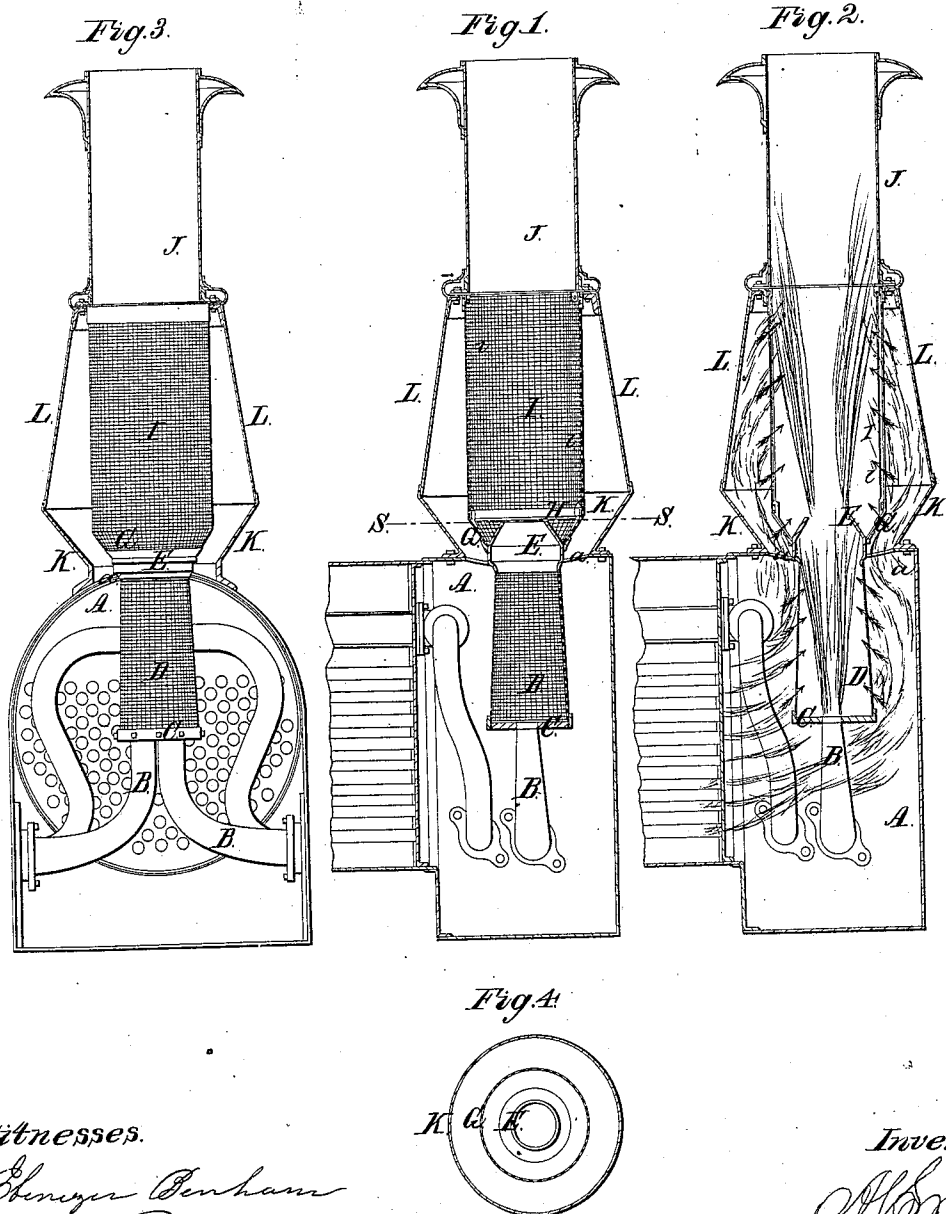


A.S. Swett, Jr.,
Spark Arrester,

No 38,992,

Patented June 23, 1863.



Witnesses.

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IMPROVEMENT IN SMOKE-STACKS FOR LOCOMOTIVES.

Specification forming part of Letters Patent No. 38,992, dated June 23, 1863.

To all whom it may concern:

Be it known that I, ALLEN S. SWEET, Jr., of Detroit, in the county of Wayne, in the State of Michigan, have invented certain new and useful Improvements in Stacks for Locomotives; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, forming a part of this specification, all of which is prepared with a view to the obtaining of Letters Patent therefor.

In the drawings, Figure 1 is a longitudinal vertical section through the entire stack and all the parts thereof. Fig. 2 is a like section, with lines showing the currents of gases; and Fig. 3 is a transverse vertical section through the exterior work of the stack, but exhibiting the interior work in elevation. Fig. 4 is a horizontal section of the stack on the line S S in Fig. 1.

Similar letters of reference indicate like parts in all the figures.

