

(No Model.)

2 Sheets—Sheet 1.

W. E. SYMONS.
VARIABLE EXHAUST NOZZLE.

No. 541,893.

Patented July 2, 1895.

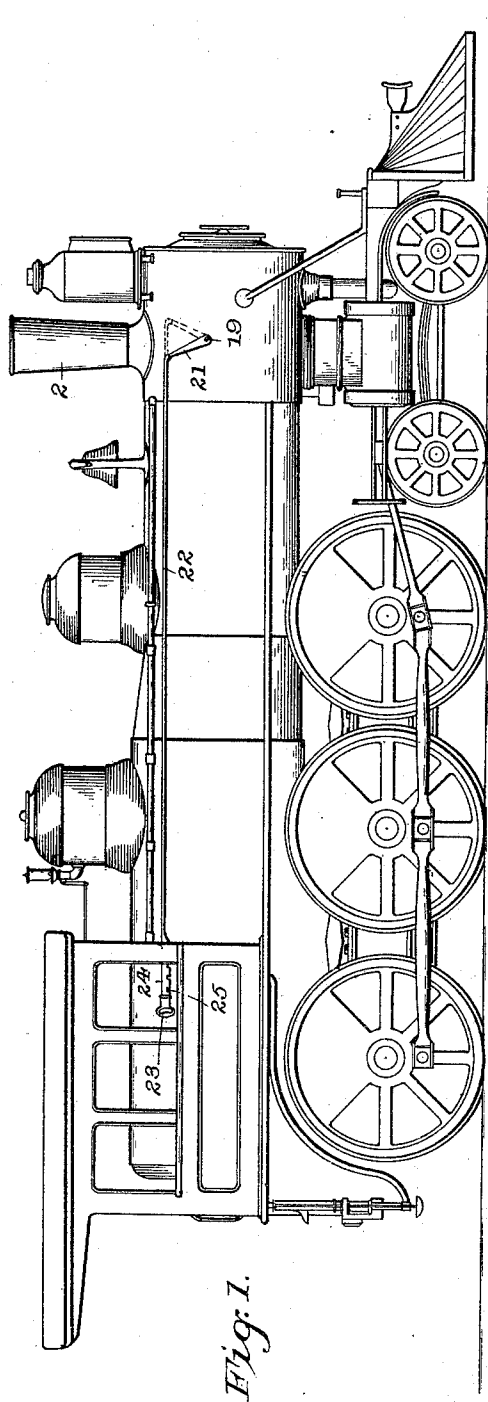


Fig. 5.

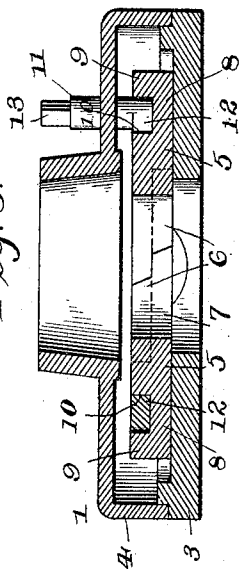


Fig. 7.

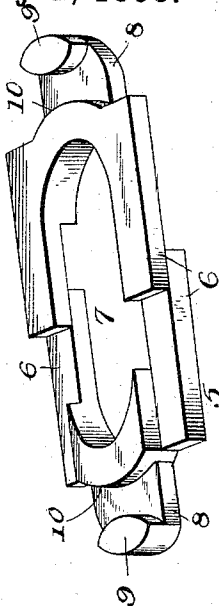


Fig. 6.

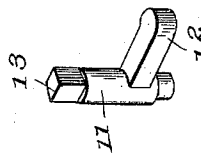
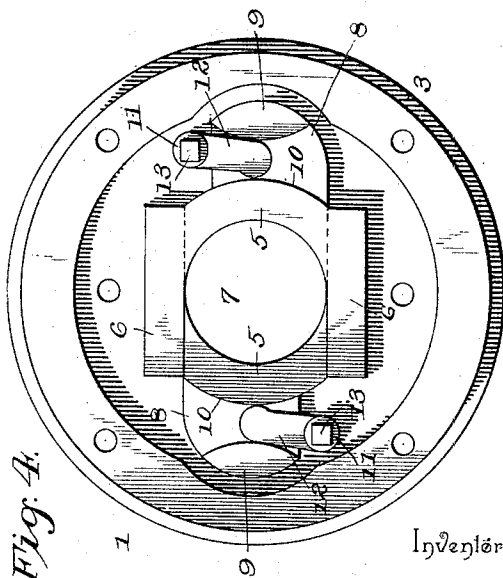


Fig. 4.



Inventor

Witnesses

Chas. A. Ford
[Signature]

By his Attorneys:

Wilson E. Symons,

Chas. Snow & Co.

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Fig. 3.

