(No Model.) 2 Sheets—Sheet 1.

W. F. ELKINS.

SPARK ARRESTER.

No. 356,243. Patented Jan. 18, 1887.

Fig. 1.

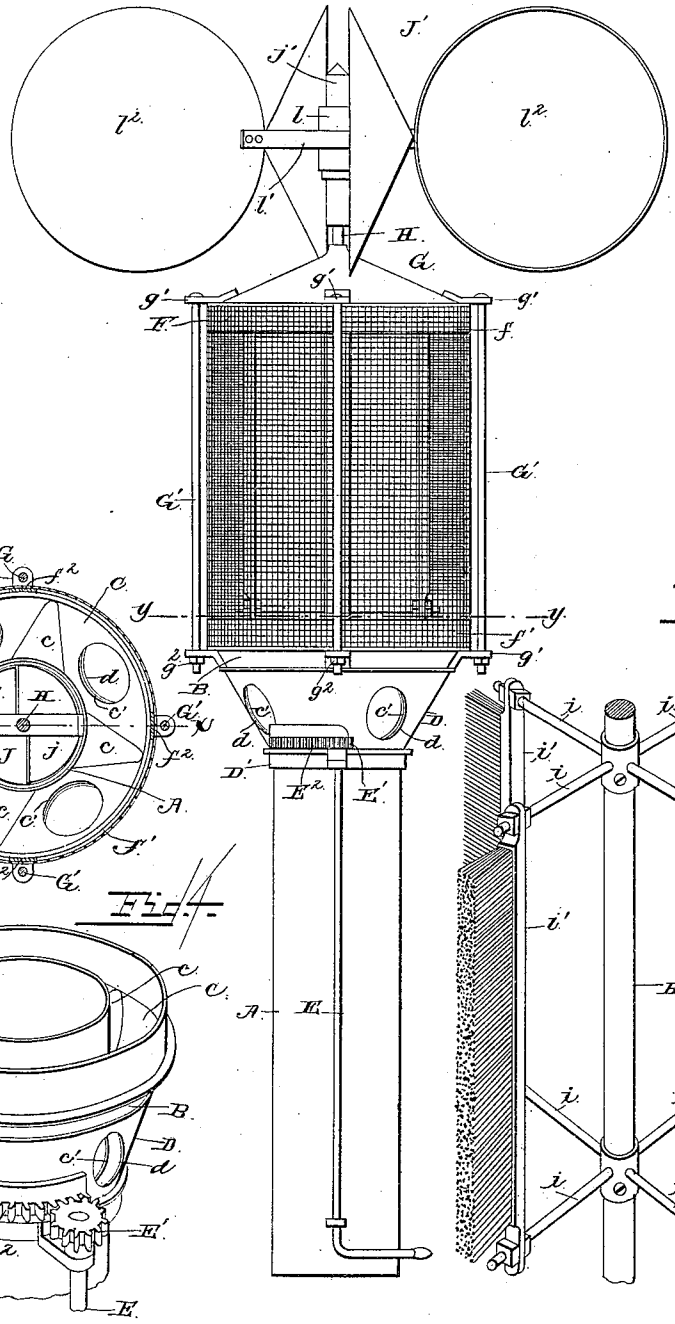


Fig. 3.

Fig. 5.

Fig. 4.

