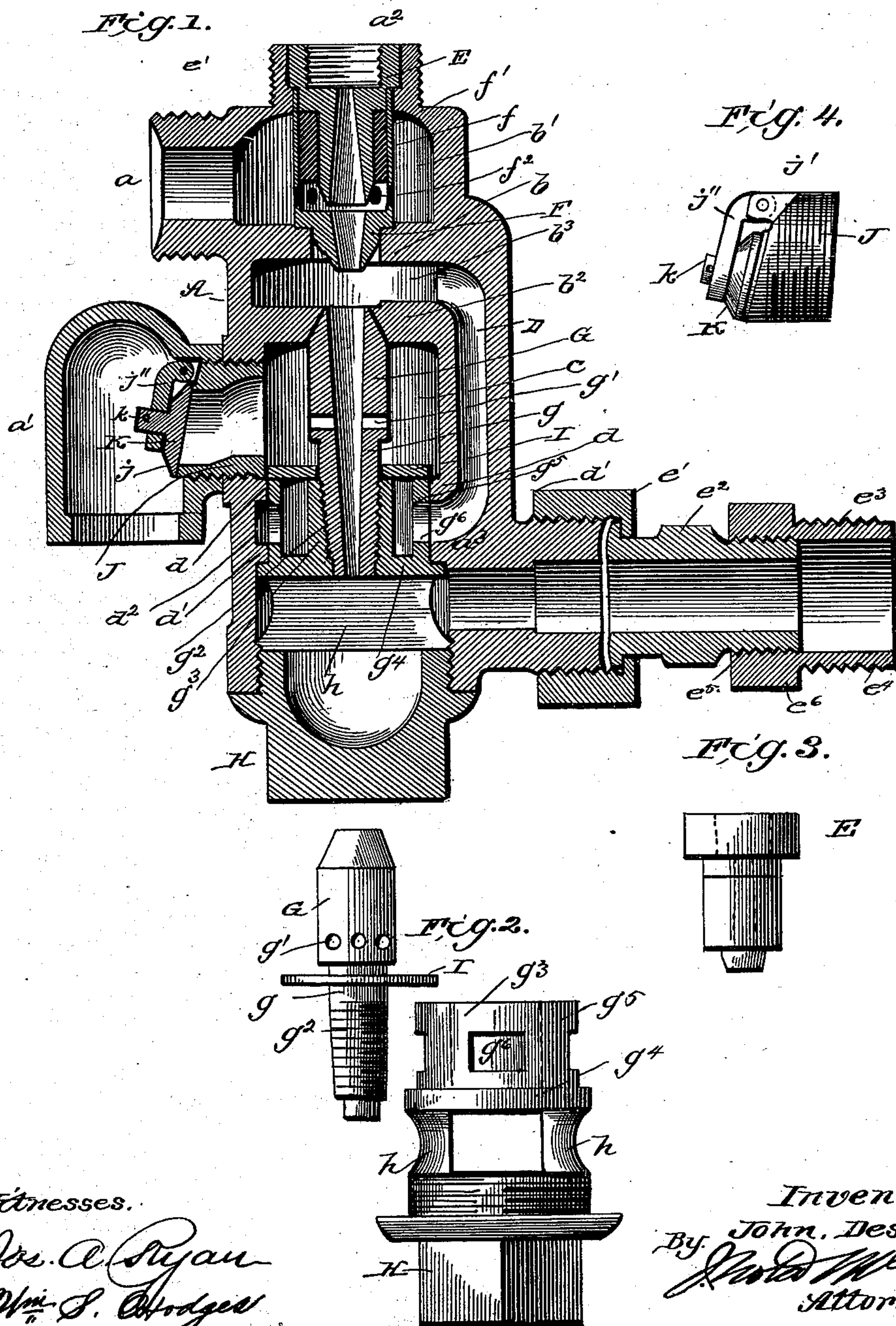


(Model.)

J. DESMOND.
STEAM INJECTOR.

No. 402,513.

Patented Apr. 30, 1889.



