(No Model.) 3 Sheets—Sheet 1.

F. MERTSHEIMER.

EXHAUST NOZZLE FOR LOCOMOTIVES.

No. 432,422. Patented July 15, 1890.

Fig. 1.

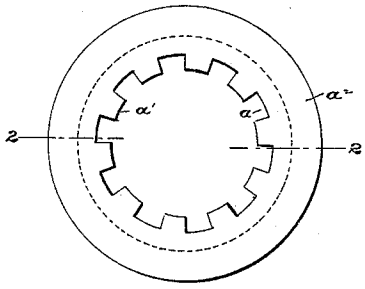


Fig. 2.
on line 2-2

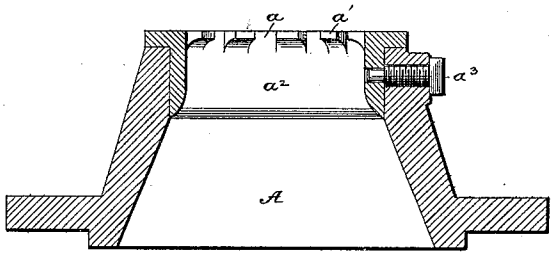
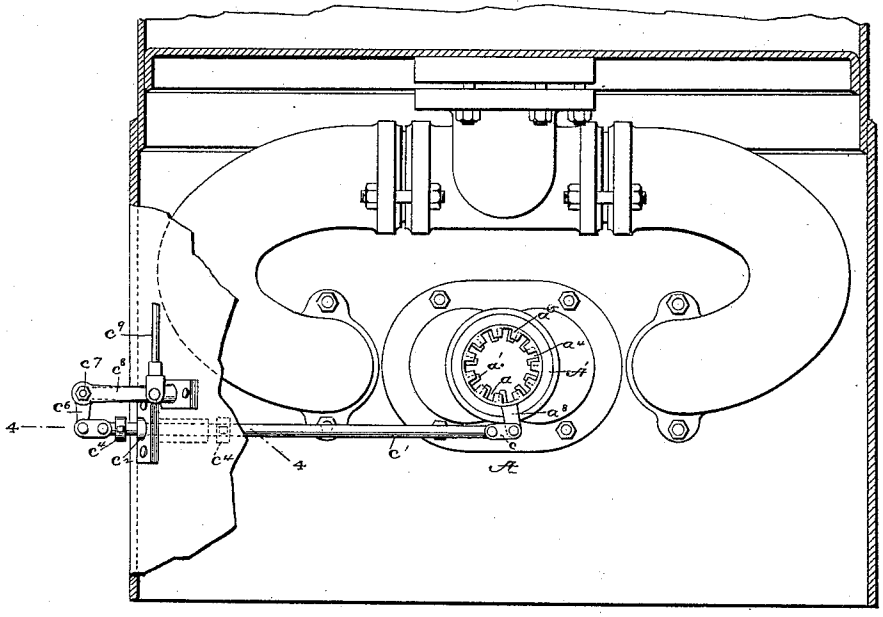


Fig. 3.



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F. Stanley Elmore.

Inventor
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By Alice F. Dodge
Attorney

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F. MERTSHEIMER.

EXHAUST NOZZLE FOR LOCOMOTIVES.

