G. S. BRAINERD.

Variable Exhaust for Locomotive.

No. 202,144. Patented April 9, 1878.

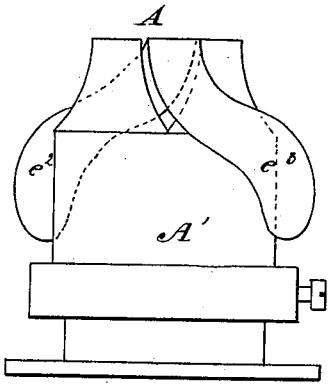


Fig: 5

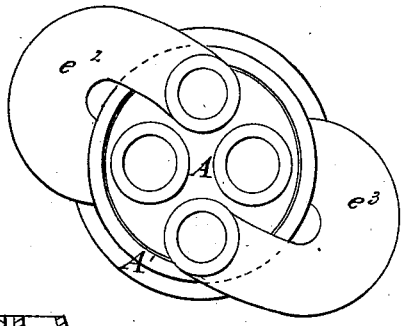


Fig: 6.

Fig: 1.

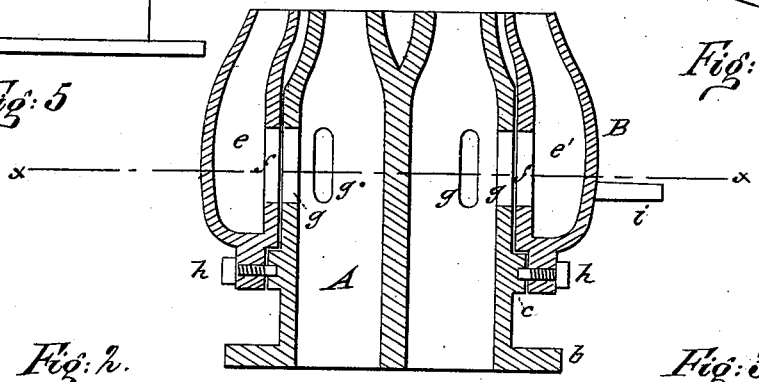


Fig: 2.

Fig: 3.

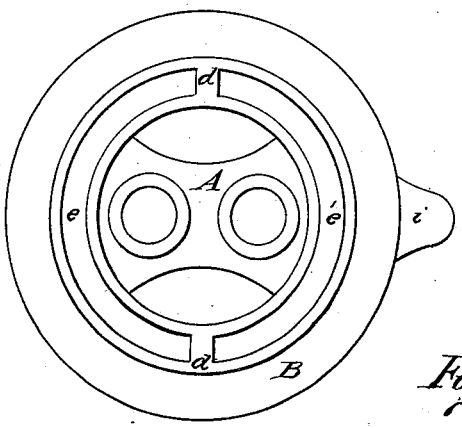
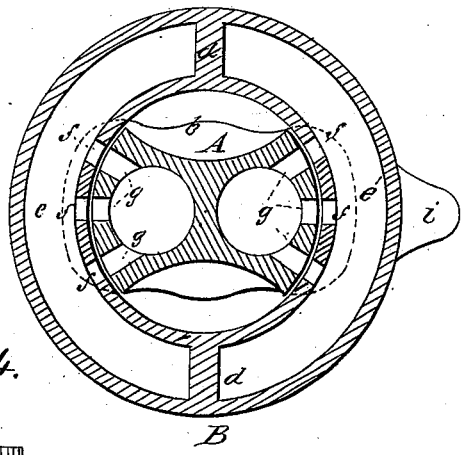
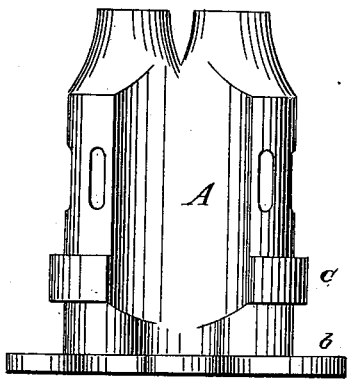


Fig: 4.





