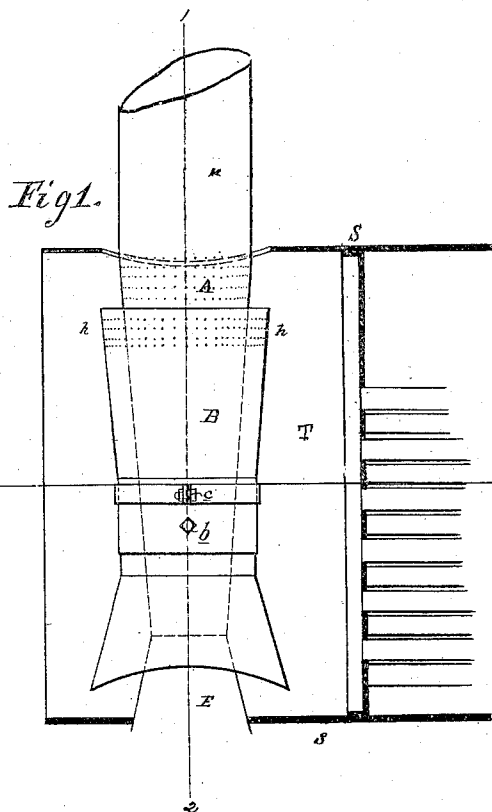
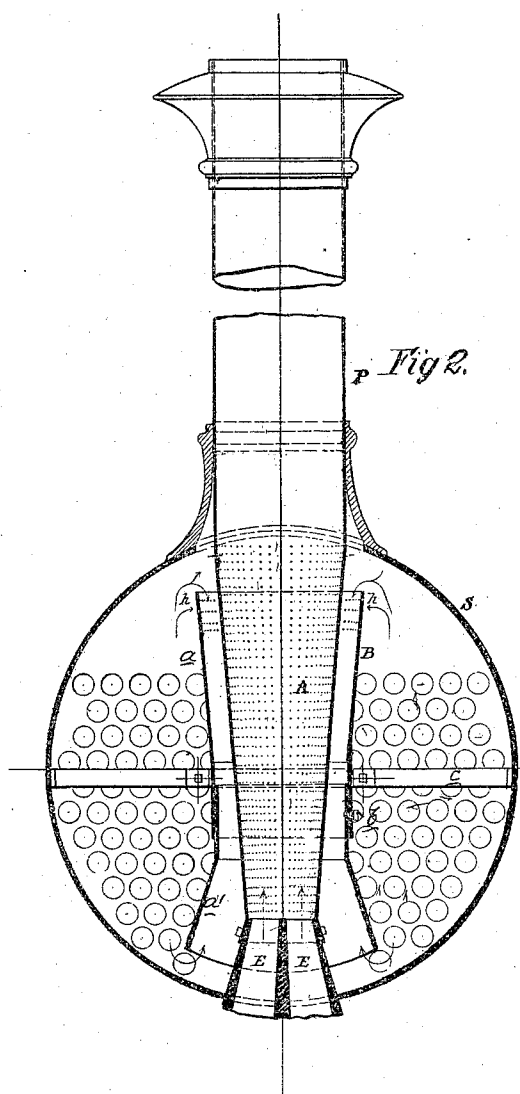


J. Smith,
Shark Arrester.
No. 106,515. Patented Aug. 16. 1870.



Witnesses { *Wm. A. Steel*
John Parker

James Smith
by his Attor
Howard and Son

UNITED STATES PATENT OFFICE.

JAMES SMITH, OF ALTOONA, PENNSYLVANIA.

IMPROVEMENT IN SPARK-ARRESTERS.

Specification forming part of Letters Patent No. **106,515**, dated August 16, 1870.

I, JAMES SMITH, of Altoona, county of Blair, State of Pennsylvania, have invented certain Improvements in Spark-Arresters, of which the following is a specification:

Nature and Object of the Invention.

