(Model.)

W. PENBERTHY.

STEAM INJECTOR.

No. 343,139. Patented June 1, 1886.

Fig. 1.

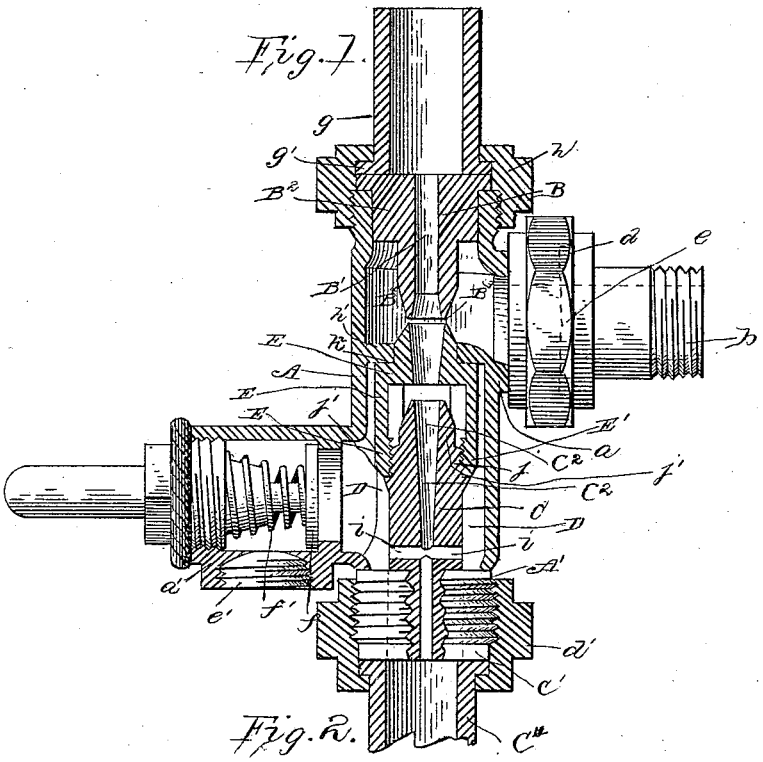
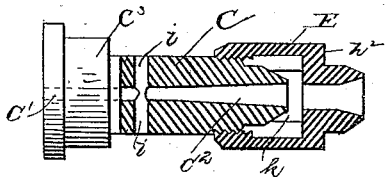


Fig. 2.



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STEAM-INJECTOR.

SPECIFICATION forming part of Letters Patent No. 343,139, dated June 1, 1886.

Application filed April 6, 1886. Serial No. 197,981. (Model.)

To all whom it may concern:

Be it known that I, WILLIAM PENBERTHY, a citizen of the United States of America, residing at Leadville, in the county of Lake and State of Colorado, 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 pertains to improvements in injectors for taking water from a lower plane and then feeding it to boilers; and it consists of the combination of parts, including their construction, substantially as hereinafter set forth, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a longitudinal sectional elevation of my invention, and Fig. 2 is a detail view thereof.

In carrying out my invention I employ a casting or tubular casing, A, having two lateral arms, *a a'*, one, *a*, having in practice suitable connection by a separable screw-threaded pipe-section, *b*, with a water-pipe leading from the source or supply of water, that may be in a plane lower than the injector. The screw-threaded pipe-section *b* is removably connected to the arm *a* of the tubular casing A by a coupling-nut, *d*, its one end screwing upon a screw-thread of the said pipe-section, while its other end is provided with an inwardly-projecting flange overhanging or resting upon a collar or flange, *e*, upon one end of the pipe-section *b*, and securing the latter firmly and tightly to its place, when the coupling-nut is screwed "home." The other arm, *a'*, is fitted with a spring-actuated valve, *f*, normally pressed inward by the action of its spring *f'*, to close the casing A and the said arm, and which arm is provided with an outlet or opening, *e'*, to permit the discharge or escape of the waste or overflow water. These arms *a a'* are disposed upon opposite sides and near opposite ends of the tubular casing or casting A, one—that one connecting with the overflow or waste water outlet—being arranged near the delivery end A' of the casing, and the other—that one connecting with the supply-pipe—being arranged near the supply end of the casing.

B is the jet-pipe, the same having a contracted or diminutive passage, B', extending through it, and having a stepped annular shoulder or disk, B^2, upon one end, fitting partly within and partly against the receiving end of the tubular casing A, and completely closing the same externally of the passage of the pipe B, being held in place and in alignment and contact with the shoulder or flange *g'* of a pipe-section, *g*, by means of a flanged coupling-nut, *h*, the latter screwing in place and being in construction the same as the previously-referred-to coupling-nut *d*. The pipe-section *g* connects with a steam-pipe leading to the steam-space of the boiler. The inner end, B^3, of the pipe B is tapered and projects into the receiving water-chamber B^1, and stands opposite to the water-inlet, and will be again referred to further on.

C is the combining-tube, arranged in the tubular casing A, its passage C^2 being similarly constructed and arranged in perfect alignment with the passage of the pipe B, with which it coacts. Through the lower or outer end of the combining-tube C, and in direct alignment with the passage C^2, is the delivery tube C^3, which, it will be seen, is directly opposite one end of said passage C^2, immediately in rear of the hereinafter-referred-to lateral passages *i*. Said delivery-tube has its one end formed with a stepped shoulder or disk, C', partly fitting within and partly against the delivery end of said casing A.

