

(No Model.)

J. T. McLELLAN.
AUTOMATIC EXHAUST NOZZLE.

No. 528,549.

Patented Nov. 6, 1894.

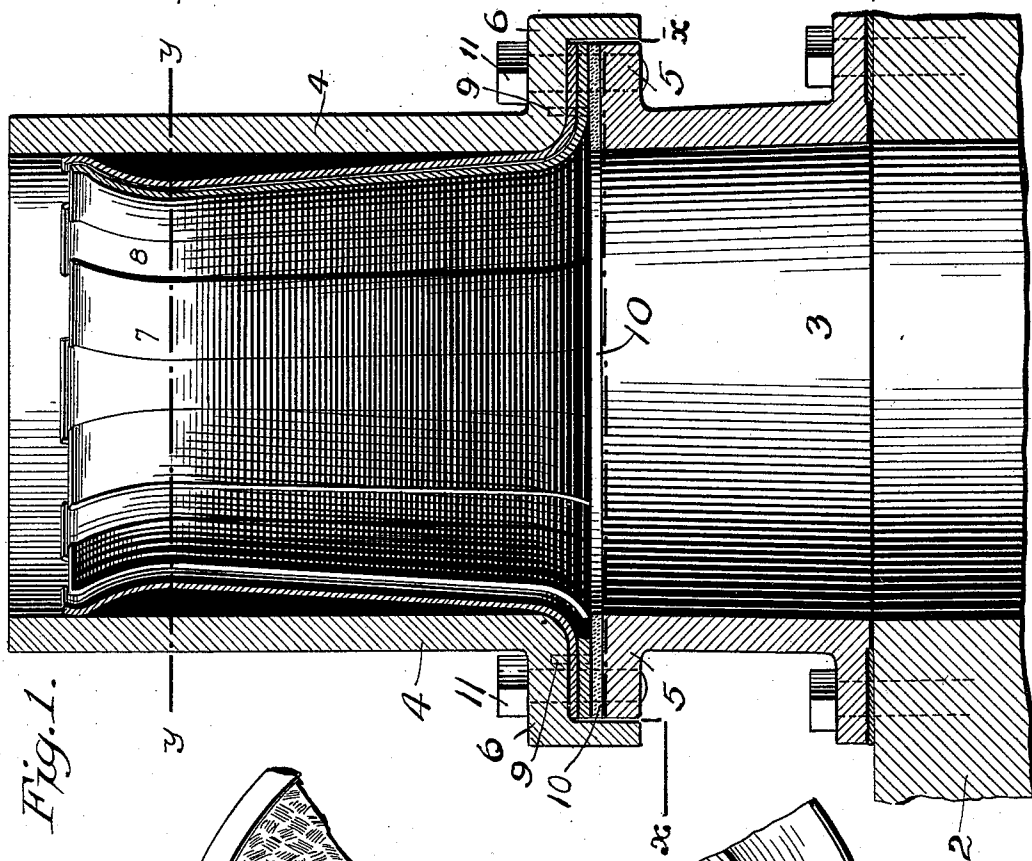


Fig. 1.

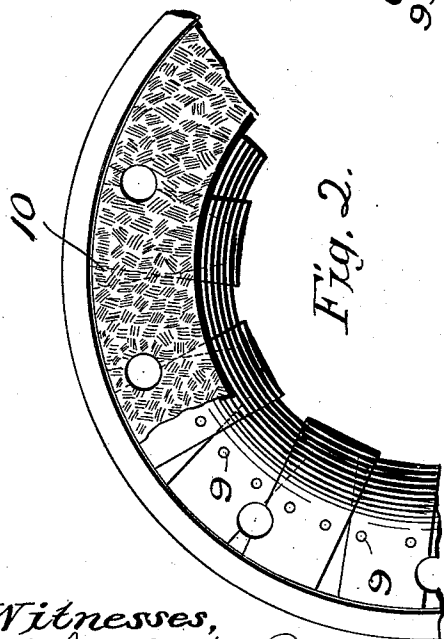


Fig. 2.

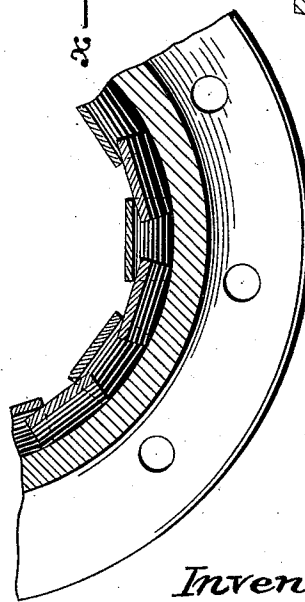


Fig. 3.

Witnesses,
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UNITED STATES PATENT OFFICE.

JOHN T. McLELLAN, OF BOZEMAN, MONTANA.

AUTOMATIC EXHAUST-NOZZLE.

SPECIFICATION forming part of Letters Patent No. 528,549, dated November 6, 1894.

Application filed January 16, 1894. Serial No. 497,110. (No model.)

To all whom it may concern:

Be it known, that I, JOHN T. McLELLAN, of Bozeman, Gallatin county, Montana, have invented a certain new and Improved Automatic Exhaust-Nozzle, of which the following is a specification.

My invention relates to exhaust nozzles for locomotives, though the same may be applied in the smoke stacks of the boilers belonging to stationary engines and also those of traction and portable engines.