Witnesses

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

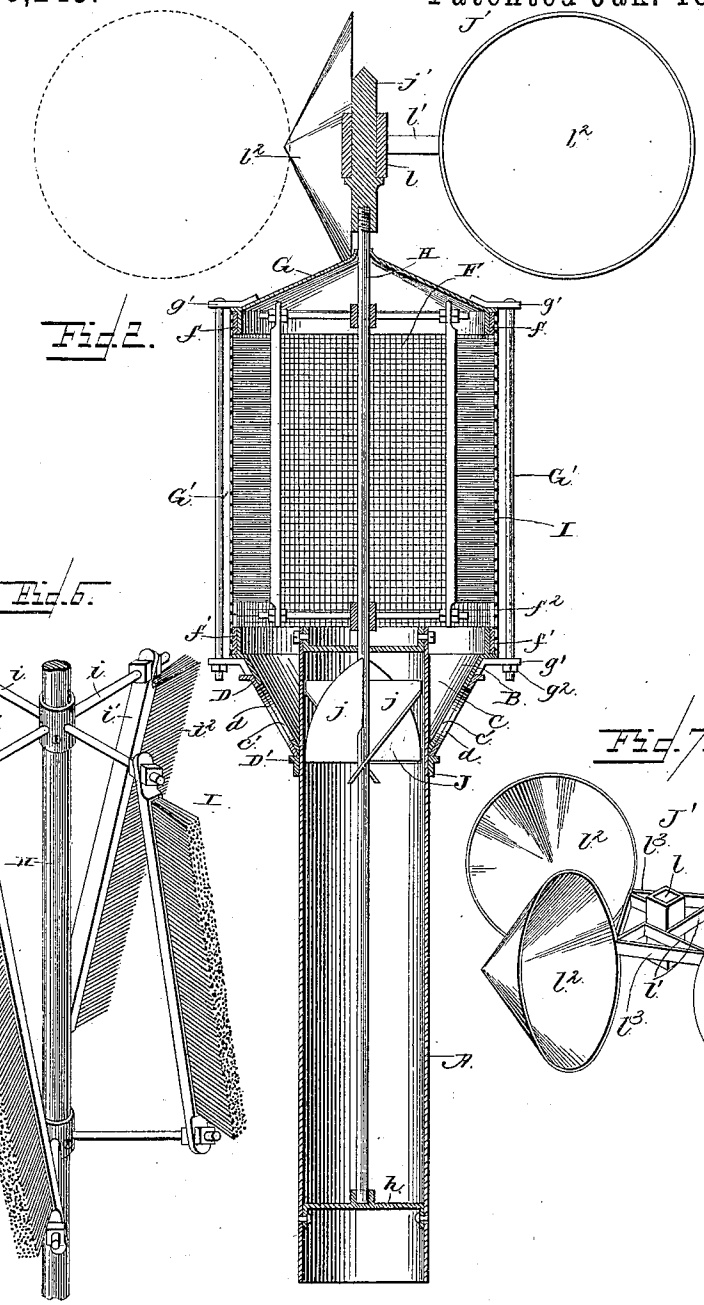


Fig. 6.

Fig. 7.

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UNITED STATES PATENT OFFICE.

WILLIAM FRANKLIN ELKINS, OF COMANCHE, TEXAS.

SPARK-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 356,243, dated January 18, 1887.

Application filed September 23, 1886. Serial No. 214,329. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM FRANKLIN ELKINS, a citizen of the United States, residing at Comanche, in the county of Comanche and State of Texas, have invented a new and useful Improvement in Spark Arresters and Extinguishers, of which the following is a specification.

My invention relates to improvements in spark arresters and extinguishers; and it consists of the peculiar combination and novel construction and arrangement of the various parts for service, substantially as hereinafter fully described, and particularly pointed out in the claims.

The object of my invention is to provide improved means for effectually preventing the escape of sparks from a locomotive or stationary engine of any class, to obviate the danger of the "live" sparks from setting fire to surrounding objects.

A further object of my invention is to provide improved means to prevent the accumulation of sparks in the sieve from clogging up the same, to thus secure a free passage for the smoke and other gaseous products of combustion, to provide improved means for emptying the compartments or receptacles for the sparks of their contents with ease and rapidity, and to provide means which shall utilize the current generated by the escaping heat and smoke through the smoke-stack to be rotated thereby, and thus actuate the clearing-brush, or which shall be driven, together with the clearing-brush, by an independent device, to create increased draft in the said stack and thus promote the combustion of the engine.

