

(No Model.)

T. LEE.  
SPARK ARRESTER.

No. 567,601.

Patented Sept. 15, 1896.

Fig. 1.

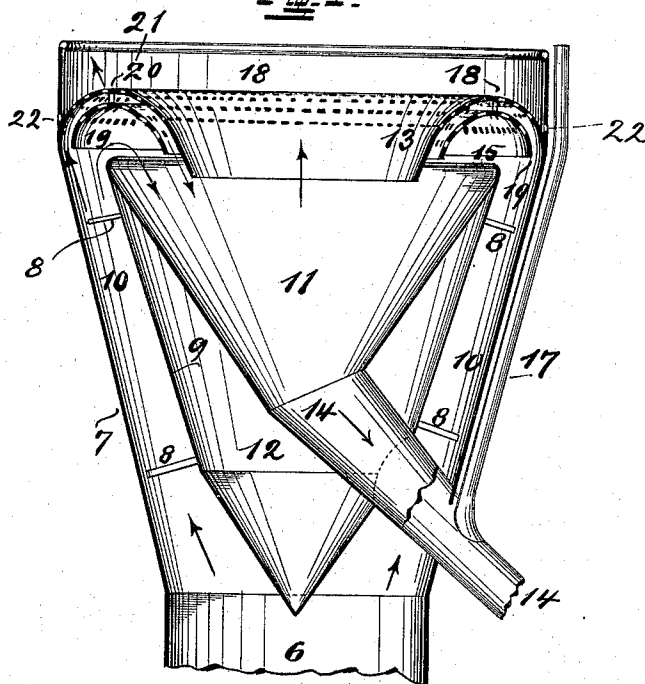


Fig. 2.

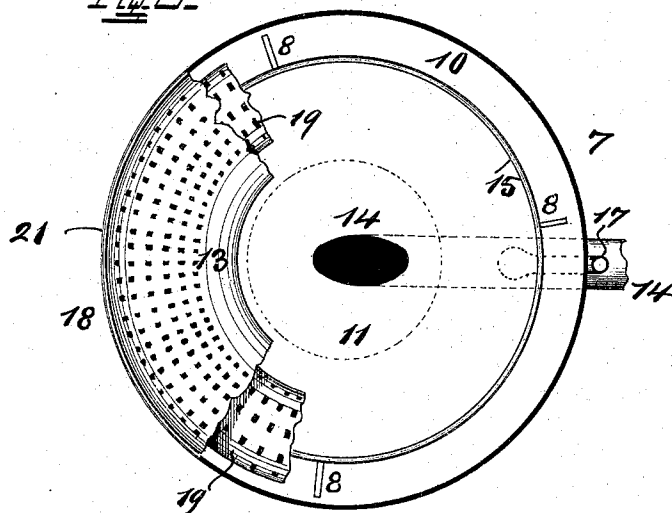
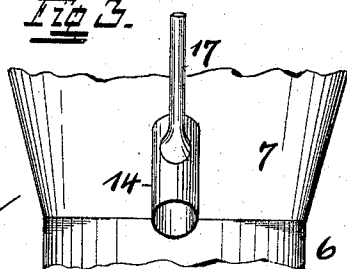


Fig. 3.



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# UNITED STATES PATENT OFFICE.

THOMAS LEE, OF HOME CITY, OHIO.

## SPARK-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 567,601, dated September 15, 1896.

Application filed July 13, 1896. Serial No. 598,915. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS LEE, a citizen of the United States, and a resident of Home City, Hamilton county, State of Ohio, have  
5 invented certain new and useful Improvements in Spark-Arresters; and I do declare the following to be a clear, full, and exact description of the invention, such as will enable others skilled in the art to which it ap-  
10 pertains to make and use the same, attention being called to the accompanying drawings, with the reference-numerals marked thereon, which form a part of this specification.

This invention relates to spark-arresters as  
15 used on top of smoke-stacks for the purpose of detaining the red-hot cinders or sparks carried up by the smoke, and it relates particularly to such stacks through which, also, in addition to the smoke, the exhaust-steam  
20 from steam-engines or other sources passes out, as, for instance, in locomotive smoke-stacks.

It relates particularly to improvements on the spark-arrester shown in my Patent No.  
25 537,048, dated April 9, 1895, which is intended for use on locomotive smoke-stacks, the particular object of that spark-arrester being to provide a construction which does not interfere with the draft, and also prevents condensation of the out-passing steam while coming  
30 in contact with parts of the spark-arrester. Since the issue of that patent, and after practical experiments and tests meanwhile made, various imperfections have been found which  
35 require correction and by this invention are sought to be improved.

The novel features of this present invention are particularly pointed out in the following specification, which contains a description  
40 of them, together with their operation, parts, and construction, which latter is also illustrated in the accompanying drawings, in which—

Figure 1 is a vertical section through the  
45 smoke-stack of a locomotive provided at its upper end with my improved spark-arrester. Fig. 2 is a top view of Fig. 1 with parts broken away; and Fig. 3 is part of a side elevation, looking at it from the right, as  
50 shown in Fig. 1.

6 is a part of a suitable smoke-stack flaring outwardly at its upper end, as shown at

7. Within this upper wider part is suitably supported, preferably by resting on braces 8, a deflector 9, being of the shape of an inverted cone and of a size sufficiently reduced  
55 to leave an annular passage 10 between it and the outwardly-flaring part 7 of the smoke-stack. Within this deflector and supported on its upper edge is a separator 11, also of inverted-cone shape, but of less depth than the  
60 deflector-cone, so as to leave an air-space 12 between the two cones. This space is intended to serve as a non-conductor of heat and for such purpose may be left empty or  
65 be packed with asbestos, mineral wool, or other similar substances.

