

J. Y. SMITH.

Steam Air Ejectors.

No. 136,780.

Patented March 11, 1873.

Fig. 1.

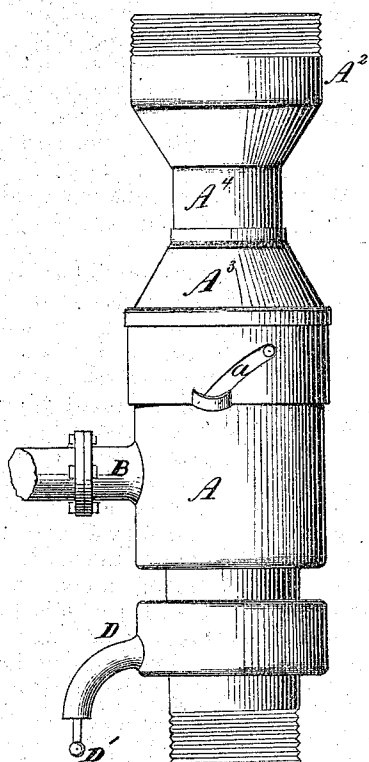
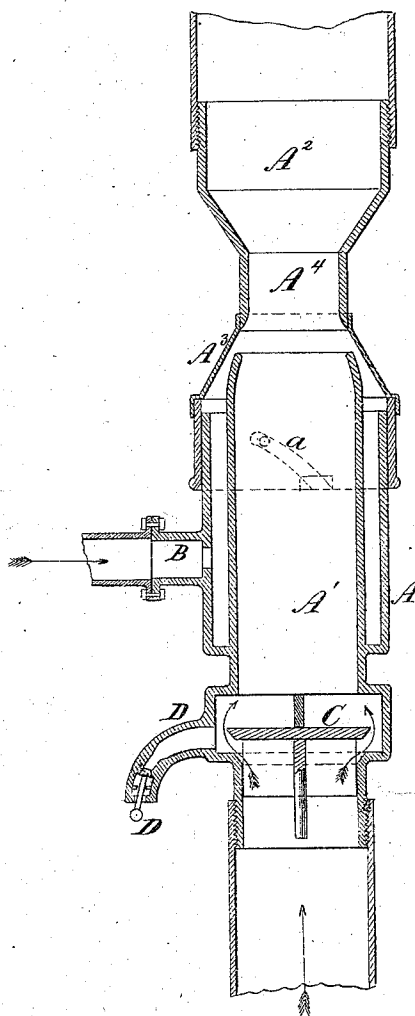


Fig. 2.



Witnesses.
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UNITED STATES PATENT OFFICE.

JOHN Y. SMITH, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN STEAM AIR-EJECTORS.

Specification forming part of Letters Patent No. 136,780, dated March 11, 1873.

To all whom it may concern:

Be it known that I, JOHN Y. SMITH, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Ejectors for Ejecting Air from Vessels connected with Car-Brakes, and for other purposes, of which the following is a specification:

Figure 1 is an elevation of my improved ejector; and Fig. 2 is a sectional elevation, showing the adjustable outer case, the slot therein, the steam-induction pipe, the passage for the steam, the air-nozzle, the vacuum-valve, and a drip-valve.

Corresponding letters refer to corresponding parts in both of the figures.

This invention relates to that class of instruments which are used for forming a vacuum in vessels, pipes, or in other devices where it is necessary; and it consists in the construction, combination, and arrangement of its parts, as will be more fully explained hereinafter.

In constructing devices of this character I form the case A of cast or of sheet metal and provide upon that end thereof into which the fluid or liquid to be expelled enters a screw-thread or other suitable means for attaching thereto a pipe or hose. At a suitable distance from this end of the case a chamber is provided upon the lower or outer wall of which there is formed a valve-seat, as shown in Fig. 2. To the opposite side or wall of this chamber there is attached an air-nozzle, A', the length of which is to be such that its opposite end shall extend nearly to the angular portion of the section A² of the outer case. Outside of the air-nozzle A' there is a chamber or steam-space which is formed by the outer wall of the section A of the case and the air-nozzle. Into this space steam is admitted through a pipe, B, attached to its surface or to a suitable nozzle thereon. The adjustable section A² of the case is to be constructed substantially as shown in Fig. 2, it having upon its inner end a socket, A³, which fits snugly on the end of section A so that it may turn and slide thereon. Upon two sides of this socket there are formed angular slots, as shown at a, in order that as the section A² is turned upon section A it shall be moved longitudinally thereon and thus the distance of its angular portion with reference to the end of the air-discharge nozzle regulated at