As in making the connection between the water and the steam supply pipes and the arms *a a'* of the casing A, as above described, so in effecting the connection between the combining and delivery tubes C C^3 and delivery end A' of the casing and the pipe C^4, leading to the water-space of the boiler, I employ a coupling-nut, *d'*, applied in the same way and of the same construction as the aforesaid connections. The passage C^2 of the combining-tube C is provided at the point of connection between the combining and delivery tubes with lateral outlets *i i*, connecting with the waste-water chamber D, surrounding said pipe, and with which chamber the lateral arm *a'* also connects. The inner end of the passage C^2 of the combining-tube C is flared outward, said passage being thus enlarged thereat, while the pipe itself is provided near the inner end, upon the outer surface, with a screw-thread,

j', and a shoulder, j, at the base of said screw-thread, upon which is fitted or screwed the lifting-tube, comprising the cylinder E, having the externally-tapered end E′, in which respects this invention is particularly distinguished from anything hitherto known in this class of devices. The cylinder E of the lifting-tube at one end fills or closes the one end of the waste-water chamber D, and is provided at intervals in its lantern-shaped portion with a number of water-passages, k, also connecting with said waste-water chamber, while the externally-tapered end of said lifting-tube projects forward within the receiving water-chamber B^1, contiguously to the jet end B^3 of the pipe B, a slight space being left between them for the action of the steam upon the water.

The lantern-shaped lifting-tube is an important feature of my invention. It is held in position partly by means of shoulder h^2, which abuts against wall h' of the casing, but chiefly by means of its screw-threaded connection with the combining-tube C. The lifting-tube is thus removably secured to the combining-tube, because, being most exposed to the wearing action of the water and its floating sand or earthy matter, ordinarily it is of that part of the injector which is soonest worn out, and hence when it becomes worn it may be readily and cheaply replaced with a new one.

From the foregoing construction it will follow that as steam is admitted into the injector action will be created at the contiguous or spaced-apart ends of the jet-pipe B B^3, and the lifting-tube, which will as a consequence lift the water into the water-receiving chamber B^1, which water will pass into the lifting-tube and out through the passages k of the lantern-shaped portion E and the lateral outlets i i, into the overflow or waste water chamber D. By the accumulation of the water in the chamber D the pressure thereof will become sufficiently great to overcome the action of the spring on the valve f, and the latter will open and permit the air to escape and the water to pass off through the overflow or waste water outlet e'. This action of the water and escape of air will secure a perfect current, when the spring-pressure upon the valve will return the valve to its seat, and the action of the steam will now keep up a continued pumping of the water into the casing and the feeding of the same into the boiler.

In admitting the steam to the injector it, (the steam,) after first passing through the steam-jet B, enters the passage of the lifting-tube and passes out through the apertures k of the lantern-shaped frame into the overflow or waste water chamber D, forcing back the spring-actuated valve f, and thus producing, by reason of its easy access to the atmosphere, a vacuum, thus causing suction, which elevates the water through the passages in the combining and delivery tubes, thus preventing any reactionary effect in the lifting process which would otherwise occur.

This device, it will be seen, is exceedingly simple in construction, involving, as it does, a minimum number of parts, and is therefore readily and cheaply made, while at the same time equally as substantial and durable as, if not more so than, the more complicated and expensive of this class of devices, and is more efficient in operation. It will also be noticed, as already above called to attention, that the combining-tube is combined with and separably connected to the lifting-tube, including the apertured lantern-shaped portion and tapered-end pipe thereof, whereby these several parts are readily cast or made separately, and can therefore be readily replaced when the same need renewal, and thus permit of easily keeping the contrivance in repair or running order.

From the foregoing it will be seen that in the combining-tube C is provided the passage C^2 and the delivery-tube C^3 at one end, while on its other end is removably secured the lantern-shaped portion of the lifting-tube, which, it will be further seen, rests against the wall in the casting or casing A, and that by means of the pipe-coupling at the delivery end and the nut d', the whole device will be securely held in position.

I am aware that it is not new to provide a lifting-tube having an apertured portion for permitting overflow, and removably connecting to said lifting-tube a delivery-tube, also apertured for the purpose designated, said lifting-tube and the combining-tube having a collar fitted thereon; but my invention is an improvement over such a device, and I provide but one apertured frame-like portion, which forms a part of the lifting-tube, and I provide at the forward end of the combining-tube two lateral outlets or passages, i i, and by thus constructing said lifting and combining tubes, in addition to casting said combining-tube and the delivery-tube integral, I provide a cheaper device, one that will stand more service and is not as liable to get out of order as is the device above referred to.

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

1. In an injector, the lifting, combining, and delivery tubes herein described, comprising the tapered combining-tube having an outer screw-threaded surface, the lifting-tube having the apertured lantern-shaped portion and correspondingly screw-threaded on its inner surface at one end, and its tapered end or nozzle, the delivery-tube integral with said combining-tube, and the lateral outlets or passages formed between said combining and delivery tubes, substantially as shown and described.

2. In a steam-injector, the combination, with the tapered combining-tube and the delivery-tube integral therewith, of the apertured lan-

tern-shaped lifting-tube having its one end screwed upon the tapered end of said combining-tube, substantially as shown and described.

3. In an injector, the combination of the combining-tube having the tapered passage, the delivery-tube integral with said combining-tube, the apertured lantern-shaped lifting-tube, and the pipe-connection and nut for securing the lifting-tube against the wall in the casting or casing, substantially as shown and described.

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

WILLIAM PENBERTHY.

Witnesses:
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