

(No Model.)

Q. J. HOKE.
SPARK EXTINGUISHER.

No. 339,553.

Patented Apr. 6, 1886.

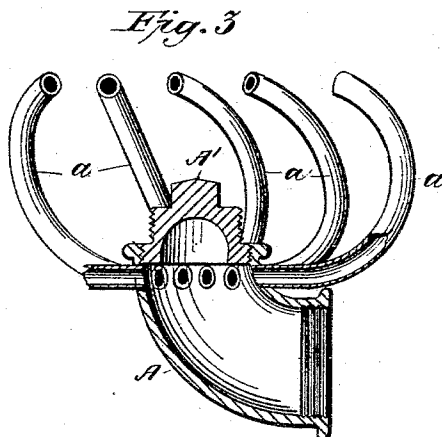
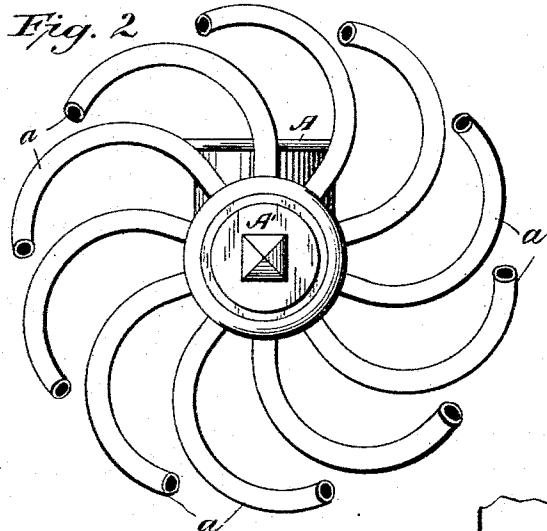


Fig. 1

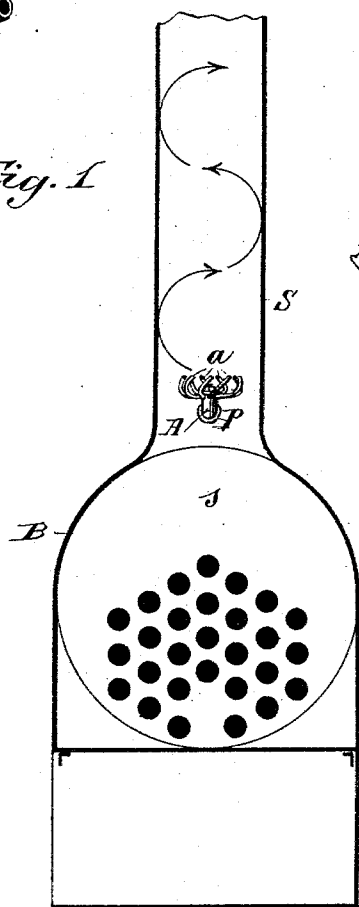
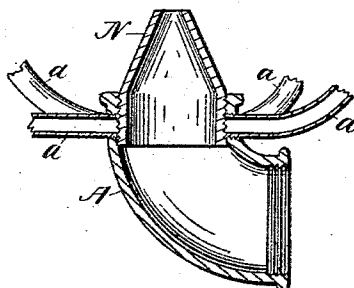


Fig. 4



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UNITED STATES PATENT OFFICE.

QUINTON J. HOKE, OF YORKVILLE, SOUTH CAROLINA, ASSIGNOR OF ONE-HALF TO THOMAS S. JEFFERYS, OF SAME PLACE.

SPARK-EXTINGUISHER.

SPECIFICATION forming part of Letters Patent No. 339,553, dated April 6, 1886.

Application filed November 28, 1885. Serial No. 124,192. (No model.)

To all whom it may concern:

Be it known that I, QUINTON J. HOKE, a citizen of the United States, residing at Yorkville, in the county of York and State of South Carolina, have invented certain new and useful Improvements in Spark-Extinguishers and Arrester; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention relates more especially to that class of devices known as "spark-extinguishers" in contradistinction to those known as "spark-arresters." In the former class the sparks passing through the stack of a steam-boiler are extinguished before they reach the atmosphere, or they are extinguished by impact with the stack and precipitated into the smoke-box. In the latter class the sparks are arrested on their way to the upper end of the stack or prior to their escape therefrom, this class of devices being chiefly applied to, on, or within the upper end of the smoke-stack.

The devices that form the subject-matter of this invention pertain in a manner to both of the classes of devices referred to, in that they not only operate to extinguish the sparks before they issue from the stack, but in that they also operate in a measure to arrest the sparks, and more especially the heavier incandescent particles carried along with the products of combustion, which, when brought in contact with the stack, are arrested in their upward flight and precipitated into the smoke-box.

The invention consists, essentially, in devices applied at or near the base of the smoke-stack of a steam-boiler for projecting the exhaust-steam into the stack in such a manner as to produce a spiral, rotary, or whirling motion in the draft, the greatest velocity of movement being on the "periphery," if I may so call it, of the column of steam and gases and products of combustion, instead of along the axis of the column, as in the case of a whirlwind or cyclonic column, said periphery being confined or limited by the stack itself.

