W. M. K. THORNTON.

Locomotive Smoke-Stack and Spark-Arrester.

No. 209,992. **Patented Nov. 19, 1878.**

Fig 1

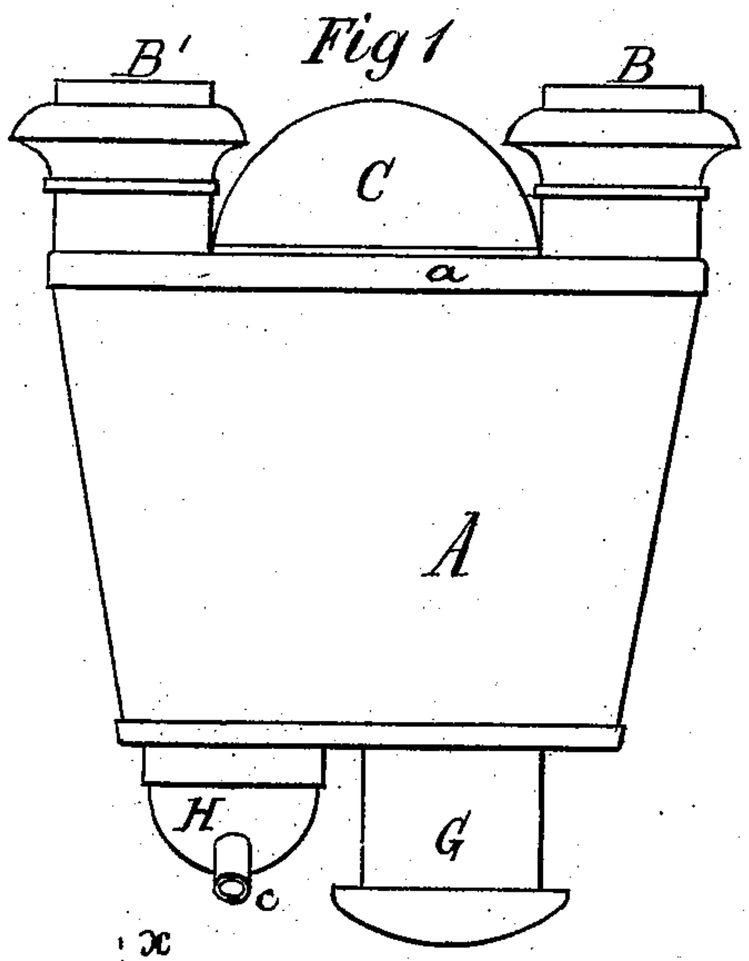


Fig 2.

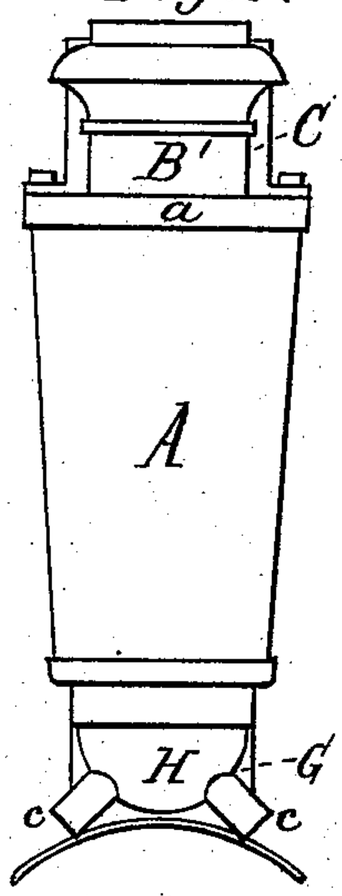


Fig 4.

