

W. M. K. THORNTON.
Locomotive Smoke-Stacks and Spark-Arresters.

No. 216,363.

Patented June 10, 1879.

Fig1.

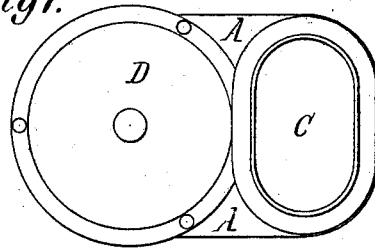


Fig2.

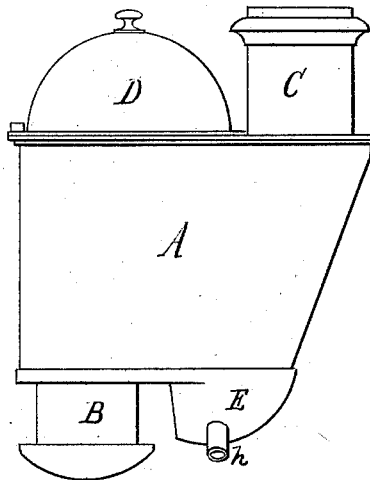


Fig3.

Fig7.

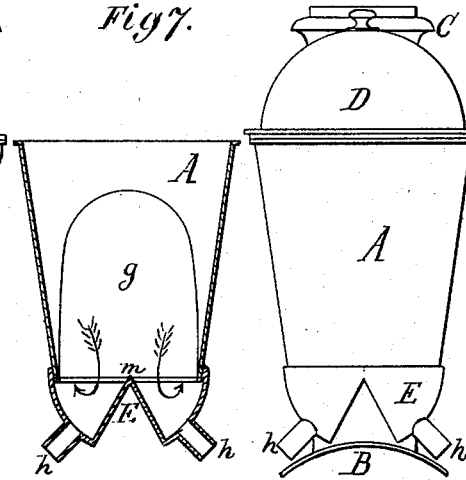


Fig4

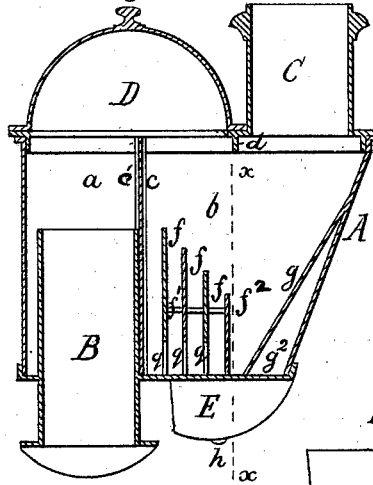


Fig5.

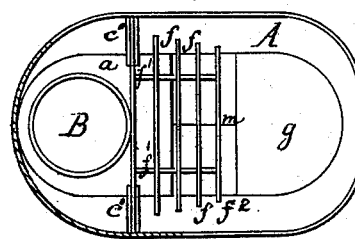
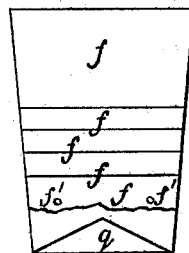


Fig6.



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IMPROVEMENT IN LOCOMOTIVE SMOKE-STACK AND SPARK-ARRESTER.

Specification forming part of Letters Patent No. **216,363**, dated June 10, 1879; application filed October 26, 1878.

To all whom it may concern:

Be it known that I, WM. M. K. THORNTON, of the city and 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 top view, Fig. 2 a side view, and Fig. 3 a rear view, of my improved stack and spark-arrester. Fig. 4 is a longitudinal section, and Fig. 5 a horizontal section, of the same. Fig. 6 is a rear view of the partition-plates, which constitute the main means for arresting the sparks. Fig. 7 is a vertical transverse section in the line *xx* of Fig. 4.

My invention relates to that description of smoke-stack which is provided with a single exhaust receiving-passage and a single draft-escape passage; and the nature of my improvement consists, first, in the combination of a series of transverse division-plates of gradually-decreased height, a concave crown-chamber, a spark receiving and discharging chamber with a smoke-stack of the description above mentioned; second, in a spark-receptacle formed on the bottom of the body of the smoke-stack, said receptacle being concave on its inside at all points except at its front end and center, and at its center being provided with an upward projection of the form of an inverted *V*, which divides the receptacle into two compartments, each of which compartments is provided with a spark-discharging nozzle, all as will be hereinafter described; third, in an inclined directing-plate having a chamber in rear of itself, in combination with the series of division-plates, a concave crown-chamber, spark-receptacle, and a smoke-stack having a single exhaust-receiving passage and a single draft-escape passage.

In the accompanying drawings, *A* represents the body of the stack. It is of nearly an ovate form in horizontal section.

B is the receiving pipe or passage for the exhaust from the engine. *C* is the draft-escape pipe or passage. *D* is the hollow or concave crown-chamber, and *E* the spark receiving and discharging contrivance.

Below the crown-chamber and on one side of the pipe *B* a series of partition-plates, *c f f*², are arranged across the stack. These plates are of gradually-decreased height, and all of them are low enough to allow the exhaust to pass from the section *a* to the section *b* of the stack after the same has risen into the crown-chamber and is deflected toward section *b*.

