

J. R. McCORMICK.
SPARK ARRESTER.

No. 344,391.

Patented June 29, 1886.

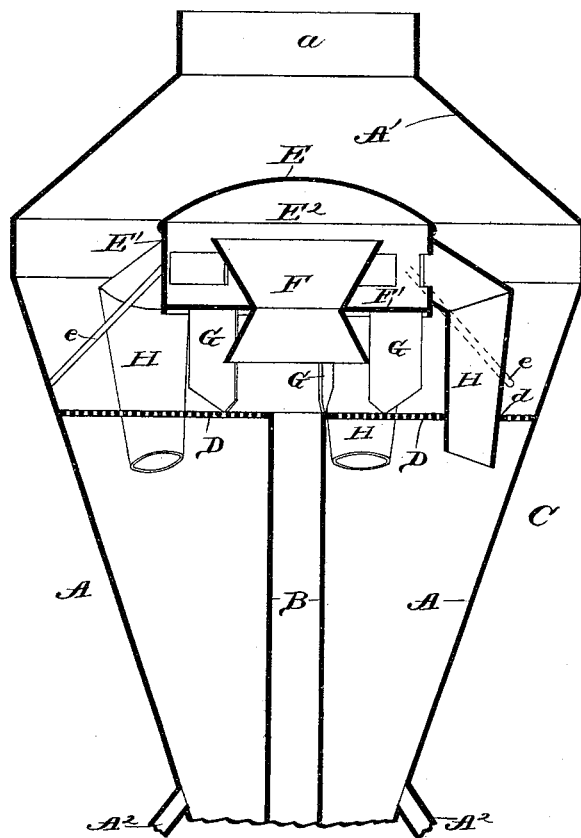


Fig. 1.

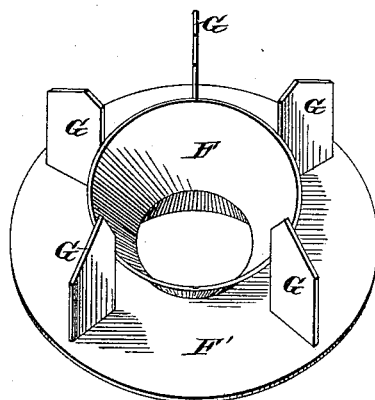


Fig. 5.

Witnesses

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Fig. 2.

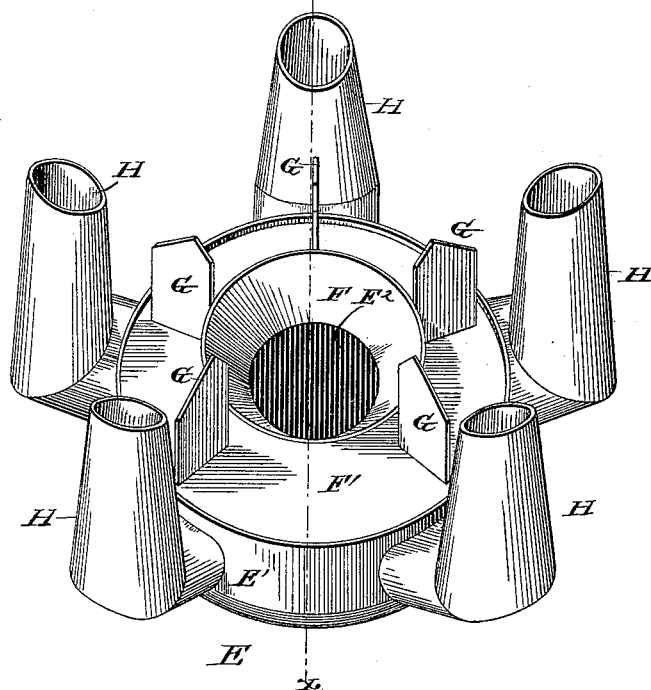
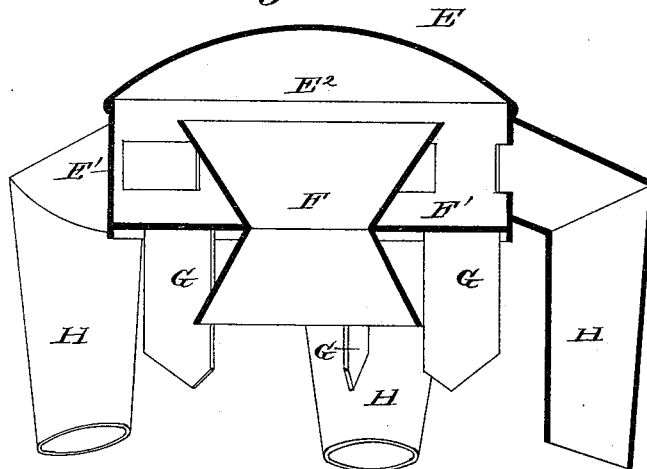


Fig. 4.



