(No Model.) 2 Sheets—Sheet 1.

F. MERTSHEIMER.

EXHAUST NOZZLE.

No. 493,510. Patented Mar. 14, 1893.

Fig. 1.

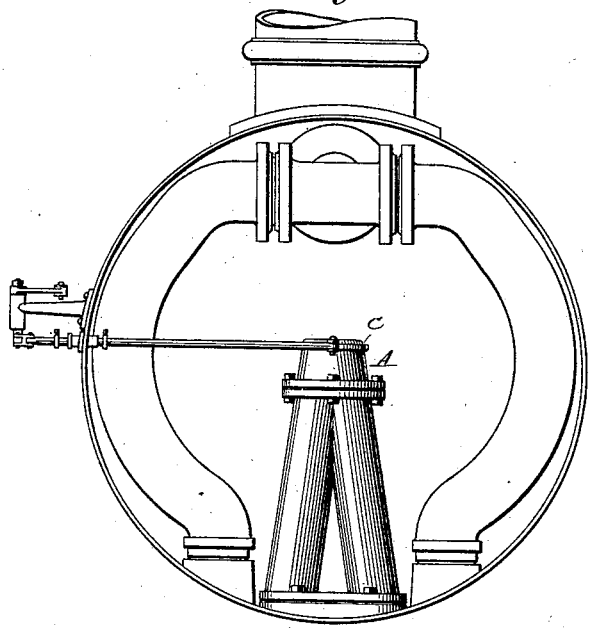
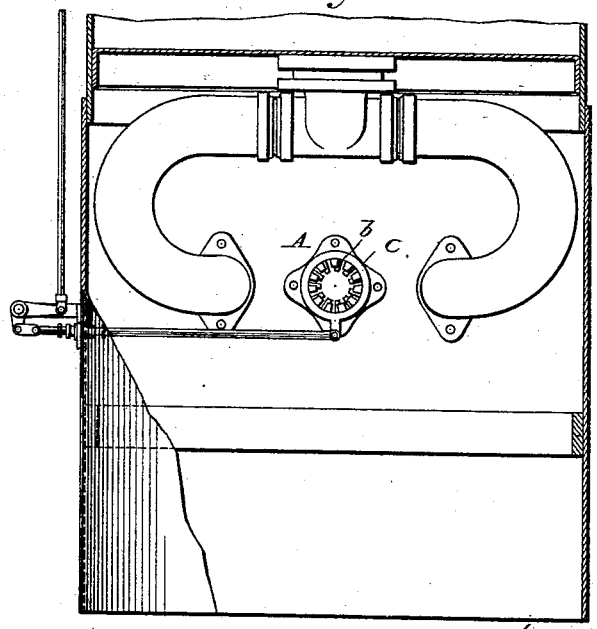


Fig. 2.



Witnesses
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A. E. Rawlings

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(No Model.) 2 Sheets—Sheet 2.

F. MERTSHEIMER.

EXHAUST NOZZLE.

No. 493,510. Patented Mar. 14, 1893.

Fig. 3.

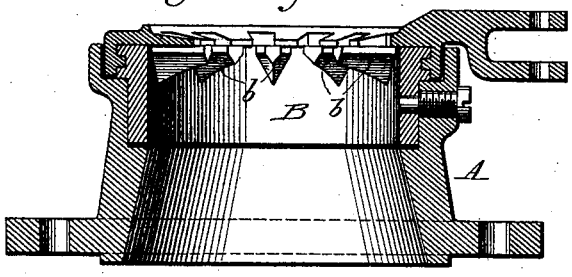


Fig. 5.

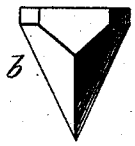


Fig. 4.

