J. L. JACOBS.

Spark-Arrester.

No. 213,112. Patented Mar. 11, 1879.

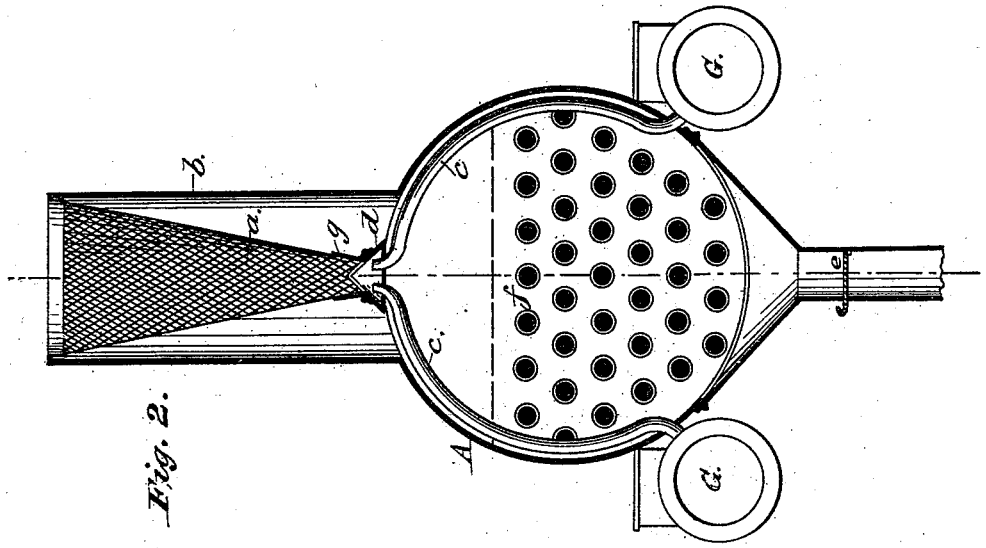

Fig. 2.

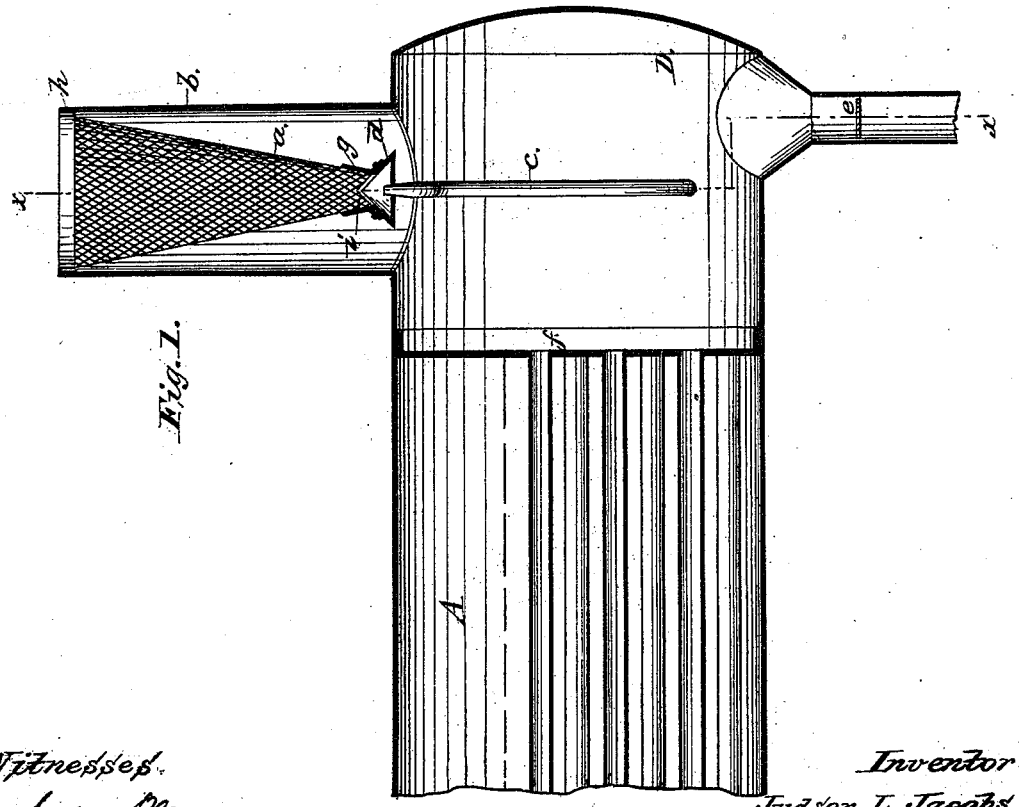

Fig. 1.