Witnesses

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UNITED STATES PATENT OFFICE.

JOHN ROBERT McCORMICK, OF AUSTIN, TEXAS.

SPARK-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 344,391, dated June 29, 1886.

Application filed April 17, 1886. Serial No. 199,224. (No model.)

To all whom it may concern:

Be it known that I JOHN ROBERT McCORMICK, a citizen of the United States, residing at Austin, in the county of Travis and State of Texas, have invented a new and useful Improvement in Spark-Arresters, of which the following is a specification, reference being had to the accompanying drawings.

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

The object of my invention is to provide an improved spark-arrester which shall deflect the sparks and cinders that escapes from a locomotive-engine, and prevent them from being discharged into the open air, while alive or ignited, and which shall discharge the said sparks at the base of a smoke-stack or into a receptacle provided therefor, to provide means for permitting of the free escape of smoke from the stack without carrying the cinders, &c., with it, and to provide an improved smoke stack, which shall be simple and strong in construction, thoroughly effective and reliable in operation, and comparatively inexpensive of manufacture.

In the accompanying drawings, Figure 1 is a vertical longitudinal sectional view through a smoke-stack of a locomotive-engine having my improved spark-arrester applied thereto. Fig. 2 is a detail perspective view of the deflector detached from the smoke-stack. Fig. 3 is a like view of the conducting funnel or tube detached from the deflector, and showing the annular plate thereof and the radial wings. Fig. 4 is a vertical sectional view through the deflector and conducting-tube on the line *x x* of Fig. 2.

Referring to the drawings, in which like letters of reference denote corresponding parts in all the figures, A designates the outer shell, and B the inner shell, which is arranged concentric with the outer shell, both of which constitute the smoke-stack C. The outer shell, A, is made tapering in form or cone-shaped, and it has a contracted cap, A', at its upper end, which is provided with an outlet or exit, *a*, for the smoke. The outer conical shell, A, is se-

cured by bolts or other suitable means upon the bridge-plate of the locomotive, and at or near its lower end it is provided with two escape-pipes or conducting-tubes, A², for cinders or coals that are deflected between the outer and inner shell of the smoke-stack, said escape-pipes conducting the extinguished cinders into a suitable receptacle provided therefor, which, however, is not shown herein, as it forms no part of my present invention. The inner shell, B, is cylindrical in shape, and opens at its upper end through a perforated diaphragm, D, that is secured at its edges or periphery to the outer shell, A. This diaphragm may be either a perforated disk of sheet-metal or a wire screen, and it is secured in place by any suitable means, and at or near its periphery it is provided with a series of openings, *d*, through which are passed the lower ends of tubes that form the diving-flues, as will be presently described.

E designates the deflector, which is arranged centrally within the outer or inclosing shell and above the open upper end of the smoke-conduit or inner shell, B. This deflector is made concave in form, and it is provided with a deep annular flange, E', that depends from the edges thereof, to form a chamber, E². The chamber is left open at its lower end, and the upper end of a conducting-tube, F, opens into the same, to conduct the smoke and products of combustion from the smoke-conduit or inner shell, B, into the said chamber. The said deflector is supported or upheld in its proper position above the diaphragm, and out of contact with the outer shell, by means of stays or bolts *e*, that are secured to the said outer shell and the deflector, whereby an open space is provided around the edges of the deflector, to permit the free escape of the smoke from beneath the deflector and out of the exit *a* of the smoke-stack.

The conducting-tube F is made in the form of two truncated cones with their apices placed together so as to make the conducting-tube of contracted diameter at its middle and with flaring open ends. The conducting-tube is arranged in a vertical position, and one of the flaring mouths is arranged immediately above the open upper end of the central smoke-conduit, B, while the other end of the said con-

ducting-tube projects into the open chamber E^2 of the deflector. This conducting-tube is provided at its middle, where the apices of the two truncated cone-shaped ends thereof meet, with an annular flange or disk, F' , that projects outwardly therefrom and beyond the edges of the flaring ends of the said tube, and the diameter of the disk F' corresponds to the diameter of the chamber E^2 . This disk F' fits within the lower edges of the depending flange E' of the deflector, and closes the open bottom thereof, to form a closed chamber; and the disk is further provided with a series of radial wings, G , that depend downwardly therefrom. The lower ends of these wings rest on the diaphragm D , and they lie within the outer edges of the disk F' , and bear against the edge of the lower flaring end of the conducting-tube. The deflector is further provided with a series of radial tubes, H , that form the diving-flues, and the lower edges of these tubes or flues pass through the peripheral openings d in the diaphragm D , to direct the products of combustion through the diaphragm and into the space intermediate of the outer and inner shells. The upper ends of the tubes or diving-flues are bent at an angle to the vertical lower portions thereof, and the said upper and lower ends of the diving-flues are arranged at an acute angle to each other. The upper ends of the flues are made larger than the lower ends, and they open into the chamber E^2 of the deflector at the upper end of the latter, and the lower or vertical ends of the diving-flues are made tapering in form, the extreme lower ends of the flues being comparatively small in diameter as compared with the upper ends thereof, that open into the deflector, so as to concentrate and extinguish the sparks before they are passed into the space or chamber intermediate of the outer and inner shells.