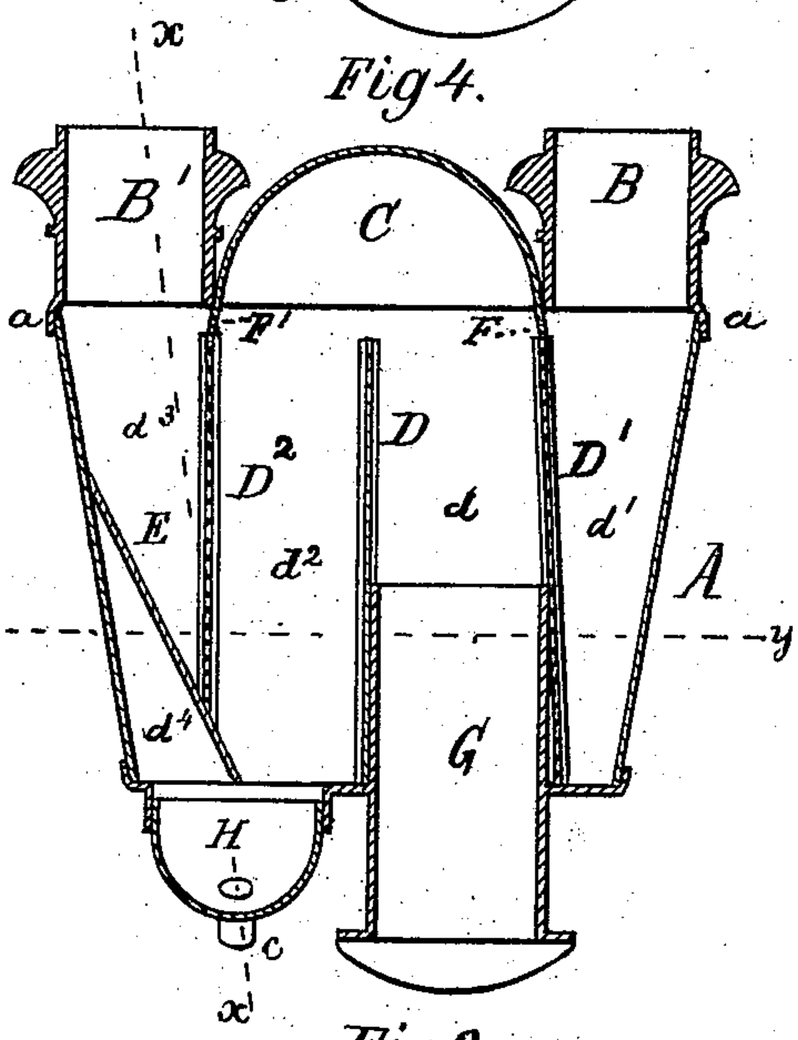


Fig 3.

Fig 5.

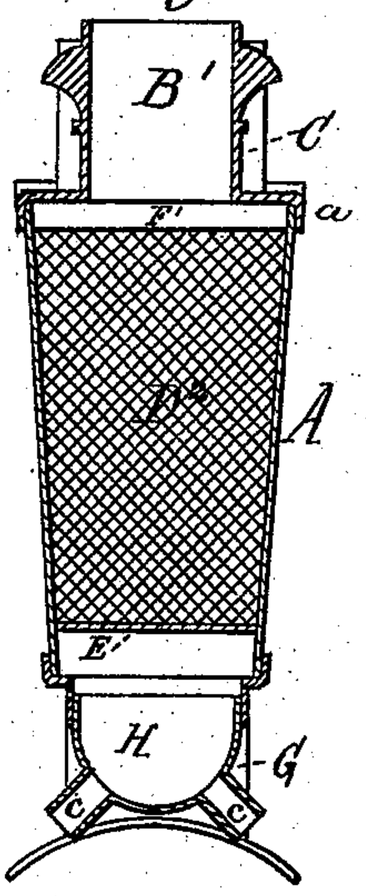
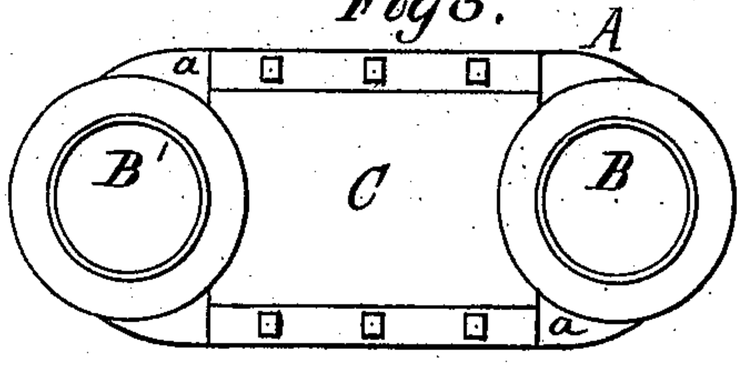
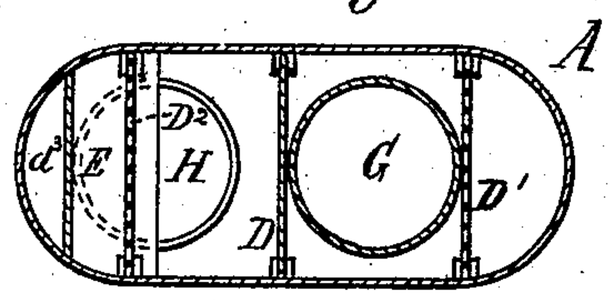


