

T. J. McMAHON.  
SPARK-ARRESTER.

No. 182,214.

Patented Sept. 12, 1876.

Fig. 1

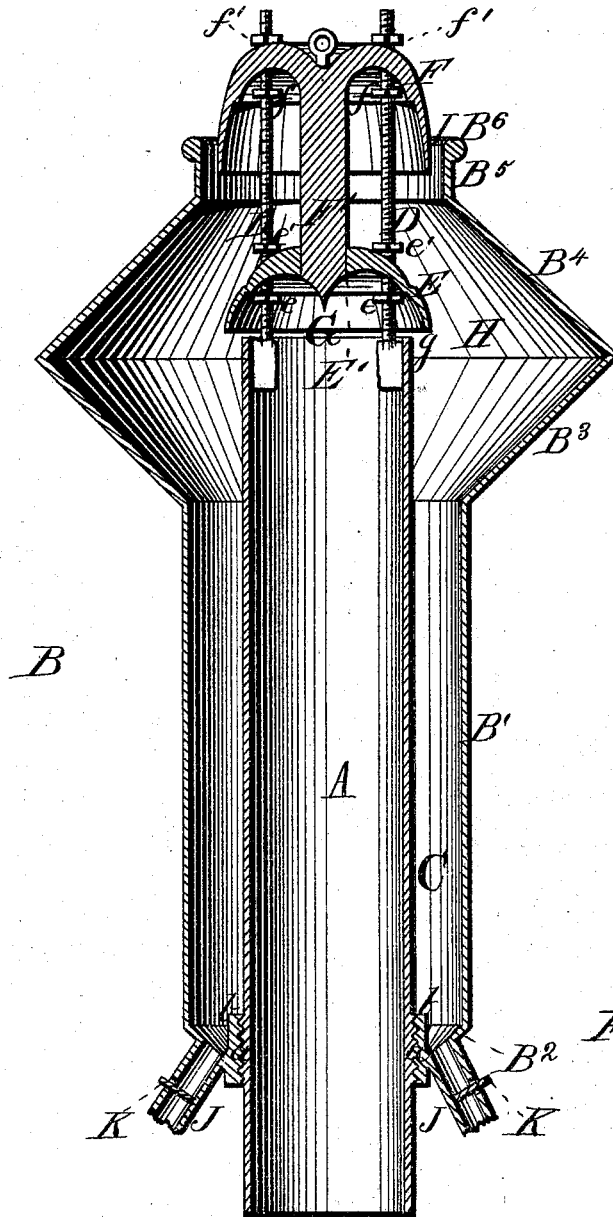
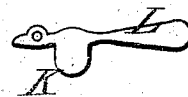


Fig. 2.



WITNESSES  
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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN SPARK-ARRESTERS.

Specification forming part of Letters Patent No. 182,214, dated September 12, 1876; application filed July 29, 1876.

To all whom it may concern:

Be it known that I, TERRENCE J. McMAHON, of Golden City, in the county of Jefferson and State of Colorado, have invented a new and valuable Improvement in Spark-Arresters; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, and to the letters and figures of reference marked thereon.

Figure 1 of the drawings is a representation of a longitudinal vertical section of my spark-arrester, and Fig. 2 is a detail view of the same.

The object of this invention is to provide a spark-arrester for the smoke-stacks of steam-engines which will effectually arrest and extinguish the sparks flying upward among the products of combustion without interfering with the draft, and which will also promote economy in the consumption of fuel.

The nature of said invention consists in certain improvements in spark-arresters, hereinafter particularly described.

In the accompanying drawings, A designates the main pipe or smoke-flue, through which the products of combustion are carried upward by the exhaust steam. Said smoke-flue A is screw-threaded on its outer surface at *a*, to receive an internally screw-threaded ring, *b*, which forms the bottom of stack-head B. Said stack-head consists of a cylindrical portion, B<sup>1</sup>, which surrounds a part of smoke-flue A like a sleeve, leaving a spark-receiving chamber, C, of cylindrical form, between said portion B<sup>1</sup> of the stack-head and said smoke-flue A; also, of an inclined bottom portion, B<sup>2</sup>, which connects the lower end of said cylindrical portion B<sup>1</sup> with bottom ring B, and forms an inclined floor for cinder-receiving chamber C; also, of two conoidal hollow portions, B<sup>3</sup> B<sup>4</sup>, the lower one, B<sup>3</sup>, of which rests on the top of cylindrical portion B<sup>1</sup>, and flares upward, while the upper conoid B<sup>4</sup> flares downward with its outer rim resting on the upper edge of B<sup>3</sup>; and, finally, of an annular upper flange, B<sup>5</sup>, surmounted by a turned rim, B<sup>6</sup>. The parts *b* B<sup>1</sup>, B<sup>2</sup>, B<sup>3</sup>, B<sup>4</sup>, B<sup>5</sup>, and B<sup>6</sup> are all made in one piece, and of iron, copper, brass,

or other suitable material, according to the uses for which the engine is designed.