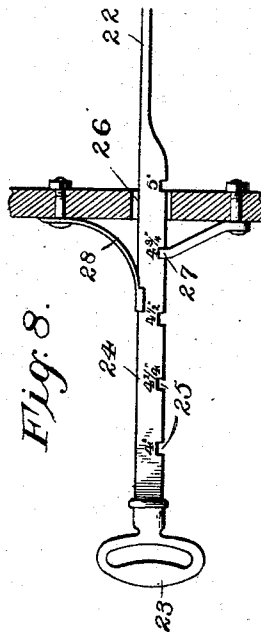
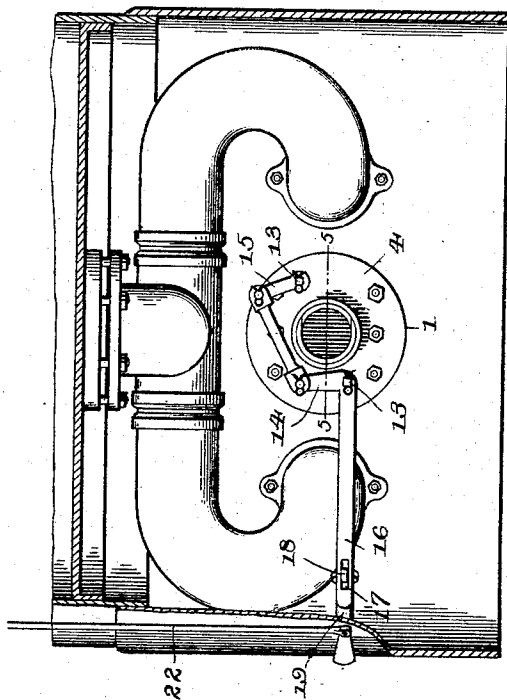


Fig. 8.

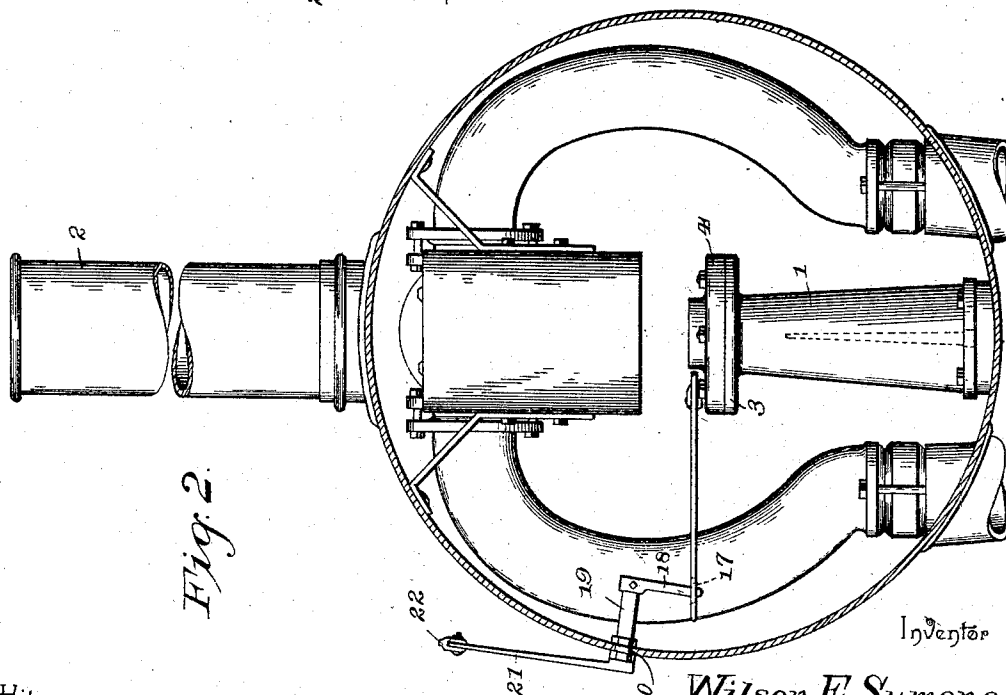


Fig. 2.

Witnesses

Charles Ford
W. E. Symons

By his Attorneys.

Wilson E. Symons,

Chas. Knowlton.

UNITED STATES PATENT OFFICE.

WILSON E. SYMONS, OF RATON, TERRITORY OF NEW MEXICO.

VARIABLE EXHAUST-NOZZLE.

SPECIFICATION forming part of Letters Patent No. 541,893, dated July 2, 1895.

Application filed October 6, 1894. Serial No. 525,146. (No model.)

To all whom it may concern:

Be it known that I, WILSON E. SYMONS, a citizen of the United States, residing at Raton, in the county of Colfax and Territory of New Mexico, have invented a new and useful Variable Exhaust-Nozzle, of which the following is a specification.

My invention relates to improvements in exhaust-nozzles adapted particularly for use in connection with locomotive engines; and the objects in view are to provide simple means for varying the area of the outlet to control the intensity of the draft to suit the load or other conditions of operation, the valve being constructed to prevent accumulations from interfering with its operation.

Further objects and advantages of the invention will appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

In the drawings, Figure 1 is a side view of a locomotive engine provided with an exhaust-nozzle embodying my invention. Fig. 2 is a front view of the apparatus. Fig. 3 is a plan view. Fig. 4 is an enlarged plan view of the nozzle, with the cap-plate removed. Fig. 5 is a transverse vertical section on the line 5 5 of Fig. 3. Fig. 6 is a detail view of one of the cam-bearing spindles. Fig. 7 is a detail view of the sectional slide-valve. Fig. 8 is a detail view of the means for holding the parts in their adjusted positions.