WITNESSES:

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UNITED STATES PATENT OFFICE.

GEORGE S. BRAINERD, OF ST. ALBANS, VERMONT.

IMPROVEMENT IN VARIABLE EXHAUSTS FOR LOCOMOTIVES.

Specification forming part of Letters Patent No. **202,144**, dated April 9, 1878; application filed March 7, 1878.

To all whom it may concern:

Be it known that I, GEORGE S. BRAINERD, of St. Albans, in the county of Franklin and State of Vermont, have invented a new and Improved Variable Exhaust for Locomotives, of which the following is a specification:

Figure 1 is a vertical section of my improved exhaust-nozzle. Fig. 2 is a plan view. Fig. 3 is a horizontal section taken on line *x x* in Fig. 1. Fig. 4 is a detail view of the nozzles or termini of the exhaust-pipes. Fig. 5 is a side elevation of a modified form, and Fig. 6 is a plan view of the same.

Similar letters of reference indicate corresponding parts.

The object of my invention is to provide blast-nozzles for locomotives and other engines, by means of which the blast created by the exhaust of the engine may be controlled, so that it may act on the fire with increased or diminished effect.

The invention consists in a casting containing one or more nozzles, in which the exhaust-pipes of the engine terminate, said casting being surrounded by a movable annular cone, which communicates with ports in the sides of the nozzles, so that it may receive a part of the exhaust. The annular cone is divided into two compartments, one for each exhaust-nozzle.

Referring to the drawings, A is an exhaust-nozzle, which, in the present case, has two exhaust-passages, which are of the same size as the exhaust-pipes, except at the discharge end, where they are contracted. This nozzle is provided with a flange, *b*, which is secured to the center casting in the smoke-box of the locomotive by means of bolts. The nozzle A is cut away at its sides between the two passages, and the remaining portion is turned off cylindrically to form a bearing for the cone B, and has a narrow flange, *c*, upon which the said cone rests.

An annular chamber, which is open at the top, is formed in the cone B, and divided by partitions *d* into compartments *e* e^1. In the inner wall of each compartment *e* e^1 there are three ports, *f*, which coincide with three ports, *g*, in the nozzle A. Each set of three ports communicates with one of the exhaust-passages of the nozzle.

The cone B is capable of turning on the nozzle A, so as to bring the ports *f* opposite the ports *g*, or opposite the spaces between the ports *g*. The motion of the cone on the nozzle is limited by screws *h*, that project from the cone into grooves formed in the side of the nozzle.

When the full effect of the blast is desired the cone B is turned upon the nozzle A, so as to bring the ports *f* opposite the spaces between the ports *g* in the nozzle. Communication between the nozzle and cone is thus shut off, and all of the exhaust passes through the nozzles; but when it is desired to diffuse the exhaust so as to lessen its effect on the fire, and to relieve the pistons from back pressure, the cone B is turned upon the nozzle A until the ports *f g* coincide. The steam will then pass through the ports and through the annular space in the cone, as well as through the nozzles. The force of the blast will thus become greatly diminished.

The cone B is provided with an apertured ear, *i*, with which is connected a rod for operating the cone.

The modification shown in Figs. 5 and 6 consists in substituting for the compartments *e* e^1 two curved tubes, e^2 e^3, which are attached to a sleeve, A′, fitted to the nozzle A, and communicate with the ports *g* in the nozzle in the same manner as the compartments *e* e^1. These tubes are curved so that a line drawn diametrically across their outer ends will form a right angle with a line drawn across the discharge-openings of the nozzle A.

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

1. A locomotive in which each engine has separate exhaust-pipes, provided with relief-pipes equal to the exhaust-passages of the cylinders, the vertical nozzles, and the cone, having one or more ports, in combination with the sleeve having the vertical permanent exhaust, as shown and described.

2. The combination of the double-walled cone B, having ports *f*, and divided by the partitions *d* into two or more compartments, *e* e^1, and the double nozzle A, having the ports *g*, substantially as herein shown and described.

GEORGE SEGUR BRAINERD.

Witnesses:

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