W. C. Grimes,

Spark Arrester,

No. 2,455. Patented Feb. 12, 1842.

Fig. 1.

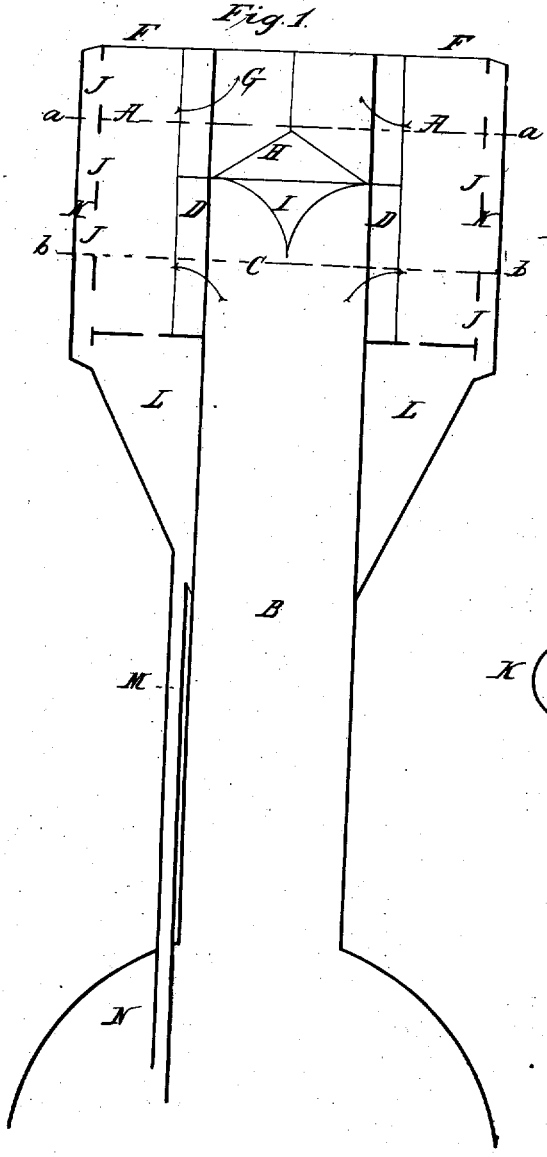


Fig. 2.

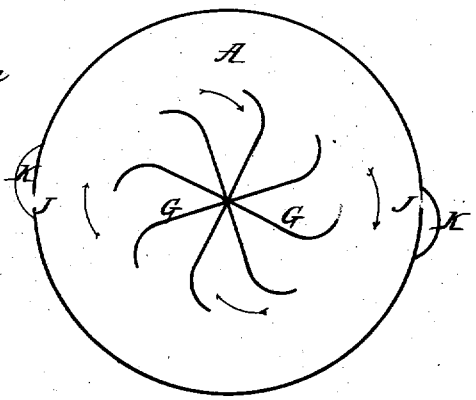
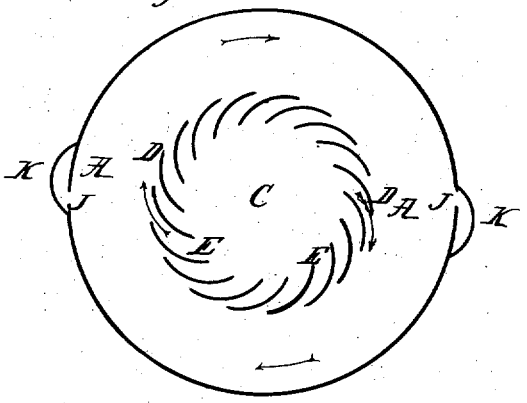


Fig. 3.



UNITED STATES PATENT OFFICE.

WM. C. GRIMES, OF YORK, PENNSYLVANIA.

SPARK-ARRESTER.

Specification forming part of Letters Patent No. 2,455, dated February 12, 1842; Reissued December 25, 1855, No. 335.

To all whom it may concern:

Be it known that I, WM. C. GRIMES, of York, in the county of York and State of Pennsylvania, have invented a new and Improved Mode of Preventing the Escape of Sparks or Ignited Particles from the Chimneys of Locomotive-Engines; and I do hereby declare that the following is a full and exact description thereof.

To prevent the escape of coals, sparks or ignited particles with the gaseous products discharged from the chimneys of locomotive engines, various methods have been essayed; but screens of woven wire, or finely perforated plates have been most generally adapted, and found to answer best in practice. This method however is obviously defective, in as much as a mere screen cannot be made to retain sparks of a diameter, much,—if any—less than its meshes or perforations; which, to prevent their becoming choked with soot or other matter are necessarily of a size that allows of their emitting a dangerous shower of ignited particles. Hence it is manifest that the object can never be fully accomplished without the application of some principle which shall constantly tend to separate the sparks and particles, irrespective of their dimensions, from the gaseous current before it reaches the point of discharge. Three known principles of nature, viz, momentum, gravitation, and centrifugal force, may be applied to this purpose; two of these, momentum, and gravitation have severally been essayed; but with unfavorable results; the influence of the former being but momentary; while that of the latter is too small to be available where particles so light are acted upon by a current so strong. It is therefore by centrifugal force only, that a constant and efficiently intense influence over particles so light, can be obtained. And it is my peculiar application of this principle, to this purpose that constitutes my invention as hereinafter described.