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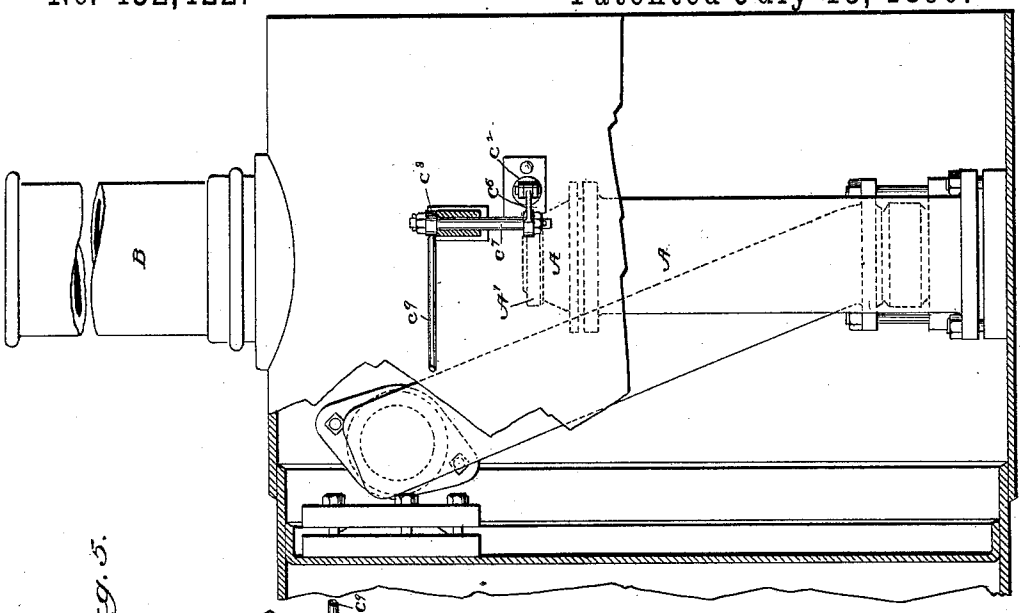


Fig. 5.

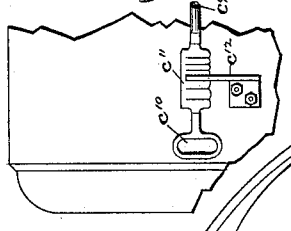


Fig. 4. on line 4-4

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F. MERTSHEIMER.

EXHAUST NOZZLE FOR LOCOMOTIVES.

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Fig. 6.

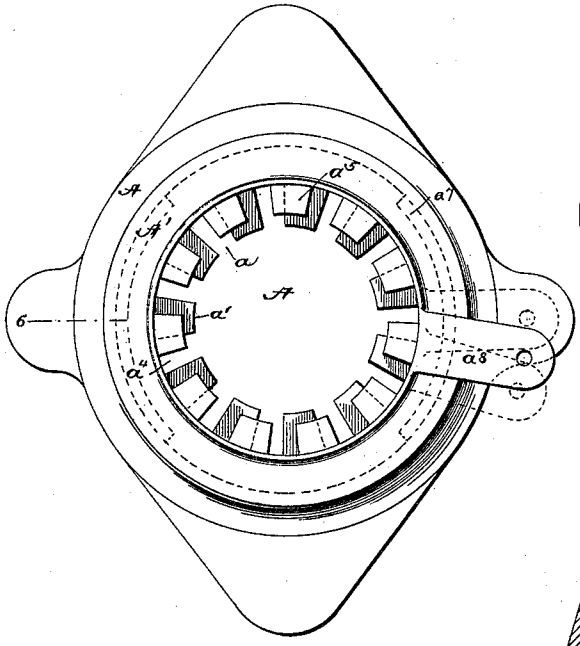


Fig. 8.

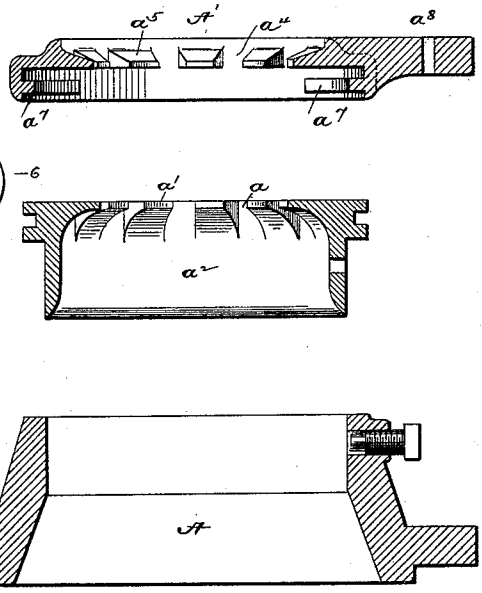
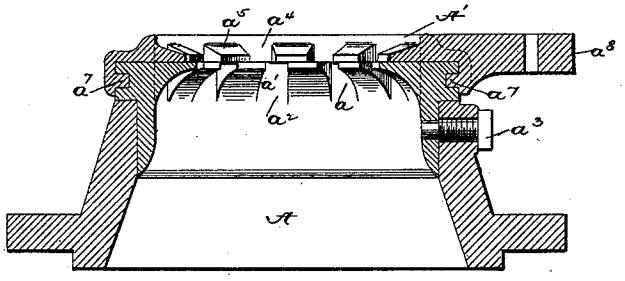


Fig. 7.
on line 6-6



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F. Stanly Emore.