Fig 6.





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UNITED STATES PATENT OFFICE.

WILLIAM M. K. THORNTON, OF ST. LOUIS, MISSOURI, ASSIGNOR OF THREE-EIGHTHS HIS RIGHT TO CHARLES L. THOMPSON, OF SAME PLACE.

IMPROVEMENT IN LOCOMOTIVE SMOKE-STACK AND SPARK-ARRESTER.

Specification forming part of Letters Patent No. **209,992,** dated November 19, 1878; application filed October 25, 1878.

To all whom it may concern:

Be it known that I, WM. M. K. THORNTON, of St. Louis, in the county of St. Louis and State of Missouri, have invented a new and useful Improvement in Locomotive Smoke-Stack and Spark-Arrester; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation, Fig. 2 an end elevation, and Fig. 3 a plan, of a locomotive smoke-stack and spark-arrester as improved by me. Fig. 4 is a longitudinal section, and Figs. 5 and 6 are transverse and horizontal sections, of the same, Fig. 5 being taken in a plane indicated by the line *x x* of Fig. 4, and Fig. 6 in a plane indicated by the line *y y* of Fig. 4.

My invention relates to that description of locomotive smoke-stack and spark-arrester which is provided with a single exhaust-receiving passage at its bottom and two escape-draft passages at its top. This stack and spark-arrester, as now improved by me, is divided internally into five compartments, and is provided with a crown-chamber and a spark receiving and discharging bottom beneath two of the five compartments above mentioned. Three of the said compartments are equal in depth with the body of the stack, and are formed by up-and-down partitions, the central partition being solid or imperforated, and the other two being of wire-gauze. The other two compartments are formed by one of the wire-gauze partitions just mentioned and an inclined solid or imperforated plate. The five chambers of the stack are in communication with the two draft-escape passages and the exhaust-receiving passage by means of the wire-gauze partitions; and the two intermediate chambers, as well as the extreme rear chamber, are in communication with one another and with the spark-receptacle and the nozzles thereof by means of the crown-chamber.

By means of my improvement the amount of surface presented for arresting the sparks is increased without injury to the draft of the stack, and all liability of burning sparks rising with the steam and other gases (after being precipitated into the spark-receptacle) and passing into the open air is avoided.

In the accompanying drawings, A represents the smoke-stack. In horizontal section this stack is oblong or elliptical. B B′ are the escape-draft passages of the stack. C is a crown-chamber, of semi-cylindrical form, applied between the draft-escape passages on the top *a* of the stack A. This crown is to be flanged, and bolted, in a removable manner, to the stack.

D D^1 D^2 are three partitions, which are placed transversely across the stack A; and E is an inclined partition, which passes from the back end of the stack to a position forward of the partition D^2. The partitions D and D^1 extend from the bottom of the stack to the margin of the top *a* thereof, while the partition D^2 extends from the margin of the top *a* to the surface of the inclined partition E. The partition E extends from about the middle of the height of the stack A to the bottom thereof. The central partition, D, is solid or imperforated, and it divides the stack A internally into two halves, from bottom to margin of its top *a*. The partitions D^1 D^2 are of wire-gauze, and that E of solid or imperforated plate metal. These three partitions, together with the partition D, form, with the outer shell of the stack, five chambers, *d* d^1 d^2 d^3 d^4. In the lower end of the chamber *d* the receiving-pipe G for the exhaust from the engine is inserted, and under the chambers d^2 and d^4 the spark-receptacle H is applied, and it forms the bottom, in part, of these chambers. This receptacle is in form of a hollow semi-sphere, and it is provided with two diverging and diametrically-opposite nozzles, *c c*, for the sparks to escape through.