My invention is equally applicable to all locomotives, either wood or coal burners. Coal ordinarily throws out with its products of combustion few, if any, of those pieces of solid burning matter which are termed "sparks," and it is therefore not common to provide coal-burning locomotives with devices for preventing the escape of such; but as all locomotives burn some wood, it happens that coal-burning locomotives, by reason of their throwing out sparks without check or hinderance, when any occur, are the source of frequent and sometimes very destructive fires in the buildings, grass, or woods adjacent to the railroad. My invention is intended to avoid all this danger, and also to save to those in charge of the locomotive the care and trouble due to any of the adjustable or removable screens, bonnets, &c., sometimes used. It is intended to take care of itself under all ordinary conditions, and in wood-burning to grind or burn up and completely consume the sparks as fast as they are produced, without ever accumulating any to do harm, and to insure a powerful draft at all times, because there is no obstruction in the way of the free escape of the exhaust-steam which comprises three-fifths of the whole volume passing the pipe, none of which is brought in contact with the screen or netting.

To enable others of proper skill who are

familiar with the several devices for this purpose before known to make and use my invention, I will proceed to describe its construction and operation by the aid of the drawings, and of the letters marked thereon.

A is the smoke-box of a locomotive, and B B are the exhaust-pipes.

C is a plate of cast-iron, which is fixed horizontally in the position represented, and is perforated to receive the nozzles or upper ends of the pipes B B. These nozzles are directed upward parallel, or nearly so, each to the other, and, except in the fact that they may be larger, and consequently may discharge the steam more freely than usual, they differ in no important respect from the ordinary exhaust-nozzles of locomotives. They may be placed lower or higher than represented without defeating the object of my invention.

D is a hollow cylinder or slightly-tapering frustum of a cone made of wire-gauze. It is secured to the plate C at its lower edge, and to the ring E at its upper edge, and forms a casing of wire-gauze around and at a little distance from the jets of steam which issue from the nozzles B B. The general form of the ring E is shown very clearly in the drawings. Its upper portion is conical, and the area of opening through it at its upper edge is somewhat less than the area of the cross-section of the wire-gauze casing D.

G is a hollow case of wire-gauze in the form of a frustum of a cone fixed with its smaller end downward upon the ring E, being secured thereto at about the middle of its height, as represented.

H is a narrow ring of metal, which unites the conical case G with a further casing of like material, I, which is of much greater diameter than the casing D, and extends upward in a cylindrical or slightly conical form along the stack, as represented. This wire-gauze casing I is joined at its upper edge to a sheet-metal continuation, J, which is open at the top, like the top of an ordinary stack for a coal-burning locomotive.

The aperture in the top of the smoke-box A is represented by *a*, and is so much larger than the ring E as to allow a considerable annular space around the latter, through which a portion of the products of combustion may flow. Said annular space is to be of a

diameter much less than the cross-section of the chamber above, in order to prevent the too rapid escape of caloric, and at the same time giving greater freedom to the sparks and gases after passing the same.

K is a lower conical portion of the exterior of the stack, placed with its larger end uppermost.

L is a conical part fixed in the reverse position above K, and secured thereto. The upper edge of L is also secured to the top of the upper wire-gauze casing, I, and to the base of the top piece, J, of the stack. The gauze or bonnet is held in place at the top by simply pinching the same between the flanges of L and J, as shown.

The several parts may be secured together, and adapted to connect and disconnect from each other by any approved means. The rods *i*, lying just within the upper wire-gauze casing I, are employed for this purpose, and braces, (represented), screw-bolts, hooks, and other devices (not represented) may be employed throughout the entire structure to strengthen and aid in handling, cleaning, or repairing the parts.

The operation and effect of my invention may be readily understood from Fig. 2, with a brief explanation. The wire-gauze always allows the easy passage of the gases, and consequently the draft is sufficiently good while the engine is firing up or is standing at a sta-

passage of the gases through a given area of D more rapid than through a given area of G and I. The area of the aperture through the contracting-ring E is so proportioned to the other parts that the retardation due to this ring exactly or very nearly balances the tendency to a more violent induction of the gases through D, and induces a practically equal force of induction over the whole area of the wire-gauze casing or casings D G I. The sparks are stopped by the wire-gauze, while the gaseous products of combustion with which the sparks are mingled, and by which they are supported, are transmitted through the interstices of the wire-gauze, the motion being always from the exterior toward the interior. The considerable extent of surface of wire-gauze thus uniformly efficient and arranged to transmit the gases alone renders the retardation of the gases by the presence of the wire-gauze almost insensible, and the absence of any steam in contact with the sparks allows each spark, while standing still or moving upward on the exterior of the gauze, to continue its combustion, by virtue of the little free oxygen always present in the gases, and thus to burn out and pass away without difficulty.

Having now fully described my improved stack, what I claim as new therein, and desire to secure by Letters Patent, is—

1. In the stacks of locomotives, the employ-