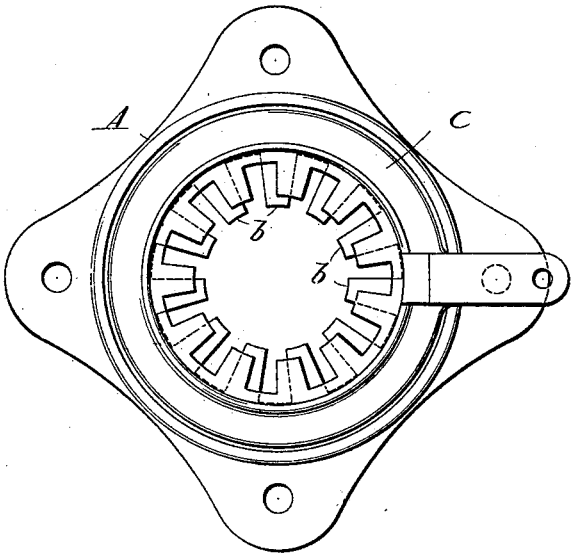


Fig. 6.

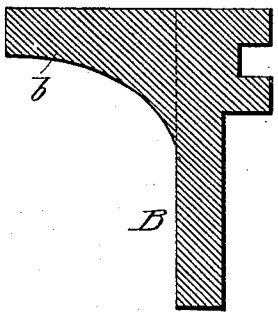


Fig. 7.

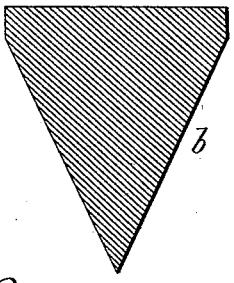
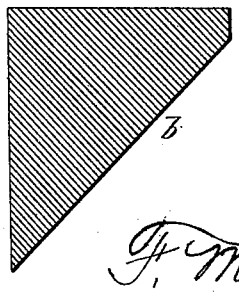


Fig. 8.



Witnesses
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Attorney

UNITED STATES PATENT OFFICE.

FREDERICK MERTSHEIMER, OF CHEYENNE, WYOMING.

EXHAUST-NOZZLE.

SPECIFICATION forming part of Letters Patent No. 493,510, dated March 14, 1893.

Application filed July 22, 1892. Serial No. 440,905. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK MERTSHEIMER, of Cheyenne, county of Laramie, and State of Wyoming, have invented a new and useful Improvement in Exhaust-Nozzles, of which the following is a specification.

My invention relates to that class of exhaust nozzles used more particularly in locomotive engines for the purpose of increasing the draft.

The present invention relates to improvements upon the variable nozzle, for which Letters Patent of the United States were granted to me on the 15th day of July, 1890, numbered 432,422.

The essential feature of my nozzle as set forth in the original patent, consists in a series of inwardly projecting fingers. In the nozzle proper, combined with a series of corresponding fingers on a rotary ring, the fingers serve to break up and distribute the out-going blast of steam.

Present improvements consist in reducing the width of the fingers toward their under sides, so that they present sharp edges toward the ascending steam. In this form they present less resistance and act more efficiently than those having flat under surfaces as in the original patent.

Another improvement consists in giving the fingers with the sharp under edges an inclination on one side and a vertical or substantially vertical face on the other, whereby they are adapted to give the outgoing steam a rolling or gyratory motion, as it ascends through the stack.

Another improvement consists in providing the base ring or nozzle proper with an internal flange, to confine the steam to its proper central course.

In the drawings Figure 1 is a front elevation of a boiler containing my nozzle, the front end being removed. Fig. 2 is a top plan view of the same, with the smoke box shown in section. Fig. 3 is a vertical cross-section through the improved nozzle. Fig. 4 is a top plan view of the same. Fig. 5 is an end of one of the fingers or teeth. Fig. 6 is a vertical cross-section through the same. Figs. 7 and 8 are vertical cross-sections through the stationary tip or ring on a larger scale, to show the form of the fingers.

The nozzle consists of a base ring or nozzle proper, A, through which the exhaust steam is delivered from the engine cylinders as usual.

