

J. L. ALBERGER & T. SAULT.
 Condenser for Steam-Escapes.

No. 227,342.

Patented May 11, 1880.

FIG. 2.

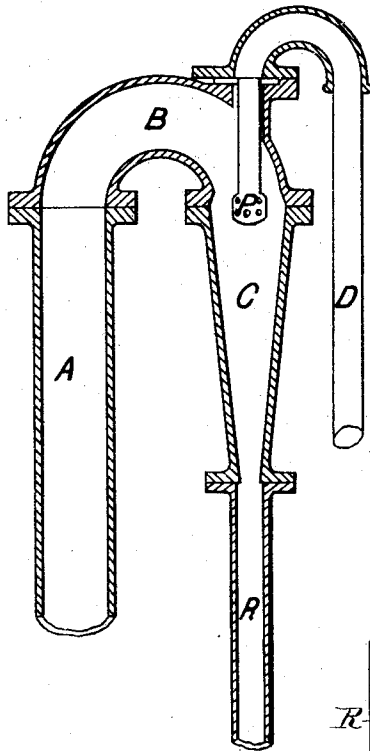


FIG. 1.

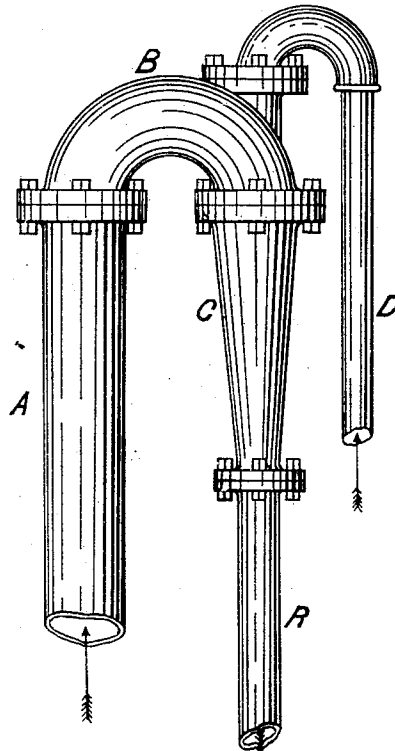


Fig 3.

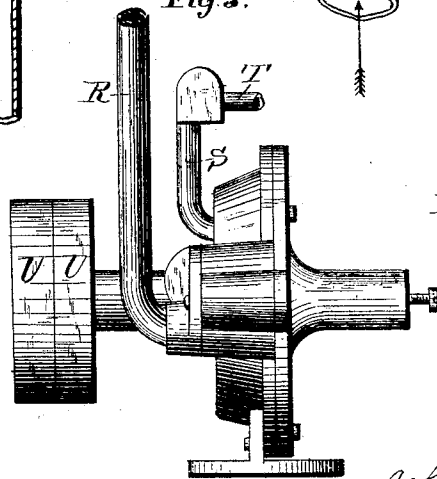
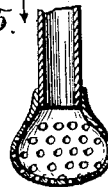


Fig 4.



Fig 5.



WITNESSES.

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UNITED STATES PATENT OFFICE.

JOHN L. ALBERGER, OF BUFFALO, NEW YORK, AND THOMAS SAULT, OF
NEW HAVEN, CONNECTICUT.

CONDENSER FOR STEAM-ESCAPES.

SPECIFICATION forming part of Letters Patent No. 227,342, dated May 11, 1880.

Application filed October 9, 1879.

To all whom it may concern:

Be it known that we, JOHN L. ALBERGER, of Buffalo, New York, and THOMAS SAULT, of New Haven, Connecticut, jointly have invented certain new and Improved Means of Creating and Maintaining a Vacuum in Steam-Escape Pipes, of which the following is a specification, reference being had to the accompanying drawings, making part hereof, and to the figures and letters of reference marked thereon.

This invention consists of certain improved means of creating and maintaining a vacuum in the escape-pipe of steam-engines, vacuum-pans, or other apparatus (wherein it may be desirable or necessary to make a vacuum available) where the aid or intervention of a condenser as a separate and distinct vessel or chamber is especially provided to receive the steam or the condensing-water for the purpose of bringing the one in contact with the other.

The invention appertains more especially to siphon and ejector condensers, in which the vacuum is produced without the aid of an air-pump, though it is intended to be used in connection with an air-pump as an adjunct in cases where the necessary altitude or siphonic action cannot be obtained to thoroughly remove the air.

The means above referred to for creating and maintaining a vacuum in the escape-pipe of steam-engines, vacuum-pans, and the like, consists, first, of inverting and constricting its discharging end, and of combining with the end so constricted a small injection-pipe provided with an enlarged foraminous nozzle and tail-pipe, by which, from a small pipe in the center of the steam-passage, a large spray of water is thrown into the constricted pipe in advance of the steam, and is centralized at the point of escape into the tail-pipe, to prevent the accession of air from below, while at the same time the enlarged tail-pipe facilitates its escape; second, of a pump so arranged, in combination with the tail-pipe of a siphon or ejector condenser, that the discharge-water, holding the air commingled with it, will fall or discharge, not into an intervening reservoir, but directly into the pump in the form of

foam, and be removed by it before the air separates from the water.