My apparatus consists of a circular chamber of suitable capacity, wherein the gaseous current and sparks are made rapidly to revolve by passing into the same in a tangential or oblique direction, so that the more violent the current, so also will be the intensity of centrifugal force; which carries the sparks and all other matter heavier than the gases evolved, out to and against the circular walls of the chamber, where they continue to rotate till consumed; or pass out through proper openings into an exterior chamber or chambers.

In the drawings annexed, which form part of this specification; Figure 1, is a vertical section of the apparatus, cut through its center. Fig. 2, is a transverse section of the same in the line *a*, *a*, of Fig. 1. Fig. 3, is a transverse section in the line *b*, *b*.

Similar letters refer to similar parts in all the figures.

I construct the chamber A, A, in which the current is made to revolve; usually of a cylindrical form, and so connect it with a pipe or chimney B,—of the common structure,—or to form a concentric enlargement of the same. Within and concentric with the chamber A is placed another chamber C, similar in proportions, but much less in dimensions; this last forms, as it were, a part, or continuation of the chimney proper; this chamber is closed at the top, while its walls consist of a series of curved slots D, D, forming a succession of tangential openings E, E, through which the current passes from the chimney or smaller chamber C, to the larger, in a tangential direction, hence its rotation within the same.

The chamber in which the current revolves is partially closed at the top by a disk, F, F, through the center of which is formed a circular opening,—for the discharge of the gaseous current,—about one half the diameter of the chamber. To arrest the rotation of the current immediately over the chamber C, and produce a central upward current;—around which a portion of the gaseous matter and the sparks continue to revolve. I place a series of vertical plates, G, G, radiating from the center of the chamber and extending upward to the central opening in the disk. The extreme ends of these plates are slightly curved in a direction the reverse of the curved slats below, and lie within a circle equal in diameter to the chamber C, or opening in the disk above.

H and I are cones which are intended to aid or facilitate the change of direction in the current the one above and the other within the chamber C.

To prevent the accumulation of sparks in the chamber of rotation, A, A, two or more slits or narrow openings, J, J, are made

in the walls of the same, through which the sparks and particles are thrown off into small exterior chambers, or channels, K, K, from whence they fall down into the receptacle, L, L. From the latter I sometimes convey a pipe M, down into the smoke box N, or the pipe may be extended downward outside the boiler and left to discharge upon the ground.

It will be perceived that as the sparks and particles have a rapid rotation within the chamber, A, they are necessarily kept out against its walls or are thrown off through the openings J, J, in the same, while the gaseous current only can reach and pass off at the central opening.

Having thus fully shown and set forth the principle, structure, and operation of my invention, I would have it understood that I do not intend to confine or limit myself to the precise form of the above structure but intend to vary the same so long as the principle of action remains unchanged.

What I claim as new, and as my invention, and desire to secure by Letters Patent is—

The mode of separating sparks and other particles of matter from the gaseous current discharged from locomotive or other chimneys, in the manner set forth, or in any other, substantially the same,—that is to say, by passing the current from a central chamber through tangential openings, into a larger circular chamber around them; wherein the sparks and particles are retained by centrifugal force, and revolve till they are consumed, or are passed out through proper openings as through J, J, into exterior chambers, made for that purpose.

WM. C. GRIMES.

Witnesses:
THOS. P. JONES,
WM. BISHOP.

Disclaimer.

The petition of E. R. BENNETT, JAMES RADLEY, and JOHN W. HUNTER, all of the city, county and State of New York, respectfully represents that your petitioners have by several assignments duly recorded in the Patent Office become the joint owners of the rights secured by certain Letters Patent granted to WILLIAM C. GRIMES, dated February 12, 1842, for an improvement in spark arresters, that they have reason to believe that through inadvertence and mistake the claim made in the specification of said Letters Patent in the following words is too broad: "What I claim as new, and as my invention, and desire to secure by Letters Patent is the mode of separating sparks and other particles of matter from the gaseous current discharge from locomotive or other chimneys in the manner set forth; or in any other substantially the same. That is to say, by passing the current from a central chamber, through tangential openings into a larger circular chamber around them, wherein the sparks and particles are retained by centrifugal force, and revolve till they are consumed, or are passed out through proper openings as through J, J, into exterior chambers made for that purpose."

Your petitioners therefore enter their disclaimer to so much of the said claim as includes the separation of sparks by means of centrifugal force or by means of tangential chutes when such separation is not effected by means of the combined operation of a central chamber, a series of central tangential openings and a larger circular chamber furnished with a series of openings J, J, into exterior chambers, said openings being so arranged as to extend throughout or nearly throughout the vertical extent of the walls of such larger chamber.

This disclaimer is to operate to the extent of the interest in said Letters Patent vested in your petitioners who have paid into the Treasury of the United States the sum of ten dollars agreeably to the requirements of the act of Congress in that case made and provided.

E. R. BENNETT.
JAMES RADLEY.
J. W. HUNTER.

Witnesses:
ROBERT REID,
JAMES T. RADLEY.

[FIRST PRINTED 1913.]