Similar numerals of reference indicate corresponding parts in all the figures of the drawings.

1 designates a vertical exhaust-nozzle, arranged to discharge exhaust steam from the cylinders through the aligned stack 2, and arranged at the upper end thereof is a horizontal valve-seat 3 over which is placed the cap 4. Within the cap, and mounted upon said seat, is a sectional valve, consisting of twin opposite members 5, 5, having parallel arms 6 which are halved, or cut-away respectively at their upper and lower sides, whereby when moved toward each other they interlock to reduce the inclosed opening 7, which registers with the bore of the nozzle. The members of the valve are provided with terminal extensions 8 bearing rounded lugs or bearings 9, and opposite to these bearings

the body-portions of the members are provided with similar bearing surfaces 10, thus presenting twin opposite convex surfaces at the outer end of each member.

Mounted vertically in the cap-plate, adjacent to the outer or remote ends of the members of the valve are spindles 11, carrying the cams 12 which fit, respectively, between the opposing bearing faces of the valve-members, whereby the partial rotation of the spindles causes a longitudinal movement of the valve-members, either toward or from each other. The upper or exposed ends of these spindles are squared, as shown at 13, and fitted thereon, respectively, are the crank-arms 14 and 15, the former of which is provided with an auxiliary operating-arm 16 which extends laterally to a point adjacent to the side wall of the exhaust-chamber at the front end of the engine. This operating-arm is provided with a terminal longitudinal slot 17 in which fits the lower arm 18 of a crank-shaft 19 mounted rotatably in a bearing 20 in said wall of the exhaust-chamber, and to the free end of the outer and longer arm 21 of said crank-shaft is attached the front end of the operating rod 22. The operating rod extends back to the cab of the engine and terminates in a handle 23 having a shank 24 provided with spaced notches 25. This shank operates in a guide 26 adjacent to or in the cab, and adjacent to the guide is a detent 27 to engage one of the said notches and a holding spring 28 to maintain the shank in operative relation with the detent to prevent accidental disengagement of the desired notch from the detent.

By means of the apparatus thus described, the members of the valve may be simultaneously and correspondingly operated to the same extent in either direction to either close or open, to the desired degree, the exhaust opening. When the members of the valve are at the limit of their inward adjustment the remaining opening is circular, and when said parts are extended the opening becomes elongated.

From the above description, it will be seen that by reason of the construction of the valve members with side cut-away or halved portions which extend to the outer extremities, respectively, of the valve members, the accu-

mulation of sediment upon the upper faces of the members does not interfere with the adjustment thereof when it is desired to reduce the outlet opening. The construction of the valve is such that the accumulations are pushed from the upper surface of one member by the ends of the arms of the other member. Hence, the valve is not rendered inoperative by reason of accumulations. Furthermore, the peculiar construction of the means for imparting motion simultaneously to the valve members provides for mounting the spindles in permanent bearings without causing deflection of the valve members from a straight path, all sliding or loose pivotal connections are avoided, and any looseness which may be caused by the wearing of the convex bearing surfaces does not interfere with the proper and positive operation of the mechanism.

Having described my invention, I claim—

1. The combination with an exhaust-nozzle, of a valve comprising oppositely disposed parts or members provided with overlapping side arms arranged to move in parallel planes with their contiguous surfaces in contact, those surfaces of each part or member upon which the arms of the other part or member slide being free from obstructions and extending to the outer extremity of the first-named part or member whereby the extremities of the arms of the other part or member operate to remove accumulations from the surfaces and allow the parts or members to assume their closed positions, and means for imparting simultaneous movement in opposite directions to the members, substantially as specified.

2. The combination with an exhaust-nozzle, of a valve comprising twin opposite complementary parts or members arranged with their lower surfaces in a common plane and

provided with side arms which are halved or cut away to interlock, whereby the upper and lower sides of the side arms are flush with the upper and lower surfaces of both members, the cut-away portions of the arms extending to the outer extremities of the members whereby sediment accumulating upon the exposed surface of one member is removed by the extremities of the arms of the other member, and means for imparting simultaneous movement in opposite directions to the members, substantially as specified.

3. The combination with an exhaust-nozzle, of a valve having twin opposite parts or members provided with interlocking side arms and also provided at their outer extremities with pairs of contiguous convex bearing faces and 10, cams arranged respectively between the contiguous bearing faces and fitting snugly in the interval between the opposite points thereof, spindles carrying said cams, and connections between the spindles whereby simultaneous motion in opposite directions may be imparted to the valve members, substantially as specified.

4. The combination with an exhaust-nozzle, of a valve having opposite slidable members, spindles provided with cams fitting between bearing faces on the members, connections between the spindles, an operating-arm attached to one of the spindles, a crank-shaft having an arm arranged in operative relation with the operating-arm, and an operating rod connected to another arm of the said crank-shaft, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

WILSON E. SYMONS.

Witnesses:

THOMAS SMITH,
HARVEY SHULL.