N. J. WHITE.
Exhaust Nozzle.

No. 208,939. Patented Oct. 15, 1878.

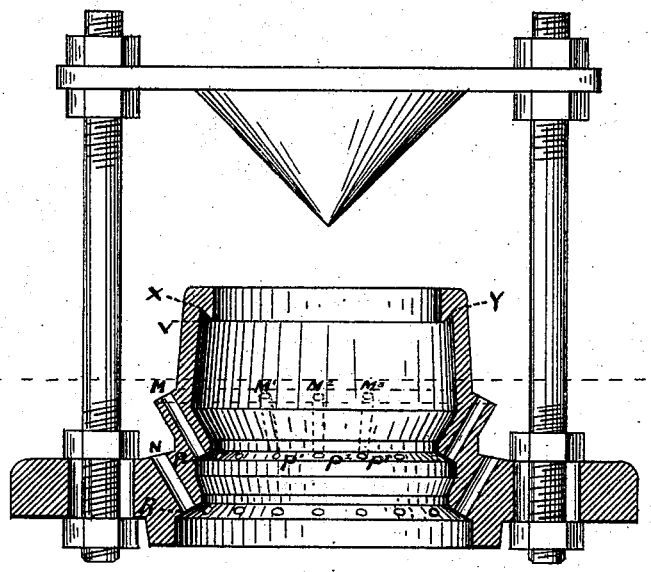

Fig. 1.

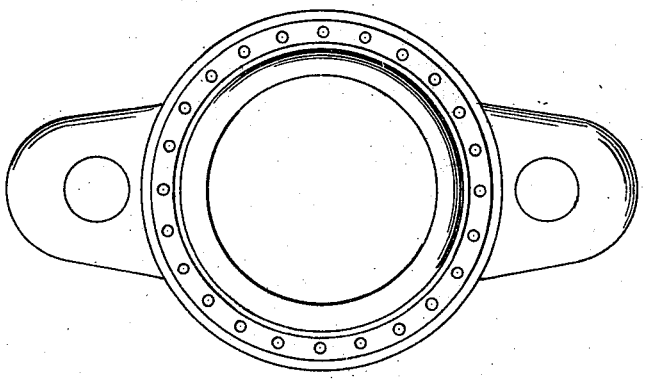

Fig. 2.

WITNESSES
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NELSON J. WHITE, OF LAWRENCE, MASSACHUSETTS.

IMPROVEMENT IN EXHAUST-NOZZLES.

Specification forming part of Letters Patent No. **208,939**, dated October 15, 1878; application filed June 22, 1878.

To all whom it may concern:

Be it known that I, NELSON J. WHITE, of Lawrence, county of Essex, State of Massachusetts, have invented a new and useful Improved Exhaust-Nozzle for Locomotive-Engines; and I do hereby declare the following to be a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawing, which forms a part of specification.

The object of my invention is to obviate the sharp explosion and sudden intermittent draft consequent to the exhaustion of steam through the present form of nozzle from the cylinder into the petticoat-pipe, whereby the unburnt particles of fuel are drawn through the flues into the smoke-stack with deleterious and uneconomic effects, the primary cause for the difficulty being found in the imperfect discharge of steam from the nozzle, through which it rushes in a condensed mass, and is got rid of less rapidly than the engine "takes it," causing thereby a back-pressure and choking of the parts, to be overcome only by the additional work of the piston. It is necessary, then, to relieve the back-pressure and soften the exhaust, which I do by radiating and dispersing the steam sufficiently to fill the base of the petticoat-pipe, the volume thus becoming greater and the tension less, and it no longer forces its way upward through an envelope of friction-producing air. This dispersion is effected by two agents, each of which helps and relieves the other—first, by the immediate discharge and radiation of as much of the steam as is possible through a series (one or more) of holes, slanting upward, bored through the base of the nozzle, which result may also be secured, though with less efficiency, by beveling the bearing of the nozzle upon the steam-cylinder in such manner as to leave an annular space around the whole circumference, through which the steam may escape. Still another method of securing approximately the same dispersion of steam would be the locating of an inverted cone just above the mouth of the nozzle, attached by standards and capable of being raised or lowered at will.

Second, the putting in of a hook or V-shaped flange at the mouth of the nozzle, whereby the tendency of the steam to "wire-draw" is lessened, the tension is relieved, the discharge rendered greater, and the explosion less violent.

In the accompanying drawing, Figure 1 represents the improved exhaust-nozzle in vertical section.

By reference to it the first agent above referred to, in order to effect dispersion, will be seen to consist of two series of holes, M P and N R, in horizontal rows, bored through the walls of the nozzles and inclining upward, each hole being one-eighth of an inch in diameter and one-eighth of an inch apart. The vertical distance between the series is about one inch, the lower series emerging on the outside at the same altitude that the next begins inside. Through these holes the steam rushes, radiating toward the petticoat or inside pipe, filling it and forcing the air ahead of it. This helps to make a gradual instead of a sharp exhaust, the draft is freer and more constant, and the fuel confined to the furnace, where it may undergo complete combustion.

The hook at the mouth of the nozzle is shown at V, whose sides form an angle of about forty-five degrees.

With this form of tip the flow of steam becomes more uniform, and the cone above is enabled to disperse the steam with the utmost efficiency, whereas were the hook not introduced the violence of the explosions would be increased, the discharge would be intermittent, and the constancy of draft for which we aim lessened.

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

1. In an exhaust-nozzle, a series (one or more) of small holes bored in horizontal rows through its walls and inclined upward and outward from its base, to radiate and diffuse as much of the steam as may there find vent, in order to completely fill the base of the petticoat-pipe with steam, all constructed and arranged as shown and described.

2. In an exhaust-nozzle, a V-shaped hook

or flange, constructed at the mouth of the pipe, to lessen the tension of the steam which has not passed out below and deliver it in a steady and uniform current to meet with equal and uniform distribution.

3. In an exhaust-nozzle, a series of holes perforating its walls to diffuse the steam, acting, in combination with a hook or flange at the mouth, to lessen the tension of the steam and increase uniformity of delivery and discharge.

In testimony whereof I have hereunto set my hand this 15th day of June, A. D. 1878.

NELSON J. WHITE.

Witnesses:
WILLIAM W. CARRUTH,
GEO. L. SNELLING.