D. HARRIGAN.

Tip for Exhaust-Pipe for Locomotives.

No. 217,459. Patented July 15, 1879.

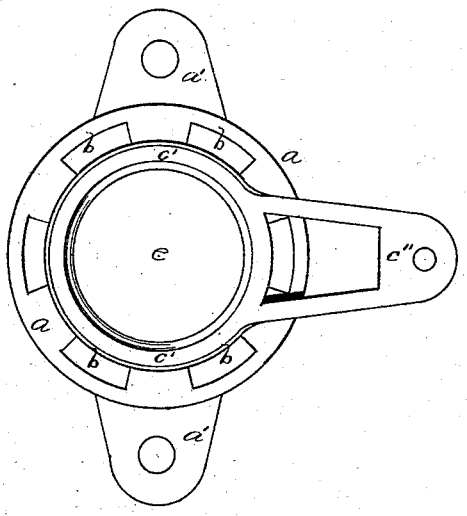

Fig. 1.

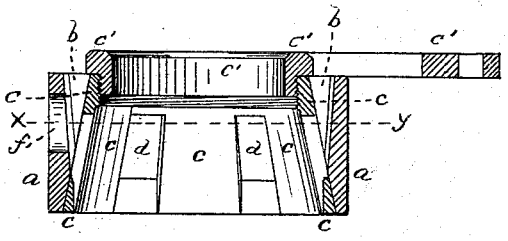

Fig. 2

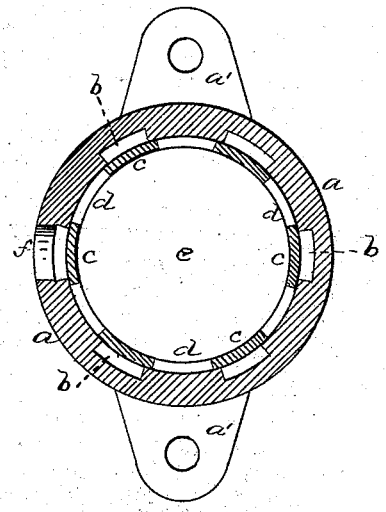

Fig. 3.

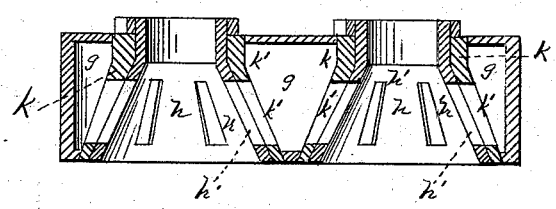

Fig. 4.

WITNESSES

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UNITED STATES PATENT OFFICE

DENNIS HARRIGAN, OF SOMERVILLE, MASSACHUSETTS, ASSIGNOR OF ONE-HALF HIS RIGHT TO JOHN F. CROCKETT, OF LACONIA, NEW HAMPSHIRE.

IMPROVEMENT IN TIPS FOR EXHAUST-PIPES FOR LOCOMOTIVES.

Specification forming part of Letters Patent No. **217,459**, dated July 15, 1879; application filed December 20, 1878.

To all whom it may concern:

Be it known that I, DENNIS HARRIGAN, of Somerville, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Tips for Exhaust-Pipes for Locomotives, of which the following is a specification.

This improvement relates to the tips or nozzles of locomotive-exhausts; and consists of a stationary tip provided with an internal rotating cone having suitable ports, so that the exhaust-tip may be a variable one.

I am aware that a stationary cone has been provided with a rotating sleeve, the two having corresponding ports.

My improvement, in which the tip (or outside frame) is stationary and the cone movable, has several important advantages. One advantage is, that the cone being movable, the steam has a tendency to press the cone tightly up into the tip, thus producing, so to speak, automatically a tight joint, and leaving no space for the entrance of cinders, ashes, &c., which wear an exhaust or exhaust-tip rapidly. Another advantage is, that a stationary tip allows of a small passage being made therein to the accompanying tip, (two often being used.) Of course, when the tip is made in the form of a rotating sleeve upon a stationary cone, this is impossible. By referring to my application filed May 11, 1878, a rotating sleeve upon a stationary cone will be found illustrating the last statement.

In the accompanying drawings, in which similar letters of reference indicate corresponding parts, Figure 1 is a plan view of my improved tip open. Fig. 2 is a vertical section of the same open. Fig. 3 is a horizontal section upon line *x y*, Fig. 2, closed.

a represents the stationary frame of the tip, secured by means of bolts in the base *a'* to the exhaust-pipe, and provided with vertical ports *b*. *c* is the rotating cone, having the collar *c'* screwed thereto, said collar resting upon the tip *a*, and being provided with a lever or arm, *c'*, to connect with the rod by means of which the cone is rotated. *d d* are vertical ports in the cone, corresponding with the ports in the frame of the tip.

Rotating the cone into a position in which the ports *b d* coincide reduces the blast, by allowing a portion of the dead steam to pass through the ports. Rotating the cone so that the ports do not coincide, as in Fig. 3, increases the blast, by forcing the steam to pass only through the main central opening, *e*.

When two tips are provided, a passage, *f*, may be cut in each tip, so as to connect the two and allow the steam to pass from one to the other in case the ports coincide, (or are open.) Thus it will be seen that, in case the ports are closed, each cylinder exhausts through its own tip; and if the ports are open and the passage *f* provided, each cylinder exhausts through both tips.

It will readily be seen by examining the drawings that the steam pushing up within and against the inside of the cone tends to force it snugly into the tip and make so close a joint as to preclude the possibility of serious wear from the entrance of cinders and ashes. This is very important in an exhaust-tip, as the wear is generally very great. If the cone were stationary and the tip a movable sleeve, as in the application above referred to, the tendency would be to force the sleeve away from the cone, thus enlarging the joint and facilitating the admission of ashes.

Fig. 4 shows a variation of my invention, in which rotating inner cones, *h*, provided with ports *h'*, are placed within stationary outer cones, *k*, provided within ports *k'*, and the whole placed within a chamber, *g*, into and through which the steam circulates when the ports are open. Of course, the outer cone, *k*, takes the place of the frame *a* in Figs. 1, 2, and 3. In this variation the steam exhausts through both tips at once, thereby producing a more even pressure in the petticoat-pipe.

I am aware that a rotating outer cone is not new, cones, sleeves, and jackets having been placed upon exhaust-pipes in several instances. I do not claim broadly, therefore, a rotating cone, as my invention comprises only a rotating inner cone in connection with a stationary surrounding frame, both being provided with corresponding ports, in a tip.

Again, I do not claim the chamber *g*, in which two cones are placed, as new in connection with this invention.

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

1. In a tip for the exhaust-pipe for a locomotive, the combination, with a stationary frame or outer body of the tip, provided with suitable ports around the main opening, of a rotating inner cone fitting under and into said frame or tip, and provided with corresponding ports, constructed and arranged substantially as and for the purposes herein set forth.

2. The combination of the rotating cone *c c'*, provided with the ports *d*, and the frame *a*, provided with ports *b* and passage *f* to a corresponding tip, constructed and arranged substantially as and for the purpose above specified.

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