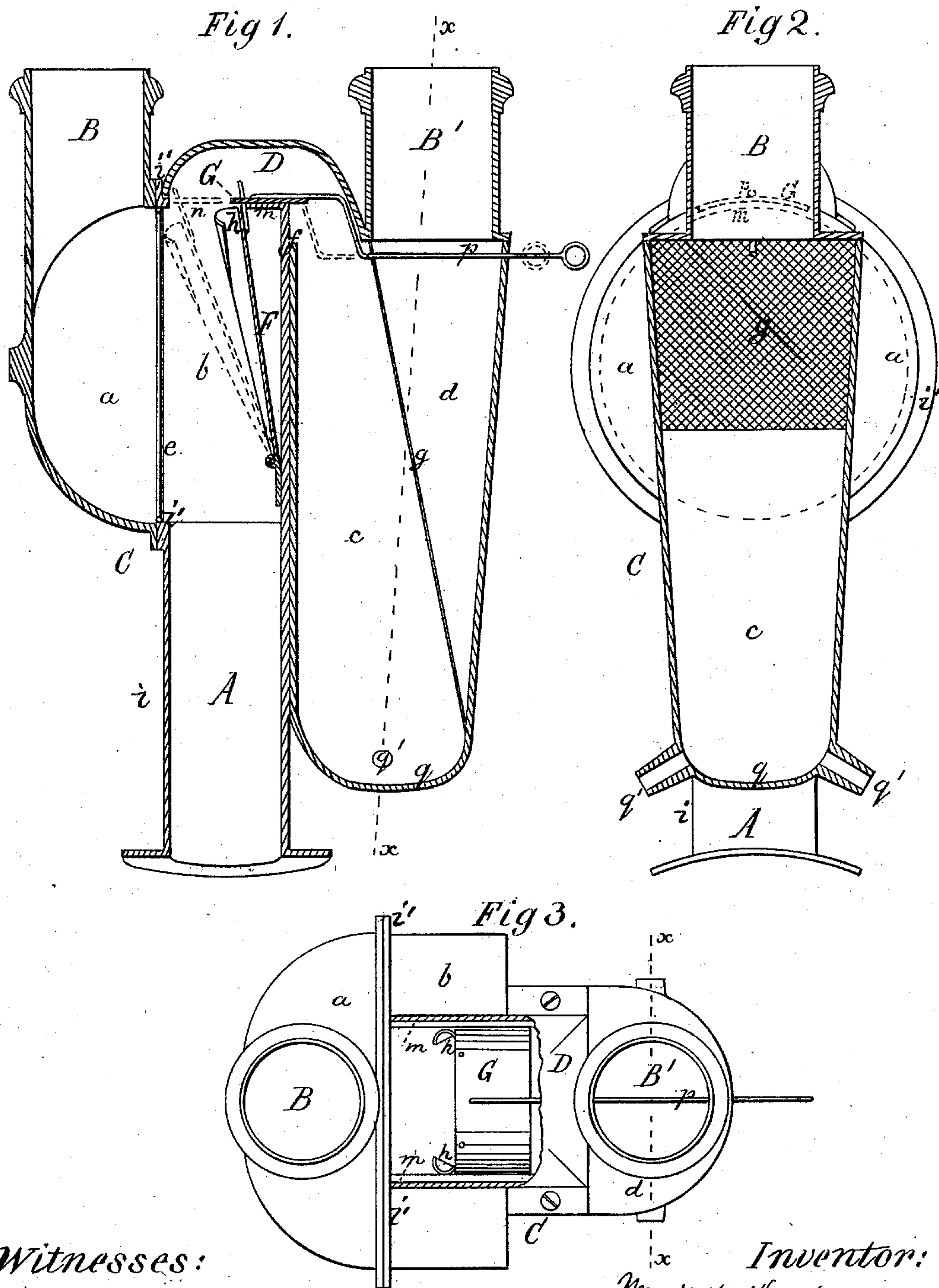


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Locomotive Smoke-Stacks and Spark-Arresters.

No. 216,362.

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Witnesses:

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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN LOCOMOTIVE SMOKE-STACK AND SPARK-ARRESTER.

Specification forming part of Letters Patent No. **216,362**, dated June 10, 1879; application filed October 23, 1878.