Inventor:
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By his Atty
Phil. T. Dodge

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

FREDERICK MERTSHEIMER, OF KANSAS CITY, KANSAS.

EXHAUST-NOZZLE FOR LOCOMOTIVES.

SPECIFICATION forming part of Letters Patent No. 432,422, dated July 15, 1890.

Application filed March 13, 1890. Serial No. 343,779. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK MERTSHEIMER, of Kansas City, in the county of Wyandotte and State of Kansas, have invented certain Improvements in Exhaust-Nozzles for Locomotives, &c., of which the following is a specification.

My invention relates to certain improvements in exhaust-nozzles intended more particularly for use in locomotive-engines, but applicable in general to exhaust-nozzles wherever employed to utilize the exhaust-steam from the cylinders for the purpose of maintaining a draft through the boiler.

One feature of my invention resides in the means for varying the area of the opening through which the steam is delivered from the nozzle. To this end it consists in combining with the internally-notched nozzle a rotary notched tip. By turning this tip so that its notches register with those of the nozzle proper the area of the opening is increased. By a rotation in the opposite direction, so that the notches of one part are covered by the teeth or projections between the notches of the other part, the area of the opening is reduced. In this manner the force and character of the blast may be modified to meet the varying conditions encountered in practice. This adjustment is particularly advantageous in locomotive-engines which are used to haul light and heavy trains indiscriminately, or where the engine is employed on a road having level portions and heavy grades. When climbing a grade, more pressure is required in the cylinders than when running on a level, and consequently a stronger exhaust is obtained with the effect of disturbing and agitating the fire and burning an excessive amount of fuel, provided the nozzle is of a character suitable for use on levels, where less steam is used. By providing for a change in the area of a nozzle at will I am enabled to adjust it to suit any condition which may be encountered. I am also enabled to so regulate the blast as to prevent the fire from being choked by clinker or coke when the nozzle is closed, so as to produce a sharp blast, which will agitate or disturb the fire, so as to admit of the engine steaming freely.

Another feature of my invention consists in so constructing the notched ends of the nozzle and the notched rotary tip in relation to each other that the ribbed or toothed surface is maintained under all the adjustments without regard to the area of the opening.

In the accompanying drawings I have represented my improvement as applied in a locomotive-engine having a vertical form of nozzle receiving the exhaust from both cylinders; but it is understood that it is applicable in the same manner to nozzles receiving the exhaust from the cylinders independently.

In the accompanying drawings, Figure 1 is a top plan view of my nozzle in its most simple form. Fig. 2 is a vertical section through the same on the line 2 2 of Fig. 1. Fig. 3 is a view looking downward into the forward end of a locomotive-boiler provided with my device, the top of the boiler being broken away to expose the internal parts to view. Fig. 4 is a view looking into the forward end of the boiler, a portion being shown in section on the line 4 4 of Fig. 3. Fig. 5 is a side elevation of parts shown in the preceding figure. Fig. 6 is a top plan view of the nozzle on an enlarged scale, and Fig. 7 a cross-section through the same on the line 6 6 of the preceding figure. Fig. 8 is a vertical section showing the several parts of the nozzle disconnected from each other.

Referring to the various figures, A represents the upright exhaust-nozzle constructed and arranged, as usual, to direct the exhaust-steam from the cylinder or cylinders in an upward direction through the stack B.