The object of my invention is to provide means in connection with the exhaust or forced draft nozzle, whereby the size of the nozzle may be varied according to the amount and force of steam exhaust through the same, rendering the opening small when but little steam is passing through the nozzle and large when a greater volume of steam is exhausted, thereby maintaining a given draft at all times and thus obtaining the highest efficiency from the boiler and the amount of fuel in the fire box.

My invention consists in general in the combination with the exhaust pipe or sleeve, of a series of overlapping bow springs arranged entirely therein, the lower ends of said springs being fastened and the upper ends left free to travel up or down as the spring lining thus formed for the sleeve is expanded or permitted to contract; and further my invention consists in details of construction and in combinations all as hereinafter described and particularly pointed out in the claims.

My invention will be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section of an exhaust nozzle embodying my invention. Fig. 2 is a partial plan view from beneath on the line $x-x$ of Fig. 1. Fig. 3 is a partial horizontal section on the line $y-y$ of Fig. 1.

As shown in the drawings, 2 represents the end of the exhaust pipe or pipes or the base of the smoke-box, in the lower part of which and directly beneath the smoke stack the nozzle is located. The exhaust pipe or sleeve is preferably composed of two parts, the lower part 3 being of any desired length and the upper part 4 supplementing the same and

containing the spring lining or automatic nozzle proper. The lower part is provided with the top flange 5, while the lower edge of the part 4 has a similar flange 6 and preferably the depending collar or flange 7 which surrounds the flange 5.

The upper end of the sleeve 4 is preferably turned out to make a smooth seat for the upper ends of the outer course of bow springs. The bow springs are arranged in two courses, the outer course 8 and the inner course 7. The bend in each spring is made near the upper end thereof and the extreme end of each spring is preferably turned inwardly to prevent the bending of the ends on the walls of the sleeve or upon one another. The lower ends of the springs are bent outwardly and are secured beneath the flange 6 by rivets or studs 9 projecting from the feet of the springs into sockets provided in the flange 6. The studs are preferably so arranged that they may be easily withdrawn from these sockets or holes. As shown in Fig. 2 the feet or lower ends of the outer course of springs are spaced equally about the foot of the sleeve 4 and the feet of the inner course lap over those of the other course, filling the spaces between the same clear up to the tops thereof. The springs are flat in transverse section and the edges of the inner course make very good joints with the inner surfaces of the springs 8. The spaces between the feet of the springs 8 are preferably filled with a packing or other suitable material, and a suitable packing is arranged between the feet of the inner course of springs and a packing ring 10 placed between the feet and the top of the flange 5, thus effectually preventing the escape of steam at this point. The upper part of the sleeve and all of the springs are firmly fastened in place by short bolts 11 passing down through the flange 6 and the springs and into the flange 5. When the bow springs are arranged in their places they form a substantially circular and inverted funnel over the lower part of the exhaust nozzle and normally presenting an opening of considerably less area than that of the lower part 3. When, however, the valves of the steam cylinders of the engine are opened and the small amount of steam consequently effectually exhausted into the nozzle, this steam will be forced

through the small opening between the tops of the springs or spring lining and will slightly distend the same, thus confining the body of steam to a small jet projected upward toward the smokestack. In case the pressure of steam is greater the springs will be still farther distended and when the valves are at full stroke the springs will be forced to their full play previously calculated and the strength of the spring proportioned therefor. In this way a large body of steam may be exhausted through the nozzle without intensifying the draft, as the jet of steam will be enlarged and thus decrease the velocity. Upon the falling off of the steam exhaust the springs will return to their normal positions or so far as permitted by the pressure of steam at a given moment. The springs are tempered to such a degree as not to be injured by the heat of the steam, at which temperature they will in practice always remain.

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

1. The combination, with the exhaust sleeve or pipe, of the annular spring lining arranged therein and adapted to be distended by pressure of the exhaust steam, and to contract automatically and in a definite degree corresponding to the steam pressure substantially as and for the purpose set forth.

2. The combination, with the exhaust sleeve, of the bow springs arranged therein to form a spring lining, the lower ends of said springs being secured to the sleeve and the upper ends being in free engagement therewith, whereby said spring lining is adapted to expand and contract automatically substantially as described.

3. The combination, with the exhaust sleeve or pipe, bow springs arranged therein in two courses, one overlapping the other to form a

spring lining, the lower ends of said springs being secured in the lower end of said sleeve, and the upper end being in free engagement with the upper part of said sleeve, to permit the automatic action of the spring lining constituted by said springs substantially as and for the purpose specified.

4. The combination, with the sleeve, of the bow springs arranged therein in overlapping courses to form a spring lining therefor, the bend in said springs being arranged near the tops thereof, the lower ends of said springs secured in the lower part of the said sleeve and the upper ends in free engagement therewith, substantially as described.

5. The combination, with the sleeve, of the bow springs arranged in overlapping courses therein, the lower ends of said springs being bent outwardly and secured to the lower end of said sleeve, and the outwardly bent upper ends of said springs being in free engagement with one another and with the upper end of said sleeve, substantially as described.

6. The combination, with the sleeve, of the bow springs arranged in overlapping courses therein, each of said springs having its lower end bent outwardly beneath the lower edge of said sleeve, the studs whereby said ends are secured to said sleeve, the lower part of the nozzle, packing arranged between the lower ends of said springs and of said sleeve, and the lower part of the nozzle, and bolts for securing said parts together, substantially as described and for the purpose set forth.

In testimony whereof I have hereunto set my hand, this 8th day of December, 1893, at Minneapolis, Minnesota.

JOHN T. McLELLAN.

In presence of—

C. G. HAWLEY,
F. S. LYON.