In the accompanying drawings, which illustrate a spark-arrester embodying my invention, Figure 1 is a side elevation. Fig. 2 is a vertical central sectional view on the line *x x* of Fig. 3. Fig. 3 is a horizontal sectional view on the line *y y* of Fig. 1. Fig. 4 is a detail view of the upper portion of the smoke-stack, with the screen or sieve removed. Fig. 5 is a detached detail view of the clearing-brush. Fig. 6 is a modified form of the brush. Fig. 7 is a detail view of the wind-wheel to rotate the clearing-brush and fan.

Referring to the drawings, in which like letters of reference denote corresponding parts in all the figures, A designates the smoke-stack of a locomotive or stationary engine of any class, to which my improved spark-arrester is applied. To the upper end of the smoke-stack I affix an outer shell, B, which incloses the said upper end of the smoke-stack and is arranged concentric therewith. This outer shell is made in the form of a frustum of a cone, and it is inverted, so that its widest end is uppermost, and the edges thereof lie flush with the upper edges of the stack. The lower edges of the contracted end of the inverted cone-shaped shell are secured to the smoke-stack in any suitable or preferred manner, and by thus disposing and securing the outer shell I provide a chamber or compartment, C, for the cinders and ashes which ascend through the smoke-stack, and are deflected downward by the means hereinafter described and fall into the compartment C.

The compartment C is subdivided, by means of vertical partitions *c*, into a number of smaller compartments, and the outer conical shell has a series of openings, *c'*, one of which communicates with each of the sub-compartments of the compartment C, so that an independent or separate discharge-opening is provided for each sub-chamber for the cinders, sparks, and other matter which may accumulate therein.

D designates a sliding shell, which is also made cone-shaped and inverted, and this sliding shell has a series of openings, *d*, which are equal in number to the discharge-openings in the shell C, the openings of the shell D being adapted to coincide with the openings in the rigid shell C to permit the sparks, cinders, &c., to be discharged from the compartments during one position of the said sliding shell, and at the end of the sliding movement of the shell D, the openings in the shells are adjusted or thrown out of coincidence to prevent the escape of the sparks, &c. The sliding conical shell D is arranged exterior to and incloses the rigid shell, and the lower edges of the movable shell D rest upon a collar or way, D', that is rigidly secured to the smoke-stack.

The movable shell is operated by the engineer, standing on the ground or other place, by turning a crank or other suitable device, *e*, on the lower end of a vertical rock-shaft, E, that is supported in suitable guides or bear-

ings on the smoke-stack, and the upper end of this shaft has a rigid pinion, E', which meshes with a segmental rack, E^2, that is secured rigidly to the outer side of the movable conical shell D.

F designates the screen or sieve, which is arranged above the open end of the smoke-stack and concentric therewith. This sieve is made larger in diameter than the open end of the smoke-stack, and it is made of wire of a mesh sufficiently close or fine to prevent small-sized sparks or cinders from escaping. The screen is secured at its upper and lower edges to rings $f f'$, which are connected by vertical strips f^2, and the lower ring, f', is secured in a very secure manner to the upper edge of the rigid shell C, as shown. The upper end of the screen is thus left open, and it is closed by means of a conical deflecting cap, G, which is secured and held in place by vertical stay-rods G', that are arranged exterior to the screen, and pass through aligned openings in bracket-ears g' on the cap and rigid conical shell C, the extremities of the stay-rods being threaded and having binding-nuts g^2 thereon, so that the rigid shell, the cap, and the intermediate screen are very securely connected and braced together, to increase the strength and durability of the apparatus. It will thus be seen that the ascending smoke and other gaseous products of combustion through the smoke-stack A are free to pass or escape through the screen F, while the cinders and sparks which are carried up by the escaping smoke cannot pass through the screen, and are retained within and deflected downward thereby, and also by the conical cap, so that they fall into the compartment, where they are retained and emptied from time to time by adjusting the movable shell to cause its openings to align with the openings in the rigid shell.

H designates a vertical shaft, which is arranged longitudinally and centrally within the smoke-stack and screen, the lower end of this shaft being journaled or stepped in a suitable bearing, h, that is arranged in and secured to the smoke-stack some distance below the open mouth or end thereof, while the opposite or upper end of this shaft is extended through the cap, as shown.

