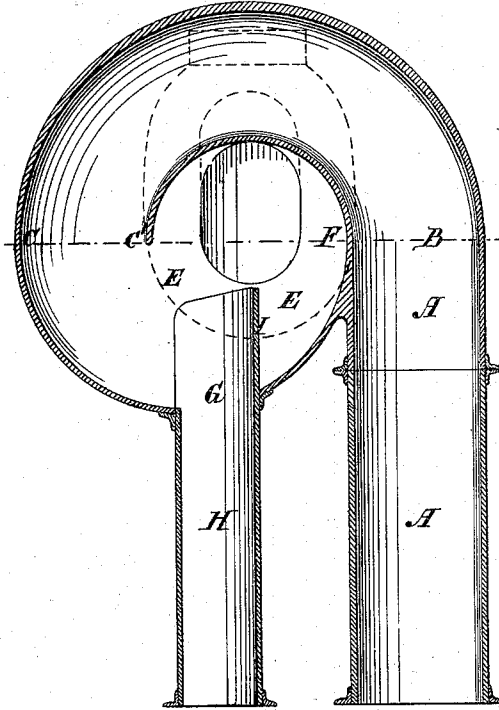


C. L. EASTMAN.  
Spark-Arrester.

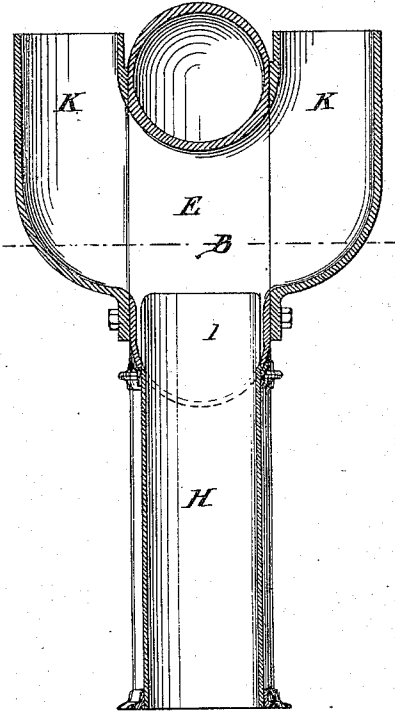
No. 165,080.

Patented June 29, 1875.

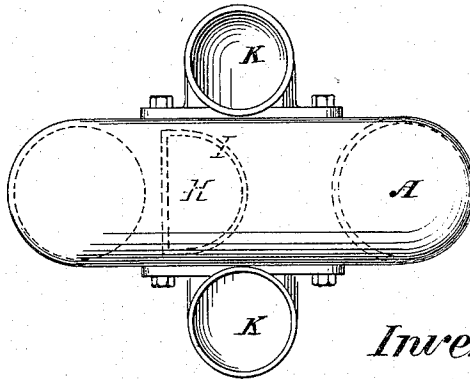
*Fig: 1.*



*Fig: 2.*



*Fig: 3.*



*Witnesses:*

*R. P. Starniff.*  
*Arthur Fletcher.*

*Inventor:*

*Charles L. Eastman*

# UNITED STATES PATENT OFFICE.

CHARLES L. EASTMAN, OF CONCORD, NEW HAMPSHIRE.

## IMPROVEMENT IN SPARK-ARRESTERS.

Specification forming part of Letters Patent No. 165,080, dated June 29, 1875; application filed April 8, 1875.

*To all whom it may concern:*

Be it known that I, CHARLES L. EASTMAN, of Concord, in the county of Merrimack and State of New Hampshire, have invented a certain new and useful Improvement in Spark Arresters and Consumers for locomotive and other engines; and I do declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings forming a part of this specification, in which—

Figure 1 represents a longitudinal section of my improved spark arrester and consumer; Fig. 2, a cross-section; Fig. 3, a top view.

In the drawings, the parts marked A A represent the smoke-stack of a locomotive or other engine, which is affixed to the boiler thereof in the same manner as smoke-stacks in common use. This smoke-stack is cylindrical in form, extending perpendicularly from the top of the boiler to the central lateral line of the top of the smoke-stack marked B in the drawings. This smoke stack or flue is continued from B on a circle or curve around to the points marked C C' in the drawings, which points C C' are upon that central lateral line upon the opposite side of said circle or curve from B, the diameter of the smoke stack or flue being about the same from its intersection with the boiler to the points C C', and at said points C C' the inner or lower side of the smoke stack or flue is cut away so as to leave a free discharge for the smoke and gases into the opening E E. The outside of the smoke stack or flue is then continued from said point C upon a diminished circle or curve around to its intersection with said central lateral line at the point marked F in the drawings. At the point marked G in said last-named circle or curve a connection is made by means of a pipe marked H in the drawings, which extends downward and connects with a flue or flues running through the boiler connecting with the fire-box of the engine, or with the pipe or pipes connecting with the fire-box of the engine. This latter pipe, marked H in the drawings, has an extension or projection on the side next the part of the smoke stack or flue marked A into the said inner open space marked E E, which said extension or projection is marked I in the draw-

ings. This extension or projection serves as a deflector to the sparks, cinders, and unconsumed fuel, the operation of which is hereafter shown. Connecting with the said inner space marked E E on each side of the smoke stack or flue are two discharge-pipes, shown at K in the drawings, through which the smoke, steam, and gases are discharged, as hereinafter shown.

