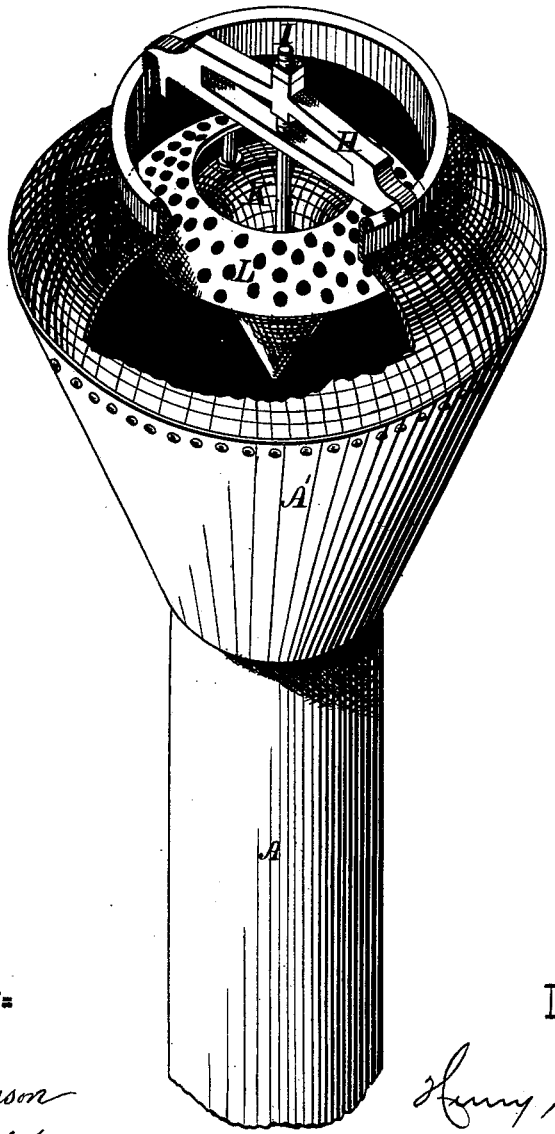
2 Sheets—Sheet 1.

H. S. BRYAN.
Spark-Arrester.

No. 198,343. **Patented Dec. 18, 1877.**

Fig. 1.



WITNESSES:

Jas. E. Hutchinson

John R. Young

INVENTOR.

Henry S. Bryan, by.

Prindle and Goepel his Attys.

2 Sheets—Sheet 2.

H. S. BRYAN.

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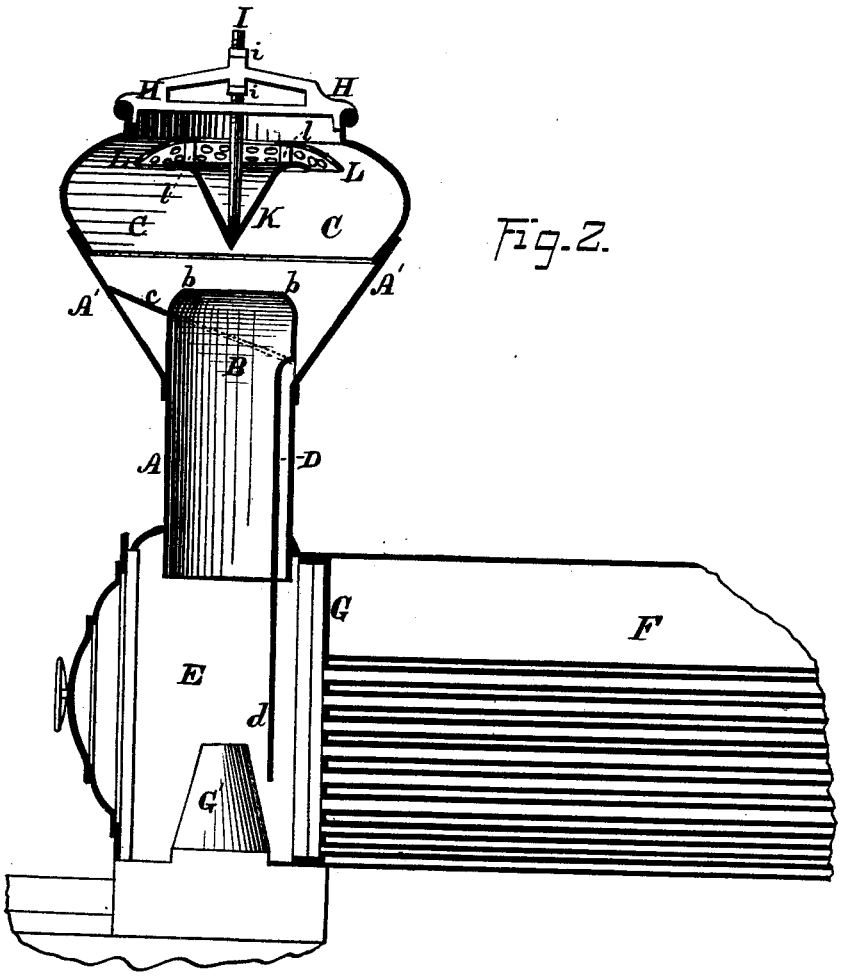

Fig. 2.