B represents a tip or ring, fixed in the upper end of the base ring and provided with a series of inwardly projecting fingers, *b*.

C is a rotatable ring or cap situated over and around the tip B and provided with a series of inwardly projecting fingers, overlying those of the tip, so that by a rotary movement the teeth of the cap may be caused to register with those of the tip, in order to leave unobstructed vertical openings between them, or turned so that the upper fingers cover, to a greater or less extent, the space between the lower fingers, thus reducing the area of the opening through which the steam may escape.

In its general construction and mode of operation so far as described, the nozzle strongly resembles that in my previous patent.

In carrying my present invention into effect, I now bevel or taper the fingers of the tip in a downward direction, bringing them to a sharp edge, or nearly so, at the lower side, so that they present in cross-section a tri-angular form. The fingers with the thin edges at the under side offer far less resistance to the ascending steam than those constructed with flat under surfaces, and they permit the steam to ascend freely, and without production of the reactionary currents, which result from the impact of the steam against the under sides of the flat teeth.

As shown in Figs. 7 and 8, the teeth may be sloped inward on both sides. In some cases it is found advisable, however, to construct the teeth as shown in Fig. 8, with one side in a substantially vertical position, and the other side inclined upward from the lower edge. As all the teeth are inclined upon the same side or in the same direction, they act jointly to impart a whirling motion to the steam as it passes between them. The rotary cap C is provided with an annular flange which extends downward and around the upper edge of the tip, and having a surrounding flange

on the base ring, the tip being provided with fingers or flanges projected into a peripheral groove in the tip, whereby the cap or ring is held down in place. The tip is secured by a fastening bolt D or other equivalent device. It will be observed that the base ring is provided with an internal flange or shoulder fitting beneath the lower edge of the tip and lying flush with its inner wall. This arrangement causes the nozzle to present a smooth inner surface to the ascending steam so that it has little or no tendency to pass outward and escape between the base ring and the inner ring B.

By forming the teeth with parallel sides, as shown in my former patent referred to, the steam passes through the interstices in a straight forward direction, and in a compact volume. For obvious reasons it is desirable to spread or scatter the blast in order to distribute it over a larger surface, and this is effectually accomplished by giving the teeth the wedge shape herein shown and described. By forming the teeth as represented in Figs. 3, 5 and 7, the steam is divided and deflected laterally in oblique directions by the opposite inclined sides. The volume passing between two adjacent teeth is deflected in two directions or planes crossing each other in front of the teeth, creating in effect two volumes or jets which, by impinging upon each other are deflected and broken up and scattered or sprayed. Practically the same effect is produced by the teeth shown in Fig. 8. The steam passing along the straight or vertical side of one tooth, is met by the deflected current passing along the inclined face of the adjacent tooth, whereby, in addition to breaking up and scattering the volume, a spiral direction is given to the whole.

Having thus described my invention, what I claim is—

1. An exhaust nozzle having a series of inwardly projecting teeth brought to an edge at the under side.

2. An exhaust nozzle having a series of inwardly projecting teeth each presenting a vertical and an inclined side wall, whereby the outgoing steam is given a whirling motion.

3. An exhaust nozzle consisting of a tip or nozzle proper, provided with inwardly projecting fingers brought to an edge at the under side and a rotary ring or cap also provided with a series of inwardly projecting fingers.

4. An exhaust nozzle provided with a series of inwardly projecting fingers, each brought to an edge at the under side, said edge having an upward inclination from the outer toward the inner end.

5. In an exhaust nozzle the combination of the rotatable cap or ring with fingers therein, the tip provided with fingers and the base ring having the internal flange or shoulder substantially as described and shown.

In testimony whereof I hereunto set my hand, this 12th day of April, 1892, in the presence of two attesting witnesses.

FREDERICK MERTSHEIMER.

Witnesses:
N. F. MILBURN,
JOHN E. THOMAS.