will. The angular portion of section A² above referred to is to be made of thin sheet metal, and should present an acute angle to the axis of the instrument, in order that as the steam passes this point it shall be brought into intimate contact with the thin portion of the case and kept there as long as possible, in order that time shall be given it to be condensed at that point, or, at best, a sufficient portion of it to aid in the production of a vacuum. That portion A⁴ of this section which is outside of, but connected to, the angular portion A³ is of about the same diameter as the smallest end of said angular portion, in order that the uncondensed steam and the jet of air from the air-nozzle may be carried forward in a compact mass into the enlarged portion of this section, which portion is provided with a screw-thread or other means for attaching thereto a pipe or hose. When the adjustable portion of this case has been placed in its proper position it may be held there by means of a set-screw or by any other convenient device, and upon the proper adjustment of this part will depend, to a great extent, the efficiency of the instrument. Its efficiency will also be very much affected by the thickness of the metal of which the angular portion A of the case is made, as it is an ascertained fact that the efficiency of instruments of this character depends, to a great extent, upon the rapid condensation of the steam at the point where it mingles with the air or liquid which it is to eject; and hence it follows that if the point where the steam strikes the case is so thin as to permit the most rapid radiation of heat and at the same time the greatest cooling effect of the surrounding atmosphere possible the efficiency of the instrument will be largely increased thereby; and in order to secure this result the thin portion of the metal must present the acute angle to the path of the steam or to the axis of the instrument above described.

In exhausting air from vessels or pipes it will be found advisable to adjust the section A² of the instrument that its angular portion shall be very near to the end of the air-nozzle, in order that when the air in the vessel from which it is to be exhausted has become rarefied to some extent by exhaustion the more rapid condensation may cause a more perfect vacuum.

In the application of this instrument to pipes

or vessels for applying the brakes of cars it is important that means should be provided for maintaining a vacuum in such pipes or vessels after the steam has been shut off from the ejector; and in order to provide for this there is placed in the chamber near the end where the air enters a valve, C, which is arranged to open inward, so that as steam is admitted to the instrument and a vacuum is formed therein the valve will open and permit the air to pass out of the pipes and vessels, but will close the instant the steam is shut off, and thus prevent the air from rushing in and destroying the vacuum.

As a considerable portion of the steam used will be condensed within the instrument, and as the water of condensation is liable to run down into the air-nozzle and thus to some extent injuriously affect the operation, and especially as this would be the case if it should be allowed to enter the pipes leading to the apparatus which applies the brakes, there is provided a small drip-pipe which is attached to the chamber in which the valve C is placed, which has in its outer end a valve, D', opening outwardly so that when steam is shut off from the instrument it shall fall of its own gravity and permit any water which may have collected there to pass off, said valve being closed by atmospheric pressure when a vacuum has been formed in the chamber.

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

1. An air-ejector having the angular portion of its case against which the steam impinges when passing the end of the air-eduction nozzle made of thinner metal than its other portions, substantially as and for the purpose set forth.

2. The combination of the adjustable section A² of the outer case of the ejector with the stationary section A thereof and with the air-discharge nozzle A¹, the parts being arranged substantially as and for the purpose set forth.

3. The combination of a vacuum-valve with the air-eduction nozzle of an ejector, substantially as and for the purpose set forth.

4. An air-ejector combining in its construction an outer adjustable case, an interior air-discharge nozzle, a vacuum-valve, and a drip-valve for allowing the water of condensation to pass from the instrument, substantially as and for the purpose set forth.

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

JOHN Y. SMITH.

Witnesses:

D. P. HOLLOWAY,
W. BRADFORD.