Figs. 1 and 2 show the nozzle with my improvement in its most simple form. The nozzle, instead of being made of smooth circular form on the interior, as usual, is formed with a series of vertical notches or grooves a in its inner surface, these notches and the intervening ribs or teeth a' serving to break up and disturb the outgoing jet of steam in the manner already referred to. I prefer to construct the tip or mouth of the nozzle, as shown in Figs. 1 and 2, in a separate piece from the body portion. This annular tip a^2 has a depending flange which is fitted closely within the end of the body portion and secured in place by a set-screw a^3 or by any other suitable means. While the employment of the tip distinct

from the body portion is advantageous in that it facilitates the manufacture and that it admits of the application of tips differing in their internal area, it is to be understood that the nozzle as a whole may be formed in one piece, if preferred. The form of the notches and intervening ribs may be modified within reasonable limits, the only essential requirement being that they shall be adapted to divide, break up, or disturb the outflowing steam at the circumference of the jet.

Referring now to Figs. 3 to 7, which show the nozzle of variable capacity, a^2 represents the tip or vent, of annular form, secured within the body of the nozzle and provided with internal notches a and intermediate teeth a' in the same manner as in the form already described. A′ represents a ring fitted over and around the end or tip of the nozzle and provided in its inner edge with notches a^4 and intervening teeth a^5 similar to those of the teeth. By turning this ring its notches and teeth may be caused to register with those in the tip, so as to give the nozzle its greatest capacity; but by turning the ring so as to carry its teeth out of register with those in the tip and over the notches in the latter the area of the nozzle may be greatly reduced until the notches of the one part are covered by the teeth of the other, after which no further reduction is possible.

I prefer to construct the teeth or ribs of the one part of greater length than those of the other—that is to say, to extend them inward nearer the center—so that although the parts are adjusted to reduce the capacity of the nozzle its inner surface will still present the notched form, as represented in the drawings. In this manner I am enabled to combine the advantage of the notched form with the capacity for adjustment in area.

The ring may be connected with the nozzle in any suitable manner; but I prefer to form the stationary tip or end of the nozzle with a peripheral groove and to form the ring with lugs which extend downward and engage in the groove, as shown as a^7. These lugs will be located at opposite sides of the center and will extend but part way round the ring. The tip will be cut away from the grooves upward, as shown in dotted lines, so that the ring may be dropped into place and then secured by giving it a partial rotation to carry the lugs into the grooves.

In order that the engineer may adjust the nozzle at will in accordance with the necessities of the moment, I propose to use operating devices of any suitable character extended rearward to the cab, or to any other suitable point from which they may be conveniently operated. As shown in the drawings, the rotatable ring is provided on one side with a projecting arm a^8, connected by links c to a horizontal rod c', extending outward through a fixed guide c^2 at the side of the boiler. Two collars c^4, adjustably secured upon the rod by set-screws, serve as stops to limit the movement of the rod and the adjustment of the parts. At its outer end the rod is connected by links to an arm c^6, fixed on a vertical rock-shaft c^7, mounted in a fixed bearing and provided at its upper end with an arm c^8, from which a rod c^9 extends rearward into the cab of the engine, where it terminates, as shown in Fig. 5, in a handle c^{10}. Near the handle the rod is provided with a flattened portion c^{11}, notched in its lower edge and arranged to interlock with a fixed notched plate c^{12}. These devices serve to hold the rod and the nozzle at any required adjustment.

Having thus described my invention, what I claim is—

1. An exhaust-nozzle provided on its interior with the series of inwardly-extending projections forming an irregular internal edge, in combination with a tip rotatable thereon and similarly formed on its interior.

2. An exhaust-nozzle notched or ribbed internally, in combination with a rotatable notched tip, the ribs or projections of the one member projecting inward beyond those of the other, substantially as described, whereby the air of the discharge-opening may be varied and a notched inner surface presented to the outgoing steam under all adjustments.

3. The exhaust-nozzle notched internally and provided with the peripheral groove and the vertical channel communicating therewith, in combination with the notched rotatable tip provided with the lug adapted to enter the channel and fit in the groove, substantially as described.

4. The exhaust-nozzle notched internally, in combination with the notched rotatable tip, the rod connected to said tip, the guide on the boiler through which the rod extends, and the stops located on the rod at each side of the guide, substantially as described.

In testimony whereof I hereunto set my hand, this 24th day of February, 1890, in the presence of two attesting witnesses.

FREDERICK MERTSHEIMER.

Witnesses:

L. J. FARRON,

M. G. JONES.