This being the construction, the operation of my invention is as follows: The smoke and other products of combustion from the locomotive-engine are first passed through the inner shell or smoke-conduit, and are carried thereby through the diaphragm into the conducting-tube F , from whence they are discharged into the chamber E^2 of the deflector, which passes them into the diving-flues, and by which they are carried through the diaphragm. A portion of the smoke escapes through the radial wings of the conducting-tube, which latter lies or is elevated a short distance above the diaphragm; but the force of the ascending smoke and exhaust-steam carries the cinders into the conducting-tube, and from thence into the deflector-chamber, the diving-flues, and through the diaphragm. The smoke and other lighter products of combustion are permitted to escape from the smoke-stack through the perforated diaphragm, and the heavier cinders fall through the space between the outer and inner shells, and are discharged from the stack by the escape-pipes into the proper receptacle. The deflector and cone-shaped

conducting-tubes serve to break the force of the ascending cinders, and to extinguish them, and the radial wings serve to evenly distribute the smoke through all parts of the cap of the smoke-stack. It will thus be seen that I provide an improved spark-arrester which effectually extinguishes and prevents the cinders from escaping from the smoke-stack, while at the same time the smoke is free to escape, and is evenly distributed through all parts of the cap of the stack.

I do not desire to confine myself to the exact details of construction and form and proportion of parts herein shown and described as an embodiment of my invention, as I am aware that numerous changes therein can be made without departing from the principle or sacrificing the advantages 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 the smoke-conduit, of the diaphragm through which the conduit discharges its contents, the suspended deflector above the diaphragm, the conducting-tube intermediate of the deflector and the smoke-conduit, and the diving-flues opening into the deflector and the diaphragm, substantially as described, for the purpose set forth.

2. The combination of the central smoke-conduit, the diaphragm, the suspended deflector above the open end of the conduit, the conducting-tube having the open flaring ends and lying intermediate of the conduit and the deflector, to convey the ascending products of combustion to the said deflector and the diving-flues, substantially as described, for the purpose set forth.

3. The combination of the central smoke-conduit, the suspended deflector, the diaphragm, the conducting-tube intermediate of the smoke-conduit, and the deflector, and made similar in form to two truncated cones placed with their apices together or adjoining, one of the said cone-shaped ends being suspended above and out of contact with the diaphragm immediately over the open upper end of the smoke-conduit, and the other cone-shaped end of the tube opening into the deflector, and the diving-flues, substantially as described, for the purpose set forth.

4. The combination of the central smoke-conduit, the suspended deflector, the diaphragm, the diving-flues, the conducting-tube intermediate of the smoke-conduit, and the deflector, and the radial wings surrounding the deflector, and the open upper end of the smoke-conduit, substantially as described, for the purpose set forth.

5. The combination of the central smoke-conduit, the diaphragm through which the conduit passes, the suspended deflector, the conducting-tube intermediate of the smoke-conduit and the deflector, and the diving-flues leading from the deflector into and through the diaphragm, the upper ends of the said diving-flues being enlarged and the lower ends

thereof being arranged at an angle to the upper ends and made tapering in form, substantially as described.

6. The combination of the smoke-conduit, the diaphragm through which the smoke is discharged, the suspended deflector having the annular chamber E², the conducting-tube intermediate of the chamber, and having its lower end suspended out of contact with the diaphragm and above the smoke-conduit, the radial wings exterior to the conducting-tube, and the diving-flues, substantially as described, for the purpose set forth.

7. The combination of the smoke-conduit, the exterior shell having the exit-pipes at its lower end, the suspended deflector arranged above the open end of the smoke-conduit and out of contact therewith and with the exte-

rior shell, the conducting-tube having the open flaring ends, the lower end of which is suspended immediately above the open end of the smoke-conduit, and the upper end opens into the chamber of the deflector, the radial wings exterior to and surrounding the conducting-tube, and the diving-flues leading from the deflector into and through the diaphragm, all arranged and combined substantially as described.

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

JOHN ROBERT McCORMICK.

Witnesses:

H. J. TALLEY,
JAMES D. STREETER.