The above-described construction produces a stack-head of very neat and attractive external appearance, and one which is susceptible of considerable ornament. This would be desirable in case of engines used on passenger railway-trains.

D D D designate screw-threaded rods, which are permanently attached to the upper end of smoke-flue A, on the inside thereof. Their function is to support inverted cones or cups E F by means of nuts *e e e*, which set under lower cup or cone E, and nuts *f f f*, which set under upper cone F. Said rods pass through perforations in said cups or cones, the sides of which perforations so bind against said rods as to materially assist in the support of said cups or cones. Lower cup or cone E is provided with a central perforation, E', and upper cup or cone F is provided with a downwardly-extending weighted pointed bar, F', which sets into perforation E', and the point of which passes a little below the same, so as to complete the inner deflecting-curve of said lower cup or cone. Said bar operates, also, by its weight to prevent the displacement of said cups or cones by wind or other accidental cause. Lower cup or cone E sets down nearly to the top of smoke-flue A, leaving a space, G, between the two, and also an annular side exit, *g*. Said cup E also sets into a space, H, which is bounded exteriorly by flaring portions B<sup>3</sup> B<sup>4</sup> of stack-head B, and which communicates with cylindrical space C. The lower part of upper inverted cup or cone F sets within annular flange B<sup>5</sup>, leaving an annular exit, I, between the outside of said cone and the inside of upper rim B<sup>6</sup> of stack-head B. The upper part of said upper inverted cup F extends entirely above said stack-head, and adds to the ornamental appearance thereof. Additional nuts *e' e' e'* are screwed home above cup E, to hold it in place, and additional nuts *f' f' f'* are screwed home above upper cup or cone F, to hold it in place.

In the inclined part B<sup>2</sup> of stack-head B are discharge-pipes J J, each of which is slotted at right angles to its length, to allow the play of a slide, K, which is rigidly attached to a lever, L, pivoted to the side of discharge-pipe

J. By operating said lever from the cab of the engine, said discharge-pipe can be closed or opened at will.

All the above-described parts of my apparatus are preferably made of metal, though in the case of lever L, and, perhaps, some others, a different material might be substituted.

The operation of my device is as follows: The exhaust steam carries the products of combustion up smoke-flue A, causing an upward current of air, smoke, steam, cinders, and sparks. Said current then comes in contact with the curved face formed by the pointed end of bar F' and the under side of lower cup E, which face, by reason of its peculiar shape, will cause eddies and counter-currents in space G, as that part of the current which is deflected outward from the point of bar F will come into collision with the part of said current which is deflected inward from the inside of cup E. Said current then escapes from space G through narrow annular exit g into space H. It is next deflected from the inside of conoidal portion B<sup>4</sup> of stack-head B into the hollow of upper cone or cup F. There it is again deflected inward by said cup, and outward by central bar F, which action produces more eddies and counter-currents in and below said cup. At last said current escapes through narrow annular exit I; but the sparks are previously nearly all extinguished by successively impinging against so many surfaces, and in the end most of them fall into space C, at the bottom of which they lie until the dis-

charge-pipes J J are opened, when they fall to the ground. Even if some sparks of fire still remain in them, they will no longer prove an annoyance, as the elevation of said discharge-pipes above the ground is not sufficient to allow said sparks to get afloat in the air again. The lower deflecting cup or cone E may be perforated, if preferred; but in this case the course of the ascending air, steam, and smoke current will be somewhat changed, and the action of the cups and stack-head on the sparks will be correspondingly modified.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination of lower inverted cup or cone E, perforated at E', with its supporting-rods, the smoke-flue A, and upper inverted cup or cone F, having central weighted pointed bar F', substantially as and for the purpose set forth.

2. The combination of stack-head B, having cylindrical portion B<sup>1</sup>, flaring portions B<sup>3</sup> B<sup>4</sup>, lower inclined portion B<sup>2</sup>, and upper annular flange B<sup>5</sup>, with smoke-flue A, inverted deflecting cones or cups E and F, and screw-threaded rods D, substantially as and for the purpose set forth.

In testimony that I claim the above I have hereunto subscribed my name in the presence of two witnesses.

TERRENCE J. McMAHON.

Witnesses:

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A. H. DE FRANCE.