In the practical operation of the stack, pipes leading from the fire-box of the locomotive will be fitted upon the nozzles *c c*, and the sparks will be drawn thrqugh these pipes back into the fire-box and there burned.

The inclined partition E serves as a means for directing the sparks to the forward part of the receptacle H, and thereby preventing them from piling up about the discharge-passages to the nozzles *c c* and clogging the same.

This partition also serves to arrest all flying sparks which rise up out of the receptacle H and pass into the chamber d^4. Were not this partition E and the chamber d^4 provided in the stack the sparks would, under the powerful influence of the exhaust and their momentum acquired by contact with the curved surface of the crown-chamber C, whirl and fly about in the stack until beaten into smaller particles, and they, in this form, might escape through the stack into the open air, to the great annoyance of passengers and danger of property.

F F′ are short deflecting or guiding ribs formed on the under side of the top *a* of the stack A. These ribs just touch the wire-gauze partitions, and their office is to direct the sparks and other matters upward out of chamber *d*, and downward out of crown-chamber C.

Operation: The exhaust from the engine enters, as usual, through the passage G, and fills the several chambers, thus establishing an equal pressure throughout. The steam and other gases escape freely through the vertical wire-gauze partitions D^1 D^2 and pass off through the escape-pipes B B′. The vertical position of the gauze partitions allows the steam to go through the wire meshes without any injurious cutting away of the netting, and at the same time the upward course of the sparks and other solid matters is not interfered with in the body proper of the stack A as much as is the case in stacks which have the wire-gauze arranged in a different position. The steam, by having a free escape, is enabled to produce a powerful draft in the stack, and while the steam is escaping the sparks are carried forcibly from the chamber *d* into the crown-chamber C, and by the curved surface of this chamber are forcibly deflected into the chamber d^2 and receptacle H. Such sparks and particles as keep in motion after arriving in the receptacle H rise into the chamber d^4, and when still fall back into the receptacle H, and escape, along with the other sparks of chamber H, through the nozzles *c c* into the pipes leading back to the fire-box of the locomotive, and are there burned.

The locomotive-stack and spark-arrester herein described has been practically tested and found to "steam" perfectly, and operate without showing sparks at its escape-draft pipes; and while this is so, the wire netting does not appear to be worn or cut away by the freely-escaping steam, from the fact that the great wear is thrown upon the crown-chamber. In order to have the crown-chamber capable of enduring the wear upon it, it is made of the hardest metal, and in the event of its becoming injured from long use it can be renewed by simply unbolting the old one and screwing on a new one.

Having described my invention, I claim—

1. The stack provided with a central partition made solid or imperforated, a vertical or nearly vertical wire-gauze partition, D^1, extending the whole depth of the body proper of the stack A, a shorter vertical wire-gauze partition, D^2, and an inclined deflecting and arresting partition, E, said stack having two draft-escape passages, B B′, a spark-receptacle, H, a crown-chamber, C, and exhaust-receiving pipe G, substantially as and for the purpose described.

2. The chamber d^4, in rear of the partition E, and forming an upward extension of the spark-receptacle H, such extension being in rear of the chamber d^3, and being formed by placing the partition E in an inclined position and having it extend down to, or nearly to, the spark-receptacle and overhang the same, substantially as and for the purpose described.

3. The combination of the imperforated partition D, perforated partition D^2, solid projections F, and imperforated arched crown-chamber C, for covering the chambers d^1 d^2, and permitting the sparks and gases to pass over the partition D, substantially as described.

4. The combination of the imperforated central partition, D, partitions D^1 D^2, and inclined partition E, extended down to, or nearly to, the spark-receptacle H, and made to form a chamber, d^4, which is an upward extension of the receptacle in rear of the chamber d^1, substantially as described.

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Witnesses:
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