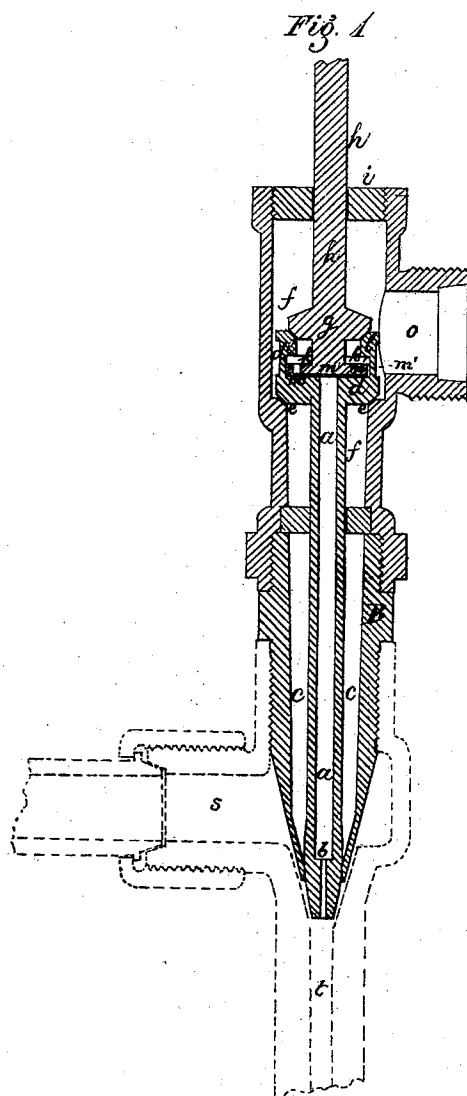


W. B. MACK.

Injectors and Ejectors.

No. 133,997.

Patented Dec. 17, 1872.



Witnesses

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WILLIAM B. MACK, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN INJECTORS AND EJECTORS.

Specification forming part of Letters Patent No. 133,997, dated December 17, 1872.

To all whom it may concern:

Be it known that I, WILLIAM B. MACK, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Injectors and Ejectors, of which the following is a specification:

Figure 1 of the accompanying drawing is a vertical longitudinal section of my improved injector or ejector.

The present invention relates to certain new and useful improvements in injectors or ejectors, whereby the objection caused by the expansion and weakening of the nozzle by the passage of the steam between it and the rod is obviated and the durable and effective working of the apparatus is secured. My improvements consist, mainly, in a longitudinal hollow rod or tube and valve-stem, arranged and operated, as will be more fully described hereinafter, so as to be actuated by the same movement and open a valve on the rear end of the rod or tube, and admit, through apertures formed in a disk or circular plate forming the bottom of the valve-stem, a gentle and even flow of steam into the rod or tube, from the mouth of which it issues through a contracted aperture in the desired quantity and with the requisite force into the boiler-pipe, without being allowed to enter the steam-nozzle until the water has been raised, when, by the further action of the valve-stem, the rod or tube is operated so as to allow the full force of the steam from the boiler to flow into and out of the nozzle, which is relieved of the injurious consequences occasioned by the pressure heretofore exerted by the steam passing between it and the rod when flowing through a transverse aperture formed near the end of the latter.

In the drawing, *a* represents a longitudinal hollow rod or tube, formed at its mouth with a small longitudinal aperture, *b*, and expanding and sloping on its outer periphery at the end so as to impinge tightly against or be released from the inner sloping periphery of a steam-nozzle, *c*. The other or rear end of the rod or tube *a* is formed with a valve, *d*, beveled on the bottom edge, or otherwise arranged to hug tightly, when closed, on a seat, *e*, formed on the interior of a body-valve, *f*. The top of the valve *d* is beveled or otherwise shaped to form a seat for a valve, *g*, connected with a stem, *h*,