*To all whom it may concern:*

Be it known that I, WILLIAM 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 vertical longitudinal section through the center of my improved stack and spark-arrester. Fig. 2 is a transverse section of the stack and spark-arrester in the line *x x* of Figs. 1 and 3. Fig. 3 is a plan view, with a portion of the crown-chamber broken away and section-lined to show the valve below.

The nature of my invention consists in a locomotive smoke-stack provided with a single receiving-passage at its bottom for the exhaust, and with two draft-escape passages at its top, said stack being further provided with partitions which run lengthwise in an upward direction, one of these partitions being solid or imperforated, and the others perforated or of wire-gauze. The stack is also provided with a crown-chamber for directing the burning sparks, steam, and gases which are forced up beyond the first vertical wire-gauze partition into the chamber which is under the direct influence of the second or rear draft-escape passage.

My invention consists, second, in an inclined deflecting partition of wire-gauze, applied as hereinafter described with respect to the spark receiving and discharging chamber, whereby the sparks are forced downward, and prevented from passing out of the rear draft-escape passage, while the steam and other gases are allowed free and ready escape.

My invention consists, third, in an adjustable plate and a valve controlled by a hand-rod, whereby the amount of exhaust admitted from the first chamber of the stack to the rear chambers is regulated as circumstances may require, and the size of the delivery end of the chamber which first receives the exhaust contracted by a hinged plate, which acts as

a chute for directing the escape of the sparks and cinders, as well as a regulator of the amount of escape from said chamber.

In the accompanying drawings, A is the receiving pipe or passage of a smoke-stack, C. This pipe A consists of a vertical leg, *i*, circular enlarged top portion *i'*, and an extended vertical portion, *f*, which is imperforated, and a vertical portion, *e*, which is perforated or of wire-gauze. To the circular portion *i'* a large semi-spherical chamber, *a*, is attached, and to the top of this chamber *a* a draft-escape pipe or passage, B, is applied, being cast with the chamber *a* if deemed best.

The spherical enlargement *a* and the cylindrical portion *i'*, together with the portions *e* and *f*, form large chambers above the pipe A and below the pipe B, for the reception and circulation of the exhaust which comes from the engine. The perforated partition *e*, being vertical, is not subjected to the tearing and wearing effect of solid particles mixed with the exhaust-steam and smoke, and yet it affords a free and ready escape for the steam and smoke, the enlarged chamber *a* and its semi-spherical form aiding also in the free passage of the same to and through the pipe B.

On the side of the chamber *b* and pipe A a chamber, *c*, is applied, and this chamber at its lower end, *g*, serves as a spark receptacle and discharger, and at its upper end is provided with a draft-escape passage or pipe, B'. Between the pipes or passages B B' a removable crown-chamber, D, is bolted to the top of the stack C.

The chamber *c* is provided with a wire-gauze partition, *g*, which runs diagonally across the chamber *c*, and thus cuts off the draft-escape B' from chamber *c*, except through the perforations of the partition *g*. By this means a chamber, *d*, is formed, as shown. The stack C is thus divided into four chambers, *a b c d*, by the partitions *e f g*. The partition *e* admits steam and other gases from chamber *b* into chamber *a*, but excludes sparks and other solid matters therefrom. The partition *f* compels the solid particles and burning sparks to rise to its top and into the enlarged circular



portion *i'*, and against the concave or arching crown chamber D, and from thence they pass into the chamber *c*.

The elevation of the sparks and downward passage of the same into chamber *c* is due to the force of the exhaust and the suction caused by the escape at the draft-passage B', together with the curved or inclined surfaces of the crown-chamber D. While the sparks are caused to descend by their superior gravity, the steam and lighter gases pass through the inclined deflecting-netting *g* into the chamber *d*, and out of the escape draft-passage B'.

At the bottom *q* of the chamber *c* diverging discharge-nozzles *q'* are applied, and through these nozzles the sparks and cinders are drawn and forced by the action of the exhaust in the stack and the draft of the fire-box, as usual.

F is a hinged plate, with side flanges, *h*, and G is a slide-valve attached to the plate F. The plate F is arranged in a nearly upright position in the chamber *b*, and serves for contracting the size of the upper part of this chamber. The valve G is placed on a curved seat, *m*, of the chambers *b* and *c*, and serves for opening and closing, to a greater or less extent, the exit-passage *n* of the chamber *b*.