My invention relates to an improvement in spark-arresters for locomotives; and it consists mainly of a perforated (or grated) tube, communicating with the exhaust-nozzles and smoke-pipe, and surrounded within the smoke-box by a sleeve or lift-pipe, the sparks being caused to pass through the annular space between the sleeve and grater-like surface of the inner pipe, and being thus ground to powder and caused to pass through the perforations of the latter before entering the smoke-pipe, all of which will be fully described hereafter.

Description of the Accompanying Drawing.

Figure 1 is a longitudinal sectional view of a locomotive-boiler and smoke-box with my improvement, and Fig. 2 a transverse section of the same on line 1 2, Fig. 1.

General Description.

S is the outer shell of the locomotive-boiler, at the front end of which is the usual smoke-box T, and above the latter projects an ordinary open smoke-pipe, P.

Into the lower part of the smoke-chamber extend the exhaust-nozzles E E, which communicate with the contracted lower end of a tapering perforated pipe, A, the latter communicating at its upper end with the lower end of the smoke-pipe P.

The perforations in the pipe A are sufficiently numerous to permit the smoke and gases to pass freely from the smoke-box without interfering with the draft, these perforations constituting the sole means of communication between the chamber and pipe P. They are, however, of such a size as to effectually prevent the passage through them of all cinders not in the form of dust.

The pipe A is inclosed by a sleeve or lift-pipe, B, which extends to within a short distance of both the top and bottom of the chamber T, and is in two sections, *a a'*, the upper section, *a*, being secured to a cross-bar, *c*, and flaring outward toward the top, and the lower

section, *a'*, flaring outward toward the bottom and extending into the lower end of the section *a*, so as to be adjustable within the latter to a slight extent vertically, being surrounded by set-screws *b*. Near the upper end of the sleeve B are perforations *h*, for a purpose described hereafter.

The passage of exhaust-steam into the pipe A creates an upward draft in the said pipe and an upward current in the annular space between the pipes A B. When, therefore, the products of combustion and cinders from the fire-box enter the smoke-chamber T they are drawn into the lower end of the tube B, the gases and fine particles of the cinders or dust passing through the perforations in the pipe A and being thrown upward through and out of the smoke-pipe, while the heavier cinders pass upward over the upper edge of the pipe B and downward to the bottom of the chamber T below the pipe B, into which they are again carried by the current, as before.

As the heavier cinders pass upward they are thrown violently against and traverse the inclined surface of the pipe A, and are thereby grated and wholly or partially broken up, the fine particles passing into the pipe A, from which they are discharged, while the coarser cinders again pass upward into the chamber T and down again into the pipe B, time after time, until by constant friction against the pipe A they are entirely reduced to powder and discharged.

As the force of the current, if not interrupted, would be apt to carry some of the fine particles out of the pipe B into the chamber T, the pipe B is perforated near the upper edge to permit the air to pass into the pipe laterally and create a counter-current toward the pipe A, and thus insure the passage of all the dust in the latter.

The lower section, *a'*, of the pipe B may be adjusted as desired to regulate the current and the movement of the cinders, and the form of the pipes may be changed, it being essential, however, that the cinders should be obliged to repeatedly strike against and traverse a perforated pipe or casing until they are broken into fine dust and carried into such pipe or casing.

It will be apparent that the outer surface of

such pipe or casing may be serrated to insure a more rapid and thorough division of the cinders.

My invention, it should be understood, is as applicable to wood-burning as to coal-burning locomotives.

Claims.

1. A perforated pipe situated within the smoke-chamber and communicating with the smoke-pipe and exhaust-pipes of a locomotive, in combination with a sleeve or casing so arranged that an upward current shall cause the cinders to pass upward from the lower part of the smoke-chamber and strike and traverse the perforated surface of such pipe, substantially as described.

2. The perforated pipe A, when tapered as described, in combination with the sleeve or pipe B, having a flaring lower end.

3. The pipe B, consisting of a stationary section, *a*, and adjustable section *a'*, arranged substantially as specified.

4. The perforations *h* in the outer pipe, B, for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAS. SMITH.

Witnesses:

W. A. MALONEY,
GEO. W. STRATTAN.