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UNITED STATES PATENT OFFICE.

HENRY S. BRYAN, OF AURORA, ILLINOIS.

IMPROVEMENT IN SPARK-ARRESTERS.

Specification forming part of Letters Patent No. **198,343**, dated December 18, 1877; application filed August 3, 1877.

To all whom it may concern:

Be it known that I, HENRY S. BRYAN, of Aurora, in the county of Kane, and in the State of Illinois, have invented certain new and useful Improvements in Smoke-Stacks for Locomotives; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a perspective view of my improved stack, a portion of the upper end being broken away so as to show the interior construction; and Fig. 2 is a vertical central section of the same upon a line extending from front to rear.

Letters of like name and kind refer to like parts in each of the figures.

The object of my invention is to prevent cinders from escaping from the smoke-stack of a locomotive until they have become finely pulverized and incapable of injury or annoyance; to which end it consists, principally, in combining with the upper end of the inner pipe of a smoke-stack a solid deflecting-cone and a perforated annular plate, made concave upon its lower side, and placed a short distance above said deflector, substantially as and for the purpose hereinafter shown.

It consists, further, in combining with the lower end and front side of said cinders-duct a shield or plate, which extends downward in front of the flue-sheet, substantially as and for the purpose hereinafter shown and described.

In the annexed drawings, A represents the exterior pipe of a smoke-stack, provided at its upper end with a bulbous enlargement, A′, that is made open at its upper side, and is formed in one piece from cast metal. The straight portion A of the stack extends upward within the enlargement A′, so as to form an inner pipe, B, and at its upper end *b* is contracted, as seen in Fig. 2. Near the upper end of the inner pipe B the lower side of the space or chamber C within the enlargement A′ is inclosed by a bottom, *c*, which inclines rearward and downward, so as to cause cinders to pass in the same direction. Upon reaching the rear lower portion of the chamber C the cinders pass downward through a duct, D, which is formed wholly within the line of the pipes A and B, and at its lower end communicates with the smoke-box E of the boiler F. From the lower end, at the front side of the duct D, a plate or shield, *d*, extends downward between the flue-sheet G and exhaust-pipe G′, and prevents cinders from said duct from being thrown forward into said pipe by the draft, or from dropping into the latter when no steam is used, by which means said cinders are prevented from being drawn through said exhaust-pipe into the cylinders. Extending horizontally across the upper open end of the stack is a bar, H, through the center of which latter passes vertically a rod, I, that is secured within and supports a cone, K, said rod being threaded, and provided with suitable nuts *i* and *i*, which enable it to be adjusted longitudinally, so as to move said cone toward or from the end of the pipe B.

As seen in Fig. 2, the cone K, at its upper edge, extends outward and slightly downward in a curve, while above said cone is placed an annular plate, L, which is perforated, and is made concave upon its lower side. Said plate extends outward beyond the edge of said cone, and is connected with the latter by means of two or more studs, *l* and *l*, which extend vertically between and are secured within said parts.

As thus constructed the operation of the stack is as follows: The upward current of heated gases through the pipe B is, upon leaving said pipes, concentrated and caused to impinge upon the central portion of the cone K, by which latter said gases are deflected outward against the wall of the chamber C. The cinders are thrown downward to the bottom of the chamber, and from thence pass downward, through the duct D, into the smoke-box E, where they are caught by the draft and again thrown upward through said pipe B, such operation being continued until said cinders have become so finely pulverized as to cause them to pass outward from the smoke-stack along with the heated gases, when it is found that they are extinguished, and possess so little weight as to enable them to float in the air a sufficient length of time for a long train of cars to pass beneath.

By means of this improvement all annoy-

ance to passengers from cinders is avoided, as well as all danger to property from fire.

It will be noticed that the cone is suspended from or by its center, instead of its outer edge, as is usually the case. This method of suspension removes the suspension-rod from direct contact with the outward current of heated gases, and prevents injury to the same from such contact, while, as ordinarily arranged, the suspension-rods are quickly cut off by the attrition of cinders, and their frequent renewal is a source of considerable expense.

The cross-bar H is, of course, subjected to wear, but, from its position, is less liable to injury than would be the ordinary suspension-rods.

It will be noticed that by casting the top A′ of the smoke-stack in one piece greater strength and more perfect proportions and form are secured than would be possible if said part was made of sections of sheet metal, having their edges secured together by rivets. This method of construction renders said stack-top less expensive and more durable, the impact of cinders upon its inner surface having no appreciable effect, while those constructed from sheet-iron are quickly cut through by cinders, and from this cause alone require frequent renewal.

Having thus fully set forth the nature and merits of my invention, what I claim as new is—

1. In combination with the upper end of the pipe B, the solid deflecting-cone K, having the perforated annular and concave plate L attached thereto, said plate being arranged above said cone, with a space between their contiguous faces, substantially as and for the purpose shown.

2. In combination with the duct D, the shield *d*, extending downward from the front side, at the lower end of the same, between the flue-sheet G and exhaust-pipe G′, substantially as and for the purpose set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 19th day of May, 1875.

HENRY S. BRYAN.

Witnesses:
GEO. S. PRINDLE,
C. H. WHITE.