E. R. ADDISON.

Variable Exhaust for Locomotives

No. 213,311 **Patented Mar. 18, 1879.**

Fig. 1.

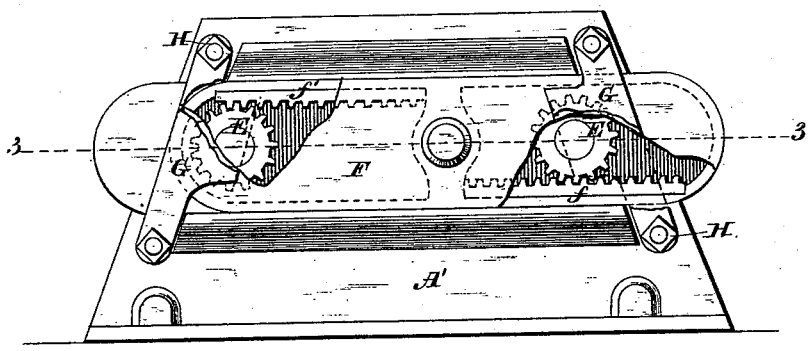


Fig. 2.

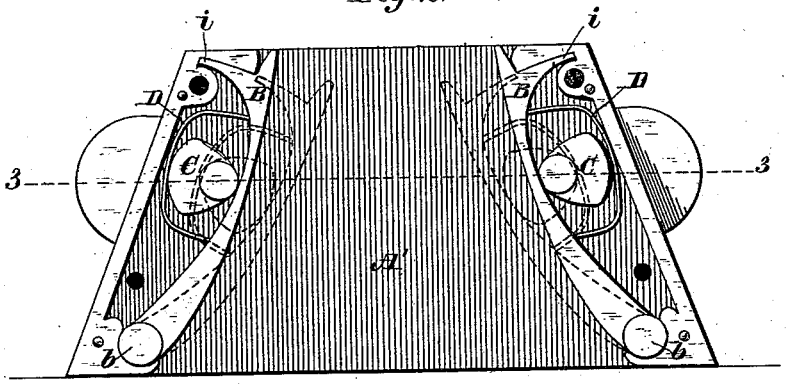
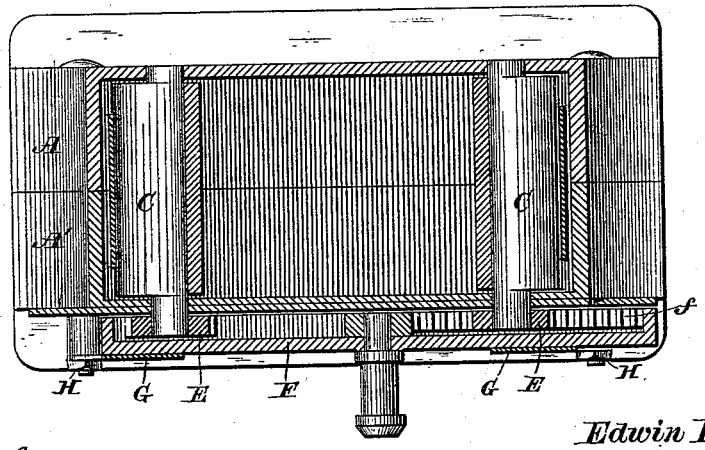


Fig. 3.



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UNITED STATES PATENT OFFICE.

EDWIN R. ADDISON, OF CINCINNATI, OHIO.

IMPROVEMENT IN VARIABLE EXHAUSTS FOR LOCOMOTIVES.

Specification forming part of Letters Patent No. **213,311**, dated March 18, 1879; application filed August 15, 1878.

To all whom it may concern:

Be it known that I, EDWIN R. ADDISON, of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Variable Exhausts for Locomotive-Engines, of which the following is a specification:

The object of my invention is to provide an exhaust-passage readily variable in capacity, and providing a free and smooth delivery in all conditions of its adjustment; also, one that will be effective in use, durable, and not liable to get out of order.