It is obvious that by imparting to the draft a whirling or spiral rotary motion the incandescent particles carried along with the products of combustion will be carried up along the inner periphery of the stack and chiefly in contact therewith and extinguished, while the heavier incandescent particles will be, when projected by the whirling movement of the draft against the smoke-stack, arrested in their upward motion and precipitated into the smoke-box, the latter operation taking place chiefly at the base of the stack and at the moment when such heavier incandescent particles are first seized by the rotary column of exhaust-steam.

In practice, and with a view to economize steam, I apply the devices to the steam-exhaust pipe, but do not desire to confine myself to this arrangement, as live steam from the boiler may be used, if desired, or the latter and exhaust-steam, the exhaust-pipe being connected with the boiler in the latter case in any suitable manner, the connection being provided with proper cut-off devices, so that live steam may be introduced into the exhaust-pipe whenever desired. Under ordinary circumstances it will, however, be found that the exhaust-steam alone will suffice to produce the desired result.

Another advantage derived from the described mode of preventing incandescent particles carried along with the products of combustion from being carried out of the stack is in an increased and more steady draft.

The invention is more especially designed for use in portable or stationary engines employed in proximity to inflammable materials—as, for instance, in engines for driving cotton-gins, thrashing-machines, and other like machines, or in locomotives in general, with engine-boilers operated or located in proximity to inflammable materials, liable to be set on fire by incandescent particles carried along with the products of combustion and escaping from the smoke-stack.

In the accompanying drawings I have shown, by a sectional elevation in Figure 1, so much of a boiler of a steam-engine as is necessary to illustrate my invention. Fig. 2 is a top plan view on a large scale of the device for imparting a spiral rotary movement to the exhaust-

steam and draft. Fig. 3 is a section of said device, also on a large scale; and Fig. 4 is a like view, the steam-nozzles being broken away, showing the device provided with an ordinary exhaust-steam nozzle, N, screwed into head A to cover the ports leading to the steam-nozzles.

B is the boiler; s, the smoke-box; S, the smoke-stack, and P the exhaust-pipe from the cylinder or cylinders. The arrangement of these devices is so well known as not to need any particular detailed description, more especially as they vary to some extent, according to the description of engine to which my improvements are or can be applied.

The exhaust-pipe terminates in or approximately in the axis of the stack at its base, and has screwed thereto a hollow head, A, to which are secured a series of tubes, *a*, extending outwardly and radially therefrom, like the spokes in a wheel. The outer end of said tube is bent upwardly and forwardly in the same direction, as well as slightly inwardly, so that their termini will lie in a circle concentric with the vertical axis of the head A, and their terminal openings will all face in the same direction. When steam is forced through these tubes, it will be projected therefrom in jets on lines tangential to the circle in which the termini of the tubes *a* lie and in vertically-inclined planes. By contact with the inner periphery of the smoke-stack a spiral rotary motion is imparted to the steam and through the latter to the gases and products of combustion passing from the furnace or the fire-tubes into the smoke-box, and thence through the stack, producing the results hereinabove described.

The device is also adapted for use as an ordinary exhaust-pipe, and to this end the head A has a screw-plug, A', which may be removed and a nozzle substituted, which when screwed into the head will cover or close the ports leading to the tubes *a*.

In practice I give the tubes *a* an inclination of about forty-five degrees; but I do not confine myself thereto, as this inclination may be

varied according to circumstances, or according as it may be found necessary to project the steam into the stack on tangential lines more or less inclined between a vertical and horizontal line.

What I claim is—

1. As a means for extinguishing and arresting incandescent particles carried along with the products of combustion through the smoke-stack of a steam-engine, injecting jets of steam into the base of the stack from points arranged in a circle concentric with the axis of the stack and on lines tangential to the said circle, substantially as and for the purpose specified.

2. Means for extinguishing and arresting incandescent particles carried along with the products of combustion through the smoke-stack of a steam-engine, which consists, essentially, in a multiplicity of steam-nozzles having their terminals arranged in a circle concentric with the axis of the stack, the terminals of said nozzles being curved inwardly and lying in different radial planes from those of their initials, substantially as and for the purpose specified.

3. The combination, with the exhaust-pipe of a steam-engine and the smoke-stack of the boiler thereof, of the head A, having tubes *a*, arranged as described, in combination with the screw-plug A', said head being connected with the exhaust-pipe at or near the base of the smoke-stack, substantially as and for the purpose specified.

4. The combination, with the smoke-stack of a steam-boiler and the head A of the herein-described spark-arrester, of the screw-plug A', and an ordinary steam nozzle or pipe constructed to be interchangeably connected with said head A' to convert the spark-arrester into an exhaust pipe, and vice versa, substantially as and for the purpose specified.

In testimony whereof I affix my signature in presence of two witnesses.

QUINTON J. HOKE.

Witnesses:

C. G. PARISH,

S. L. DAVIDSON.