The same parts in all the drawings are marked with the same letters.

The operation of my improved spark arrester and consumer is as follows, viz: The smoke, steam, gases, sparks, cinders, and unconsumed fuel from the boiler-flues of the engine, being discharged into the smoke-arch of the engine in the ordinary manner, are driven, by the force of the exhaust in common use, upward and into the smoke-stack or flue. The sparks, cinders, and unconsumed fuel, striking against the curved top of the smoke stack or flue, are carried forward in contact, or nearly in contact, with the upper interior surface of smoke stack or flue to the central lateral line marked C C', at which points the capacity of the flue suddenly enlarges in connection with the space E E and the discharge-pipes K K, and the smoke, steam, and gases then expand and have a free escape upward and outward through the said discharge-pipes, while the sparks, cinders, and unconsumed fuel, by their own gravity and the force of said expansion, are driven down through the pipe lettered H, and through the flues or pipes hereinbefore described, into the fire-box of the engine, the said deflector I operating, as hereinafter shown, to aid in securing the delivery of the sparks, cinders, and unconsumed fuel into the pipe H. The sparks, cinders, and unconsumed fuel are thus held, by centrifugal force, substantially in contact with the upper interior surface of the smoke stack or flue until they are carried below the central lateral line lettered C C', and until they are delivered into the pipe H, and are thence carried to the fire-box of the engine, as hereinbefore described. This deflector I, continuous with the side of the pipe H, as aforesaid, is placed in the central line of the apertures of the discharge-pipes K K above described. The effect of this is to prevent, or, at all events, to obviate,

any ill consequences of the reaction of the steam or gases in the inner open space lettered E E above described.

The steam expands in all directions from the points C C', where the smoke stack or flue suddenly enlarges, as above described, and any reaction from the side of the smoke stack or flue must necessarily be upward and in the direction of the discharge-pipes K K, for the smoke, steam, and gases, and downward for the sparks, cinders, and unconsumed fuel. It is obvious that the form and position of the deflector I may be modified, and, if dispensed with altogether, the sparks, cinders, and unconsumed fuel having been brought to the pipe H, would naturally be driven into said pipe, as above described, but the use of such deflector seems to make the operation of the stack more certain and complete. It is also obvious that the sparks, cinders, and unconsumed fuel may be taken from the smoke stack or flue by a connection made at any point below the central lateral line lettered C C', but I consider the best point at which to make such connection to be the one from which the sparks, cinders, and unconsumed fuel would most naturally fall by their own gravity. It is also obvious that in my improved spark arrester and consumer, the use of wire-netting or any other obstruction to the free escape of the smoke, steam, and gases from the smoke stack or flue is avoided, and that the entire contents of the smoke stack or flue are carried from the smoke-arch to the points of discharge without any diminution in the size of the smoke stack or flue, or any obstruction whatever to the draft of the engine.

I have described a smoke stack or flue,

cylindrical in form, which has certain obvious advantages of construction and operation over other forms, but this form may be varied without substantially interfering with the practical operation of said smoke stack or flue.

Having thus described my improved spark arrester and consumer, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with the main smoke stack or flue, of a continuing flue, formed substantially as shown and described, to carry the contents of said smoke-stack from the perpendicular line of ascent thereof to the opposite side of descent thereof, upon a circle or curve, and from thence upon a diminished circle or curve to the points of discharge.

2. The combination of a smoke stack or flue for a locomotive or other engine, with a return pipe or pipes connecting with the fire-box of the engine and the pipes for the discharge of the smoke, steam, and gases, arranged with respect to each other, substantially as shown and described, so that any reaction from the expansion of the steam shall be upward and in the direction of said discharge-pipes for the smoke, steam, and gases, and downward and through the said return pipe or pipes for the sparks, cinders, and unconsumed fuel, substantially as described.

3. The deflector, in combination with such smoke stack or flue, the discharge-pipe, and return pipe or pipes to the fire-box of the engine, substantially as described.

CHARLES L. EASTMAN.

Witnesses:

R. P. STANISH,  
ARTHUR FLETCHER.