In applying the plates *c f f*², they are connected together by rods *f*¹, and the highest plate is fitted loosely to the stack by means of grooved flanges *c'*, formed on the inner sides of the stack. The plates, by being thus attached together and fitted to the stack, can all be removed conveniently when any obstruction in the operation occurs. The plate *f*² is made rectangular, and rests across the open mouth of the spark-chamber. The plates *f* are constructed with a *V*-shaped notch, *g*, in their lower edges, and rest with their unnotched portion upon the bottom of the stack and their notched portion across the open mouth of the spark-receptacle *E*. The lower edges of the plates *f f*² being all on the same plane, the sparks entering between plates *c* and *f* will be allowed to pass through the notches *g* to the plate *f*², and then will be deflected by said plate into the spark-receptacle *E*. A narrow vertical rib, *d*, between the crown-chamber *D* and the draft-escape pipe *C* serves to prevent the sparks from passing directly into the pipe *C* when they pass into chamber *b* from chambers *a* and *D*. The curved form of the chamber *D*, together with the obstruction offered by strip *d*, compels the matter designated as "exhaust" from the engine to pass in a downward direction into the chamber *b*. On the inner side of the rear end of the stack an inclined partition-plate, *g*, is provided, and behind this plate a chamber, *g*², is formed. The lower end of chamber *g*² is open and in communication with the spark-receptacle *E* and chambers *a*, *D*, and *b*. The plate *g* serves as a director of the sparks into the receptacle *E*, and the chamber *g*² serves as an arrester of the sparks after they have been thrown or forced into the receptacle, and are caused to rise out of the same by their momentum or great velocity. The inclination of the plate serves to throw the sparks to the forward part of the receptacle *E*, and by this means

the discharge passages or nozzles *h h* of the receptacle are kept from being clogged, and a freer discharge of the sparks insured.

In order to still further aid in the discharge of the sparks through the nozzles *h h*, the spark-receptacle *E* is provided with a central projection, *m*, of the form of an inverted *V*, which divides it into two compartments.

The interior surface of each of these compartments, outside of the projection *m*, presents the form of a segment of a circle both transversely and longitudinally, and the projection *m* inclines downwardly and outwardly in converse directions. The only vertical side which the receptacle *E* presents is at the front of the compartments, and from this there is a curved inclination, backward and downward, given to the surface of the receptacle *E*. This construction of the spark-receptacle insures the gliding of the sparks into the discharging-nozzles.

Each of the compartments is provided with a diverging hollow nozzle, which serves as the means of connection with pipes leading to the fire-box of the engine and for discharging the sparks from the receptacle *E* into such conducting-pipes of the fire-box of the engine. The location of these nozzles is near the rear of the stack, and the sparks are caused, by the inclined plate *g*, to deposit far in advance of the holes leading from the spark-receptacle, in order that the sparks shall not accumulate over and clog said holes.

On each side of the partition *m* the sparks which are in motion are allowed to pass up into the chamber *g*², as illustrated by the arrows in Fig. 7; and from this chamber the sparks fall back into the compartments of the spark-receptacle, and pass out through the nozzles to the fire-box of the engine.

The operation of the stack and spark-arrester is as follows: The exhaust, as usual, enters the stack through the passage *B*. It then rises to the top of the stack with great force, and is deflected over the partition *c* into the chamber *b*, and, by reason of the downward direction given to it by the crown-chamber *D*, descends between the partitions *f* and against

the inclined partition-plate *g*. This action causes the sparks and other heavier matters to be precipitated to the bottom of the stack, and from thence under the plates *f* to the plate *f*², and thence into the spark-chambers of receptacle *E*; and such sparks as are violently in motion pass up again with the steam and gases, and are caught in the chamber *g*². During the descent of the sparks the steam and lighter gases are freely escaping between plates *f*² and *g* and passing out at the escape-draft pipe *C*.

The sparks from chamber of receptacle *E* are forced by the pressure in the stack into the nozzles *h h*, and from thence drawn by the draft of the fire-box into the fire-box, and there burned.

The locomotive smoke-stack and spark-arrester herein described has been found to "steam" very freely and to arrest the sparks effectually, and, while this is so, it does not require wire-gauze nettings to be applied between the exhaust-passage and the escape-draft passage.

Having described my invention, what is claimed as new is—

1. The combination, in a smoke-stack, of the partitions *c f*, crown-chamber *D*, and spark-receptacle *E*, substantially as and for the purpose described.

2. In a locomotive smoke-stack, the spark-receptacle *E*, divided into two compartments by a longitudinal projection, *m*, of inverted-*V* form, said compartments being distinct from one another and at the base of section *b* of the smoke-stack, and respectively provided with a spark-discharging nozzle, substantially as and for the purpose described.

3. The combination of the partitions *c* and *f*, divided or partitioned spark-receptacle *E m*, and inclined conducting-plate *g*, chamber *g*², and crown-chamber *D*, substantially as and for the purpose described.

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Witnesses:

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