A clearing-brush, I, is affixed to and rotates with the shaft H, and the bristles thereof bear against the inner surface of the screen to sweep the cinders, &c., that may adhere thereto into the compartments. This brush comprises the upper and lower radial arms, i, and the vertically-disposed bars i', to which are secured the bristles i^2, of wire or other stiff non-combustible material, the bristles being secured to the bars in any suitable or preferred manner.

The vertically-disposed bars i' are secured at the extremities of the radial arms i, so that the bristles will come in contact with the screen; and these vertically-disposed bars may be arranged parallel with the vertical driving-shaft H, as shown in Fig. 2, or they may be inclined to the same, as in Fig. 6, so that they will act to force the cinders and other matter adhering to the sieve in a downward direction and thus more effectually force the cinders into the compartment or receptacle provided therefor.

J designates a fan which is located in the smoke-stack beneath the open end thereof and the clearing-brush. This fan is provided with diagonal blades j, which are arranged at substantially an angle of forty-five degrees to the shaft, and the fan is carried by and rotates with the shaft H.

In some instances it may be found advantageous to drive or rotate the fan by utilizing the upward strong current of the heat, smoke, &c., that escapes from the engine, which will act upon the blades thereof and thus rotate the fan-wheel and the driving-shaft, together with the brush I; but I prefer to employ a wind-wheel, J', to rotate the driving-shaft and the devices carried and acuated thereby.

To the upper threaded end of the driving-shaft, which passes through the conical deflecting cap, is detachably secured a square spindle, j', and on this spindle is fitted a square socket, l, of the rotary wheel J'. This socket l is made square in cross-section to fit snugly on the spindle, from whence it can be readily removed, and to this socket is connected or secured in any preferred manner the radial arms l', which carry the vertically-disposed conical cups l^2 at their outer ends. These arms are of any preferred number and spaced equidistant apart, and they are braced and strengthened by the diagonal intermediate arms, l^3, that are suitably secured in place.

The operation of my invention is obvious from the foregoing description, taken in connection with the drawings. The smoke, &c., escapes freely through the screen, while the sparks and cinders are retained therein. The brush I is revolved with the shaft by either the fan or wind-wheel, and acts upon the sieve to clear the same of cinders and discharge them into the compartments, from whence they are discharged by operating the movable shell.

I am aware that changes in the form and proportion of parts herein shown and described can be made without departing from the principle of my invention.

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

1. The combination, with a smoke-stack, of an outer conical shell secured thereto to form a compartment and having the discharge-openings, a screen concentric with the stack and having its upper end closed, a movable perforated shell surrounding the conical shell, and means for operating the said shell, substantially as described.

2. The combination, with a smoke-stack, of a rigid conical shell secured thereto at its lower edges to form an intermediate chamber, a screen concentric with the stack, a cap sur-

mounting the screen, an outer movable shell conical in form and having the openings surrounding the other shell, and a rock-shaft carrying a pinion which meshes with a rack on the movable shell, substantially as described.

3. The combination, with a smoke-stack, of a screen surrounding the open end thereof and having a closed upper end, and a rotary clearing-brush inclosed within the screen, substantially as described.

4. The combination, with a smoke-stack, of a screen surrounding the open end thereof and having a closed upper end, the central driving-shaft, a clearing-brush affixed to the shaft and inclosed within the screen and comprising the radial arms and vertically-disposed bars having the bristles, and a wheel affixed to the shaft for rotating it, substantially as described.

5. The combination, with a smoke-stack, of a screen having a closed upper end, and a rotary brush inclosed within the screen and having the diagonally-disposed bars with the bristles, substantially as described.

6. The combination, with a smoke-stack, of a rigid conical shell forming an intermediate chamber, a screen having a closed upper end, a central shaft, a clearing-brush secured on the shaft within the screen, a fan-wheel also affixed on the shaft within the smoke-stack, and a wheel, J′, connected detachably to the upper end of the shaft, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

WILLIAM FRANKLIN ELKINS.

Witnesses:

W. D. Cox,

R. C. Bates.