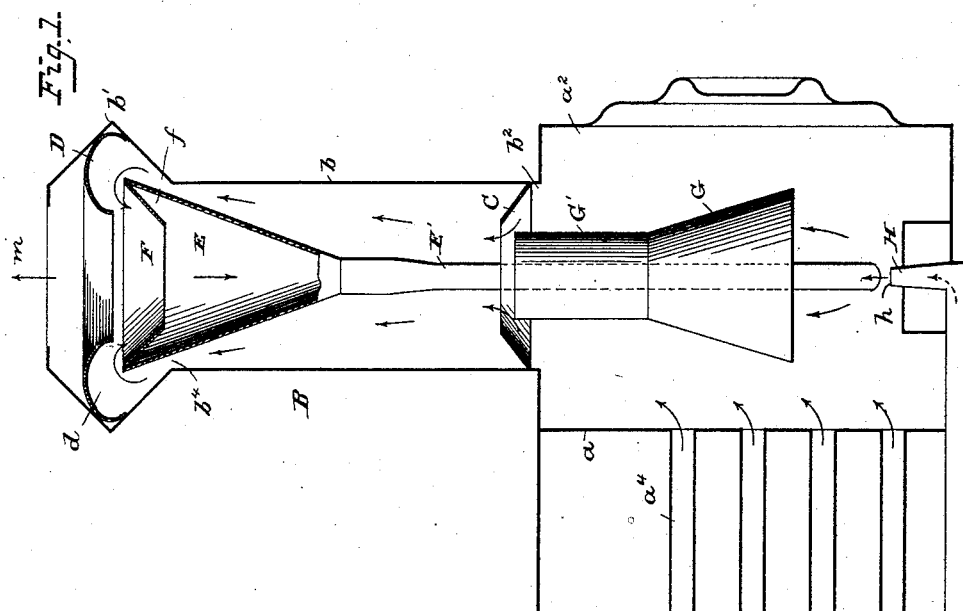
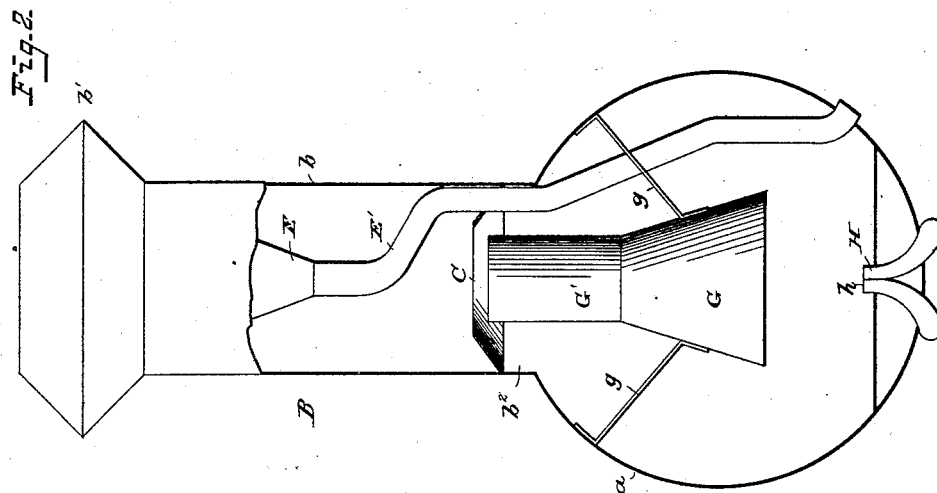


(No Model.)

P. H. ADAMS.  
SPARK ARRESTER.

No. 346,012.

Patented July 20, 1886.



Attest:  
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A. C. Hanomann.

Paul H. Adams,  
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attys.

# UNITED STATES PATENT OFFICE.

PAUL H. ADAMS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO HENRY GERLACH, OF SAME PLACE.

## SPARK-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 346,012, dated July 20, 1886.

Application filed May 18, 1886. Serial No. 202,500. (No model.)

*To all whom it may concern:*

Be it known that I, PAUL H. ADAMS, of the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have made certain new and useful Improvements in Spark-Arresters; and I hereby declare the following to be a full, clear, and exact description thereof, sufficient to enable others skilled in the art to make and use the same.

My invention relates to improvements in spark-arresters, which, while more particularly designed for use in connection with smoke-stacks of railroad-locomotives, to convey sparks, cinders, dust, &c., from said stack to the road-bed below, or beside the locomotive, are also applicable for use in connection with the stacks or flues of stationary-engine furnaces, wherein a jet or jets of steam or compressed air are employed to promote combustion, or wherein steam from the engine is exhausted into the stack or flue, whereby particles of unconsumed carbon in the form of sparks, or cinders, dust, &c., which would otherwise be forcibly discharged from the top of said stack or flue, are conducted therefrom and conveyed to any desired location.

The invention further contemplates the provision of a spark-arrester that shall operate in great measure to deaden the noise consequent upon the exhaustion of steam into the stack or flue.

To the accomplishment of the above ends the invention consists in the construction, arrangement, and combination of the several elements of the device for service, substantially as hereinafter described.

Referring to the accompanying drawings, which illustrate my invention as applied to a locomotive, and in which similar letters of reference denote similar parts, Figure 1 represents a vertical longitudinal section through the forward part of a locomotive-boiler and its attached smoke-stack. Fig. 2 represents a transverse vertical section through the parts shown in Fig. 1.

In the drawings, A designates a portion of a locomotive-boiler having the usual flue-receiving head,  $a$ , boiler-head  $a'$ , and smoke-space  $a''$ .