Witnesses.

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STEAM-INJECTOR.

SPECIFICATION forming part of Letters Patent No. 402,513, dated April 30, 1889.

Application filed June 20, 1888. Serial No. 277,635. (Model.)

To all whom it may concern:

Be it known that I, JOHN DESMOND, a citizen of the United States of America, residing at Wadsworth, in the county of Medina and State of Ohio, 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.

10 This invention pertains to certain new and useful improvements in steam-injectors.

The invention has for its object the provision of a new and improved device of this class, whereby the water supplied to the injector is not heated until the same reaches the lifting-tube, and the deleterious effect of the entrance of a globule of air into the jet of steam and water is avoided, the entrance of such globule of air into the jet in the starting of the injector being prevented by the dropping of a valve caused by a vacuum created at the mouth of the combining-tube.

15 The invention also comprises the peculiar construction, combination, and arrangement of parts, substantially as hereinafter fully set forth, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical sectional view of my invention. 20 Fig. 2 is an enlarged detail view of the steam-inlet jet, showing parts removed. Fig. 3 is a similar view of the series of tubes, and Fig. 4 is an enlarged detail perspective view of the overflow-valve.

25 Referring to the drawings, A designates the casing or tubular casting of my improved injector, having on one side the water-supply branch or arm a and the overflow branch or arm a' , at its upper end the steam-supply branch or arm a^2 , and on its other side the branch or arm a^3 , leading to the boiler. The casing or casting A is divided at its upper end by a circular partition, b , into a water-inlet chamber, b' , and adjacent to this partition is a second similar partition, b^2 , forming an upper primary overflow-chamber, b^3 . The large central or main overflow-chamber, C, is located between this latter partition b^2 and a lower circular flange or ring, d , which, together with a similar flange or ring, d' , forms an auxiliary overflow-chamber, d^2 .

D is a duct or passage-way formed in one side of the casing A in an extension, e , thereof, the same extending from the upper primary overflow-chamber, b^3 , to the lower auxiliary overflow-chamber, d^2 .

E is the steam-inlet jet or tube, disposed in the upper branch or arm, a^2 , of the casing, and the same is secured therein by one of the pipe-couplings e' screwed thereon. Upon the short pipe-section e^2 of this and the other couplings e' is screwed a short pipe, e^3 , having an outer male thread, e^4 , an inner female thread, e^5 , and a lower hexagonal-shaped flange, e^6 , to permit of the application thereto of a wrench or other device for moving the same in the desired direction. This outer male thread is used in lieu of the female thread heretofore employed, and by this change or arrangement the coupling and uncoupling of the injector to the adjoining pipes is more readily accomplished.

The lifting-tube F projects through an aperture in the circular partition b , and the same has an upper cylindrical extension, f , wherein projects the jet or tube E. This jet or tube is provided with a hardened or vulcanized rubber sleeve or jacket, f' , which entirely surrounds the same to a point near its end, and upon this rubber sleeve or jacket is fitted the cylindrical extension f . A series of holes or apertures, f^2 , is formed in the cylindrical extension f just above the lifting-tube F, and through these apertures the water is drawn from the water-inlet chamber b' . By reason of this peculiar arrangement the inflowing water is kept cool and prevented from being affected by the heat of the steam-jet, whereby the condensation will take place only in the lifting-tube.

G is the combining-tube, which projects to within a short distance of the lifting-tube, and from this combining-tube extends the delivery-tube g , a series of overflow holes or ports, g' , marking the point of connection of these two tubes. The delivery-tube g is provided on its outer surface with a left-hand thread, g^2 , whereby said delivery-tube is screwed into a central sleeve or short extension, g^3 , projecting from a lower partition, g^4 , of an inclosing-ring, g^5 , wherein are formed a series of openings, g^6 , as shown.

The end plug, H, is screwed into the end of the injector, and from its inner end project two arms, *h h*, formed integral at their outer ends with the ring *g*⁵. The upper outer end of the ring *g*⁵ fits snugly against the flange or ring *d*, while the lower thickened end of said ring bears against the flange or ring *d'*, thus forming tight joints at these points.