which may be arranged with a screw-thread to engage with a female screw formed in a head, *i*, of the body-valve *f*, and operated by a wheel or crank, &c., or otherwise arranged so as to operate in and out longitudinally. The interior of the valve *d* is arranged at the bottom of its periphery with a groove or slot, *k*, forming at the top an inner projection or flange, *l*, beveled or otherwise suitably formed on its outer edge, and against the bottom of which, when the stem *h* is drawn out, abuts the outward face of a disk or circular plate, *m*, attached to or forming the bottom of the stem *h*, which is pressed tightly when the stem *h* is turned in against the bottom or seat of the valve *d*; and thus, by the operation of the stem *h*, actuating forward or backward the rod or tube *a*, and opening or closing the valve *d* according as the stem *h* is carried out or in. The disk or circular plate *m* is formed with apertures *m'*, through which a gentle flow of steam is admitted into the tube *a* by the first outward operation of the stem *h*, which, at the same time that it carries the disk back against the flange *l*, withdraws the valve *g* from its seat on the top of the valve *d*, and admits the desired quantity of steam from the steam-pipe *o*, connected with the boiler. By still further drawing out the stem *h* the valve *d* is withdrawn from its seat *e*, and the rod or tube *a* is carried back so as to release it from the mouth of the nozzle *c*, so as to admit and allow the free flow of the steam from the pipe *o* into and out of the nozzle *c*.

By referring to the drawing it will readily be seen that when the stem *h* is first turned or drawn out the valve *g* is withdrawn from its seat and the disk or plate *m* is brought against the flange *l*, leaving a small passage between the valve *g* and the seat, through which the desired quantity of steam passes and is admitted back of the disk *m*, through whose apertures *m'* it flows into the tube *a*, and is contracted in its passage out by the small aperture *b* so that it gently comes in contact with the water, which is introduced through the pipe *s*, the bottom of the valve *d*, in the meanwhile, being held tightly against its seat *e*; but by further turning or drawing out the stem *h*, the valve *d* is withdrawn from its seat, and the rod or tube *a* is carried backward, thus admitting the full supply of steam

from the pipe *o* into and out of the nozzle *a* into the combination pipe *t*.

In my previous invention, patented June 25, 1872, No. 128,232, and others of like nature, where a transverse aperture is used in the end of the rod near the mouth of the steam-nozzle, between which and the rod the steam is admitted, the great objection is that the pressure of steam in the boiler is necessarily on the weakest part of the nozzle—that is, at its mouth—which is liable to expand and in a short time become inoperative.

By my improved arrangement this objection is obviated by introducing the steam in the manner hereinabove described, so that the supplementary steam-jet is conveyed directly through and from the rod or tube *a*, which allows, when withdrawn from the mouth of the nozzle, plenty of room for the exit of the steam from the boiler; and as no steam is permitted to enter the nozzle when the rod or tube is closed it is not subjected to any injurious pressure, and the bulging form of the end of the rod or tube *a* forms a steam-tight joint which prevents the escape of any steam between the rod and mouth of the nozzle before the required time, and takes up any wear of the rod on the nozzle-mouth, so that it is rendered durable and at all times effective in its operation.

Having thus fully described my improvements, what I claim as my invention, and desire to have secured to me by Letters Patent, is—

1. The hollow rod *a* having a bulging and sloping termination, with a longitudinal hole, *b*, at one end, and a valve, *d*, at the other, when said rod is placed inside the shell *B* of the injector, as and for the purpose described.

2. The valve *d*, connected with or forming the head of a hollow rod or tube, *a*, of an injector or ejector, and having a beveled bottom and groove or slot, *k*, and beveled flange *l*, substantially as and for the purpose specified.

3. The stem *h* having the disk *m*, apertures *m'*, and valve *g*, in combination with the valve *l* and the injector, as and for the purpose specified.

4. In an injector or ejector, the combination of the hollow rod or tube *a* and stem *h*, arranged for operation, as herein described, with the steam-nozzle *c*, body-valve *f*, and pipe *o*, substantially as specified.

5. The hollow sliding stem *a* placed within the injector, and serving to conduct steam through the nozzle thereof at the same time that it protects the nozzle from injurious pressure from the steam, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM B. MACK.

Witnesses:

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