For the purpose of operating the valve and the plate, a rod, *p*, is attached to the valve, and its outer end forms a handle, which the operator grasps when the valve and plate are to be operated.

By means of the valve and plate the sparks, steam, and gases passing from chamber *b* into chamber *c* can be regulated to any extent desired, even to the cutting off entirely of chamber *c* from the chamber *b*, or opening completely the exit-passage *n* of chamber *b*.

The flanges of the plate F form a chute, which prevents the sparks from whirling about as they rise to the crown-chamber D.

The operation is as follows: The exhaust enters the chamber *b*, and the steam and gases fill the stack to a greater or less extent, according as the valve G is adjusted. In the course of the exhaust the steam and gases first escape through the wire-gauze partition *e*, and out through the draft-escape passage B. Simultaneously with this operation the sparks and a portion of the steam and gases pass up into the crown-chamber, and are forcibly deflected over into the chamber *c* through the passage *n*. In this chamber the sparks are deflected downward against the wire-gauze partition *g* into the chambered bottom *q*, and from thence they are forced to the fire-box of the locomotive through the passages of the nozzles *q'*.

The locomotive smoke-stack constructed as herein described has been found, after long trial, to answer far better than those previously tried, for the reason that the wear and destruction of the deflecting and separating partitions or devices have been avoided by arranging them in the manner I have represented in the drawings; and while this is the

case, the arrest of large burning particles and solid particles of matter is effectually accomplished without interfering with the free steaming or exhausting of the engine through the stack.

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

1. The locomotive smoke-stack provided with the vertical wire-gauze or perforated partition *e*, the imperforated vertical partition *f*, chambers *a b c*, pipes or passages A B B', all in the same vertical plane, and the arched connecting crown-chamber D, substantially as and for the purpose described.

2. The stack C, provided with the vertical perforated or wire-gauze partition *e*, imperforated vertical partition *f*, chambers *a b c*, and the connecting arched crown-chamber D, substantially as and for the purpose described.

3. The combination, with a smoke-stack having the passages A B B', all in the same vertical plane, of the chambers *a b c*, perforated partition *e*, imperforated partition *f*, arched crown-chamber D, and the spark-receptacle *q*, with discharging-nozzles *q'*, substantially as and for the purpose described.

4. The combination of the regulating-valve G with the stack provided with chambers *a b c*, perforated partition *e*, and imperforated partition *f*, crown-chamber D, and passages A B B', substantially as and for the purpose described.

5. The combination of the wire-gauze inclined partition *g* with the stack provided with the chambers *b c*, crown-chamber D, and passages A B', and spark-receptacle *q*, with nozzles *q'*, substantially as and for the purpose described.

6. The combination of the valve G and plate F with the stack provided with the chambers *a b c d*, partitions *e f g*, crown-chamber D, passages A B B', and spark-receptacle *q*, with nozzles *q'*, substantially as and for the purpose described.

7. In a smoke-stack of a locomotive, the hinged chute F, provided with guiding-flanges *h*, in combination with the valve G, and operated by the valve through the rod which operates the valve, whereby the egress of the sparks and cinders through the stack is graduated, substantially as described.

8. A smoke-stack, C, provided with the pipes A and B, semi-spherical enlargement *a*, and vertical wire-gauze or perforated partition *e*, the said pipes A and B being connected together by the enlarged portion *a*, and the passages through these pipes being separated by the wire-gauze partition *e*, substantially as and for the purpose described.

9. The combination, in a smoke-stack, of the vertical pipe A, having a long imperforated side, *f*, a short imperforated side, *i*, a perforated partition, *e*, and an escape-pipe, B, the lower end of which forms a semi-spherical chamber, *a*, substantially as and for the purpose described.



10. A smoke-stack for a locomotive, provided in its vertical exhaust-receiving chamber *b* with a hinged regulating-plate, which is made adjustable in an inclined position in said chamber with respect to the escape or spark-exit passage *n*, for the purpose of contracting the delivery end of the chamber *b*,

and also regulating as well as directing the escape of the sparks and cinders from said chamber, substantially as described.

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