I is a check-valve designed to slide on a narrow circular portion of the delivery-tube, and when lowered to rest and fit snugly upon the upper end of the inclosing-ring *g*⁵.

Within the overflow-opening is screwed a short pipe or plug, J, in the outer end of which is formed a narrow opening and a beveled or inclined surface, *j*. Between apertured lugs *j'* of this short pipe or plug J is pivotally secured the upper end of a curved arm, *j''*, to the lower outer end of which is attached the overflow-valve K. This valve consists of a disk fitting over the beveled surface *j*, and the same has a lug or short extension, *k*, which is secured by a suitable cross-pin after being projected through an aperture in the end of the arm *j*. This valve always occupies a slanting or inclined position by reason of the inclination or bevel given the end of the short pipe or plug J. The overflow branch or arm *a'* is screwed into place on a thread formed on the outer surface of this pipe or plug J. The principal advantage of this peculiar arrangement is that the short pipe or plug can be made of harder metal than the body of the injector, and when the same becomes worn it can be readily replaced.

The operation is as follows: Steam being admitted to the jet-pipe, passes into the lifting-tube, causing the lifting of the cold water into the water-supply chamber, said water not being affected by the heat of the steam jet-tube. The steam, together with the water, first passes out of the lifting-tube into the primary overflow-chamber, from which it is conveyed through the duct or passage-way D into the auxiliary overflow-chamber *d*², and, entering the apertures of the inclosing-ring *g*⁵, will effect the elevation of the check-valve I, and, passing into the main overflow-chamber, will cause the raising of the overflow-valve and allow the overflow to take place. As soon as the jet is established at the mouth of the combining-tube, a vacuum is created at that point, causing the dropping of the check-valve, which will prevent a current of air from passing up to the said mouth of the combining-tube. Immediately upon the establishment of the jet, as detailed, the check and overflow valves are closed and said former valve is left submerged in water, which extends to the overflow-opening, and the same depth of water remains in the duct

or passage-way, and the jet will then pass through the delivery-tube on into the boiler. By this means the entrance of any globule of air in the jet will not result in the breakage thereof, as heretofore experienced, and the same are prevented from passing to the mouth of the combining-tube by the column of water around the check-valve.

I claim as my invention—

1. In an injector, the casing or tubular casting having the upper, primary, and lower auxiliary overflow-chambers and the single duct or passage-way formed in the outside of said casing and connecting said upper and lower overflow-chambers at its ends independent of the main overflow-chamber, substantially as described.

2. In an injector having the single casing or tubular casting, the main central overflow-chamber formed by said casing and having the outlet arm or branch, the upper, primary, and lower auxiliary overflow-chambers formed, respectively, above and below said main central overflow-chamber, and the duct or passage-way connecting said upper and lower overflow-chambers independent of said main overflow-chamber, substantially as described.

3. In an injector, the apertured inclosing-ring, the delivery and combining tubes, and the check-valve moving on said delivery-tube and designed to rest on the upper end of said ring, substantially as described.

4. The combination, with the casing having the circular flanges and the central and lower auxiliary overflow-chambers, of the apertured inclosing-ring designed to bear against said flanges, the delivery and combining tubes, and the check-valve designed to move on said delivery-tube and to rest upon said ring, substantially as described.

5. As an improvement in injectors, the steam-inlet jet or tube having a covering and the lifting-tube having an upper cylindrical extension surrounding said covering, whereby the water is not affected by the heat of said jet or tube, substantially as described.

6. As an improvement in steam-injectors, the steam-inlet jet or tube, the hardened or vulcanized rubber sleeve or jacket surrounding the inner portion thereof, and the lifting-tube having an upper cylindrical extension surrounding said rubber sleeve or jacket and provided with a series of holes or apertures, substantially as described.

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

JOHN DESMOND.

Witnesses:

J. NOTA MCGILL,
M. DORIAN.