Reference being had to the drawings, Figure 1 is an elevation of the escape-pipe A, the inverted neck B, the constricted end C, the water-pipe D, (which should be fitted with a cock or valve to regulate the flow of water into the condenser) and the tail-pipe R; and Fig. 2 of the drawings is a vertical section through all of the aforementioned parts, and, in addition, shows the foraminous nozzle or expanded end P of the water-pipe D. Fig. 3 is an elevation of the pump, which, when the necessary head or fall of water cannot be obtained, is combined with the tail-pipe R to discharge the water. This pump, as shown, is of the rotary variety, possessing no features of novelty, and therefore requires no detailed description. Fig. 4 is the enlarged foraminous nozzle shown in elevation, and Fig. 5 is a section through it in a vertical line.

These embrace all the parts, combinations, and arrangements of parts necessary for the complete and successful operation of the invention.

The operation is as follows: The steam escaping through the pipe A strikes the top of the water-spray (delivered through the nozzle P) with a force due to the velocity through the pipe into a vacuum, by which it is quickly condensed, and the air moving with it is carried into the spray, caught by the falling water, and carried down through the constricted nozzle with an accelerated velocity, due to the impulse of the steam escaping through the pipe added to the gravity of the falling water, the constricted nozzle concentrating the water to a solid or hollow column, or sufficient to hold and carry the gathered air with it and prevent its return from below. The nozzle P should be of such shape and so perforated that the escaping water will spray or radiate in separate streams at angles varying from fifteen to thirty degrees from a vertical line in the center of the nozzle. These perforations must be of such number and aggregate area as to deliver the proper quantity of water to condense the steam, and they should be placed in concentric rows around and beneath the

nozzle, their number and size to be governed by the quantity of steam to be condensed and the velocity of the water through them. The position of the nozzle P is also important. To secure the best results it should be placed in the upper part of the constricted pipe. The water-spray will enter through the nozzle P with a velocity due to its fall and to the tension of the vacuum, and would radiate against the sides of the constricted pipe but for the action of the steam upon it, which bends or deflects it in its downward course in a funnel-shaped column, enveloping the air mingled with it, and carrying it down through the nozzle, up which it cannot return against the concentrated column of escaping water. To secure the best results the constricted nozzle C should be proportioned so as to concentrate the maximum amount of discharge-water to a solid column, or nearly so, and the tail-pipe R should be in area to the constricted nozzle as three-fourths of an inch is to one inch. If the siphonic action is used, the tail-pipe should be thirty-four feet long to insure the best results—that is, the water should have a fall of thirty-four feet; but good results can be realized with less fall of water, and where a sufficient head of water can be had or where a pump is used the long tail-pipe may be dispensed with.

The advantages of the condenser are, first, its few parts and great simplicity of construction, the steam or water chamber being wholly dispensed with; second, its freedom from liability to choke when dirty water is used, there being no narrow channels to fill up with dirt, such as characterize the ordinary ejector-condenser; third, its great economy in the amount of water necessary to operate it and yield a high range of vacuum, which is as low as twenty-six and a half gallons of condensing-water to every gallon of water evaporated, the condensing-water being 72° and the tail-water 110° of Fahrenheit; fourth, its superiority in connection with an air-pump, in that it is less bulky than the ordinary condenser, and as it mingles the air and water completely, the air-pump can be operated as a common water-pump, filling it completely with the mingled air and water without allowing them to

separate, as in the ordinary condenser, which fills the pump partly with air and partly with water, causing it to thump or strike when the water is reached after the air is expelled. The air-pump may thus be sensibly diminished in size, having to deal with air partially compressed instead of expanded, the water being compressed relatively to the length of the column above the pump.

A great many ejector-condensers have been heretofore made; but all of them use a solid column of condensing-water and have a separate chamber to receive either the steam or water. In the one case it is a steam-chamber, in the other it is a water-chamber, depending upon whether the water escapes around the steam or the steam around the water. These separate chambers are necessary elements in the ejector-condensers as usually designed, for to make them work successfully the water-channel must be restricted to the minimum amount of water and the steam-discharge nozzle must be brought down into or under and around the water-discharge nozzle to insure a complete condensation of steam with the solid column of condensing-water heretofore used in ejector-condensers.

We claim—

1. The improved means, substantially herein described, of creating and maintaining a vacuum in steam-escape pipes, consisting of the combination of the enlarged foraminous nozzle, the constricted nozzle, and enlarged tail-pipe, constructed and arranged in relation to each other and the steam-escape pipe as described.

2. The combination of the pump with the tail-pipe of the siphon and injector condenser herein described, arranged to receive and discharge the tail-water falling directly into it while mingled with the air in the form of foam, as set forth.

In witness whereof we have hereunto signed our names this 3d day of October, 1879.

JOHN L. ALBERGER.
THOMAS SAULT.

In presence of—

F. S. MILLER, Jr.,
AMOS BROADNAX.