The upper end of the out-flaring part 7 of the smoke-stack is turned over inwardly and down, as shown at 13, the downward turn being at such an angle as to guide and throw  
70 the smoke and steam rising up in and entering from passage 10 into separator 11. By the time smoke and steam have made the required turn in their passage to enable them  
75 to enter this separator the velocity of their current and their density have decreased to such an extent as to make them unable to carry the cinders thus far suspended any  
80 further, which latter drop partly before and finally when coming in contact with the interior surface of the separator, on which surface they slide down to an outlet-pipe 14,  
85 through which they pass off. This pipe is of large diameter at its entrance to afford quick relief to the cinders as they arrive thereat. Smoke and steam pass off in opposite directions through an outlet above the separating-chamber. Around the upper edge of the latter  
90 is provided an inturned lip 15, which prevents the cinders, after once thrown against the inner surface of the separator, from being forced back again over the upper edge of the same by the smoke rising therefrom.

Part of the steam after arriving within the separator becomes condensed by reason of  
95 this latter being cooler from its exposure to the outer air than the steam, which condensation also passes off through pipe 14.

Condensation of the steam rising within  
100 passage 10 is prevented by deflector 9, which keeps the former from coming in contact with the cooler under surface of the separator, while the deflector is prevented from becom-

ing cooled by reason of the non-conducting space 12 between the two cones.

Passage 10 varies in width and becomes narrower toward the top to prevent its total area from becoming too large by reason of the upwardly-increasing diameter at the upper end of the stack and to retain its proper size proportional to the lower part of the latter. In the upper turn of this passage and piercing the inturned part of the stack are apertures 18, small enough to prevent cinders to pass, but sufficiently large for steam to pass out to relieve its excessive pressure should it occur and cause possibly a choking of the passage at this point. To prevent these apertures from becoming choked up by cinders driven against or into them or held there by the pressure of the steam, I provide a plate 19, suitably supported by braces 20 or otherwise and some distance below the upper inwardly-curved part of the cone 7, with which part it is parallel. The office of this plate, which may also be perforated, is to arrest most of the cinders as they arrive from below, causing also the larger ones as they are driven against it to be broken up. Steam and smoke passing through on both sides of this plate, the pressure becomes equalized and the openings are not apt to become obstructed.

Around the outside of the upper end of cone 7 and projecting above the perforated part thereof is a flange 21, the object of which is to prevent interference with the draft through openings 18 or prevent egress there-through being cut off by the air while the locomotive is moving. Holes 22 near its lower edge prevent accumulation of any kind back of it.

Part of the steam and smoke within cone 11 escapes occasionally downwardly through pipe 14, whereby the ready discharge of the separated cinders is assisted. Vapors so diverted are prevented, however, from escaping through pipe 14 by a flue 17 with an enlarged mouth, which intercepts their passage and conducts them to the top of the stack, where they escape.

It is obvious that plate 19 and flange 21 are not necessarily limited to be used in connection with a spark-arrester constructed in all details precisely like the spark-arrester described in my former patent above referred to.

Having described my invention, I claim as new—

1. In a spark-arrester, the combination of the upper outwardly-flaring part of the smoke-stack, a separator 11 supported within this flaring part, being of sufficiently-reduced diameter to produce an annular passage 10 between it and the stack, the upper end of

which latter is turned over and in as shown in a manner to guide the discharge from passage 10 into separator 11, openings 18 in the upper part of this inturned end of the stack, a plate 19 supported below this inturned end and in the upper turn of passage 10, an outlet for smoke and steam and an outlet for the cinders precipitated within separator 11.

2. In a spark-arrester, the combination of the upper outwardly-flaring part of the smoke-stack, a separator 11 supported within this flaring part, being of sufficiently-reduced diameter to produce an annular passage 10 between it and the stack, the upper end of which latter is turned over and in as shown in a manner to guide the discharge from passage 10 into separator 11, openings 18 in the upper part of this inturned end of the stack, a flange 21 raised around the outside of the stack projecting above the upper perforated end thereof, an outlet for smoke and steam and an outlet for the cinders precipitated within separator 11.

3. In a spark-arrester, the combination of the upper outwardly-flaring part of the smoke-stack, a separator 11 supported within this flaring part, being of sufficiently-reduced diameter to produce an annular passage 10 between it and the stack, the upper end of which latter is turned over and in as shown in a manner to guide the discharge from passage 10 into separator 11, openings 18 in the upper part of this inturned end of the stack, an outlet for smoke and steam and an outlet-plate 14 for the cinders precipitated within separator 11 having an enlarged opening at its mouth where it starts from the latter.

4. In a spark-arrester, the combination of the upper outwardly-flaring part of the smoke-stack, a separator 11 supported within this flaring part, being of sufficiently-reduced diameter to produce an annular passage 10 between it and the stack, the upper end of which latter is turned over and in as shown in a manner to guide the discharge from passage 10 into separator 11, openings 18 in the upper part of this inturned end of the stack, a plate 19 supported below this inturned end and in the upper turn of passage 10, a flange 21 raised around the outside of the stack projecting above the upper perforated end thereof, an outlet for smoke and steam and an outlet for the cinders precipitated within separator 11.

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

THOMAS LEE.

Witnesses:

W. J. MCCARTNEY,  
HENRY F. BROCKMANN.