B designates the smoke-stack, preferably having the lower cylindrical portion or barrel,

$b$ , and enlarged conical cap or top  $b'$ , which parts, if desired, may be removably connected together to facilitate the construction or repairs of said parts and their contained devices. The stack B is secured to the shell of the smoke-space above an aperture,  $b''$ , in the shell, and is provided at or near its bottom with a flaring ring, C, and within the widest part of its top with a ring, D, concave in cross-section, as shown.

E designates a funnel, the upper enlarged end of which is immediately below and central with the annular groove or channel  $d$  of the ring D, and this funnel is secured to or forms part of a tube, E, that passes downward through the stack and smoke-space  $a''$ , and through its shell near the lower side, as shown.

By reference to the drawings it will be observed that the pipe  $E'$  extends for a short distance below its junction with the funnel E, vertically downward from said funnel, whereby dust, &c., passes directly from the top of said funnel into said pipe.

I provide the funnel E at its upper end with an internal conical ring, F, the inwardly-flaring sides of which extend at an angle to the sides of the funnel E, to which they are connected to form an annular chamber,  $f$ , the purpose of which will be presently explained.

G designates a short funnel, which is secured in an inverted position at or near the middle of the smoke-chamber  $a''$  by braces  $g$ , that extend and are secured to the shell of the boiler, and this funnel is connected at its upper end to a cylindrical pipe,  $G'$ , that extends to a point within the ring C, for the purpose of lessening noise occasioned by the exhaustion of steam into the stack.

H designates the usual exhaust-steam pipes or nozzles, which may connect directly with the exhaust-pipes, or with an intermediate chamber.

When the locomotive is at rest, at which time the draft in the smoke-stack is very light, the products of combustion pass from the fire-box (not shown) through the flues  $a'$  to the chamber  $a''$ , as indicated by the arrows, and thence upwardly about the funnel G and its pipe, and through the contracted ring C to the interior of the stack, and about the funnel E and through the contracted space  $b'$  to the

annular groove  $d$  and the open air through the top of the stack, as indicated by the arrow  $m$ .

When the locomotive is set in motion and is "exhausting" into the stack through the aperture  $h$ , or whenever a jet of steam is discharged through the nozzles, strong upward currents are formed by the exhaust-steam therein through the funnel  $G$  and ring  $C$ , said parts operating as injectors to produce a partial vacuum within the chamber  $a^2$ , whereby strong currents of air from the fire-box through the flues  $a^1$  are induced, which currents are charged with the products of combustion, as smoke, particles of unconsumed or partially-consumed carbon or sparks, cinders, dust, &c., are drawn into the chamber  $a^2$ , and forcibly discharged therefrom through the stack against the curved face of the annular groove  $d$  of the ring  $D$ , and thereby deflected into the funnel  $E$  and pipe  $E'$ , from which they are discharged to the track-bed whenever the pipe is opened.

By arranging the funnel  $G$  and its pipe immediately over the steam-inlet pipes the currents are so broken and intermingled that noise incident to the exhaustion of steam to the stack is obviated.

By extending the funnel  $E$  within the stack to the depth shown I increase its efficiency to a great extent and at the same time reduce the obstruction to the flow of upward currents of steam, air, &c.

It will be understood that the chamber  $f$ , formed by the ring  $F$ , prevents the return to the chamber  $a^2$  of dust, cinders, &c., from the funnel  $E$ , due to reflex currents of air in said funnel; also, that the ring  $C$  in the stack serves a like purpose as regards said stack, while the passage or escape of gases, steam, and air is freely permitted. If desired, the funnel  $E$  may consist of two parts secured together at or near the middle, as shown at  $x$ .

The upward current may be secured by means of a steam-pipe connecting directly with the generator, instead of depending upon the use of exhaust-steam. This is necessary whenever it is desired to maintain a strong fire, whether the engine is running or not.

Without limiting myself to the exact construction shown, I claim—

1. The combination of a funnel,  $E$ , within a smoke-stack, with a single central discharge-pipe that opens into said funnel and extends for a part of its length vertically downward in the plane of the axis thereof, and a flaring ring,  $F$ , secured within said funnel to the top thereof to form a shallow annular chamber,  $f$ , said ring having its opening concentric with the discharge-opening of said funnel  $E$ , and discharge-pipe  $E'$ , substantially as described.

2. In combination, a smoke-stack, a funnel within said stack, provided at its lower end with a discharge-pipe centrally disposed, and extending vertically downward the axis of said funnel, a flaring ring,  $F$ , within, and a deflecting ring,  $D$ , above, said funnel, substantially as described.

3. A smoke-stack, a cap therefor having an annular grooved ring, a funnel below the said ring, and provided with a discharge-pipe, and a flaring ring secured to said stack within the same below said funnel, substantially as described.

4. The combination, in a smoke stack, of a smoke-chamber,  $a^2$ , having a steam-inlet nozzle, and an inverted funnel arranged below said nozzle, and a stack,  $B$ , having an annular grooved ring,  $D$ , and a funnel,  $E$ , provided with an exit-pipe,  $E'$ , substantially as described.

5. In a spark-arrester, the combination of a smoke-receiving chamber,  $a^2$ , having a steam-inlet nozzle, and an inverted funnel suspended at the middle of the chamber, above said inlet, and provided with an upwardly-extending pipe, with a smoke-stack having a cap, an annular grooved ring,  $D$ , a funnel,  $E$ , having a discharge-pipe,  $E'$ , and a flaring ring,  $C$ , substantially as described.

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

PAUL H. ADAMS.

Witnesses:

JOHN H. CAMPBELL,  
WM. J. CAMPBELL.