The casing of the variable exhaust-nozzle is made in two parts, to admit of adjustment in case of wear from use. Within this are a pair of curved valves or leaves working on trunnions, and made to approach or recede from each other by means of cams yoked to their concave backs and operated through the medium of pinions on their journals by a sliding rack having two sets of teeth engaging with the said pinions in such a manner that when the rack is moved in one direction a simultaneous movement will be imparted to the valves, causing them to approach each other, and when it is moved in the other direction they will be made to recede from each other.

In order that my invention may be more fully understood, I will proceed to describe it with reference to the accompanying drawings, in which—

Figure 1 is a front view, partly in section. Fig. 2 is a rear view with one-half of the casing removed. Fig. 3 is a horizontal section on the line 3 3, Figs. 1 and 2.

A A′ are the two parts of the divided casing, within which are a pair of convex-faced valves or leaves, B B, working on trunnions *b b* at their lower ends, and operated by cams C C, which occupy the cavities in the hollow backs of the valves, and are encircled by yokes D D, attached to the valves B B, so as to cause the said cams, by their rotation, to move the valves toward and away from each other. On the front journals of the cams C C are keyed pinions E E.

The simultaneous rotation of the two cams to produce the required concurrent movement of the valves is imparted by a double rack, F, made in the form of a cap, covering the pinions E E, and adapted to slide horizontally to the right and left across the face of the casing.

The rack-cap F being provided with two ranges of teeth, *f* and *f′*, the one engaging with the lower side of one of the pinions E, and the other engaging with the upper side of the other pinion, it will be apparent that a motion of the rack-cap in one direction will turn the two pinions in opposite directions in such a way as to throw the cams over against the backs of the valves and cause them to approach each other, and that the reverse movement of the rack-cap will move the respective pinions in the other direction, causing the cams C C to press against the yokes D D, thereby drawing the valves apart and increasing the capacity of the port or nozzle.

In practice the cams C are fitted to the backs of the valves B and within the yokes D in such a manner as to avoid any lost motion and admit of setting the valves accurately at any required proximity or distance asunder, so as to regulate the capacity of the opening with precision by the movement of the rack-cap F.

It will also be apparent that the convex curvature of the valve-faces gives a better and smoother discharge to the steam, avoiding any obstruction to the current or draft produced by the exhaust, and that the manner of mounting the valves on trunnions and forming their bottom and top ends to fit the casing all the way across, and providing their upper ends with flanges *i* projecting backward into suitable recesses, effectually excludes dirt from the working parts, as well as increasing the wearing-surface and the consequent durability of the device.

The making of the case A A′ in two parts adapts it to be adjusted or set up to compensate for wear.

The rack-cap is held in place and guided by spring-plates G G, held by the same screw-bolts H H which hold the casing together.

The movement of the said rack-cap to regulate the exhaust may be effected, as desired, either by a connection with the reversing-lever of the engine or by a separate connection under control of the engineer.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. The exhaust-nozzle casing, made in two equal or similar parts, A A′, coupled by bolts H H, and containing valves B B to regulate the capacity of the nozzle, the whole being constructed substantially as herein shown and described.

2. The valves B B, constructed with vertically-convex faces and concave backs, and working within the casing A A′ in the manner and for the purpose set forth.

3. The combination, in a variable exhaust, of the valves B B, cams C C, and yokes D D, constructed and operating substantially as and for the purposes set forth.

4. The rack-cap F *f f′*, constructed substantially as described, and acting on pinions E E on the journals of the cams C C, as explained.

5. The combination of the casing A A′, valves B B, cams C C, yokes D D, pinions E E, rack-cap F *f f′*, spring guide-plates G G, and bolts H H, as and for the purposes set forth.

E. R. ADDISON.

Witnesses:
A. H. DIXON,
GEO. H. HIGH.