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JUDSON L. JACOBS, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN SPARK-ARRESTERS.

Specification forming part of Letters Patent No. **213,112**, dated March 11, 1879; application filed November 27, 1878.

To all whom it may concern:

Be it known that I, JUDSON L. JACOBS, of the city of Boston and State of Massachusetts, have invented certain new and useful Improvements in Spark-Arresters; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, and which form part of this specification.

This invention relates to that class of inventions known as "spark-arresters" for locomotive-engines; and its objects are to prevent the exhaust-nozzles from drawing or sucking back into the cylinders of the engines on the return stroke of the piston the sparks and other foreign matter, which cut the valves and cause so much trouble and expense.

Another object is to arrest the sparks within the uptake, and thus prevent their exit to the atmosphere, by which so much damage is done to property by conflagrations.

I also preserve the furniture in the coaches by preventing the escape of the sparks and cinders, which also cause great annoyance to passengers.

Another object is to secure simplicity and a ready removal and replacement of the apparatus, also cheapness in first cost and repairs, and to allow a free and uninterrupted exhaust.

It is well known that in the old method a hood or cap is placed over the top of the stack, and perforated screens or wire-gauze placed thereon; but the smoke, sparks, and waste products of combustion driven by the exhaust-steam soon cut them out and destroy them.

Another still greater objection is that the moisture from the steam causes the smoke and sparks to cake or concrete against the hood, and thus interrupt the free exhaust of the engine, which is so necessary to prevent cushioning or back-pressure. The sparks also fall into the exhaust-nozzles and cut the valves and bearing-surfaces of the engine, all of which I avoid by my simple improvement; and to this end the first feature of my invention consists in locating within the uptake an inverted perforated pendent cone, extending so as to fill the entire outlet of the stack, and tapering to a point on a line with the top of the cylindrical portion of the boiler, where it meets and is secured to another and a smaller cone, which forms the petticoat-pipe of the exhaust.

The second feature consists in the combination of the solid cone, the perforated cone, the uptake, and the enlarged smoke-box provided with a depression or spark chamber, through which all accumulated sparks and cinders are removed, as will hereinafter more fully appear.

Having reference to the drawings, Figure 1 represents a longitudinal vertical section of a locomotive-boiler, a portion being broken away; Fig. 2, a vertical cross-section on the line *x x*, Fig. 1, taken through the smoke-arch and uptake.

A is the boiler; *f*, the tubes; D, the smoke-arch; *c*, the exhaust-pipes; *e*, the valve in the discharge-pipe leading from the cinder-receptacle; G, the cylinders; *b*, the uptake; *a*, the perforated inverted cone, and *d* the imperforated or solid cone; *g*, the lower ring or band, and *h* the upper ring or band. *i* shows the exhaust-opening in the lower cone. The cap usually surmounting the smoke-stack is not shown.

The construction of all these parts is obvious; but to explain the construction and operation of the parts more in detail, I will refer to an ordinary smoke-stack. The inverted cone being made of any suitable material, I secure the large end to a ring or band, *h*, and secure the band in any well-known manner to the upper end of the smoke-stack, so that the outlet of the stack is entirely closed, except through the perforations. The upper end of the perforated cone and band must be strongly and firmly secured to the stack, as nearly its entire weight will hang by the fastening.

The cone *a* extends down to the cone *d*, and around the lower end of the inverted cone *a* is located another band or ring, *g*, which is secured in turn to the flange or cone *d*. This cone *d* is provided at its apex with an opening, *i*, through which the exhaust-steam passes, and this opening *i* must be a little more than double the area of the exhaust-nozzle. The bottom of cone *d* is provided with holes for the admission of the pipe or nozzle, and it is made much wider at the bottom for the pur-

pose of receiving the thrust of the cinders and deflect them from the joint between the perforated cone *a* and cone *d*, thus in a great measure weakening their force, and also diminishing their size and protecting the perforated portion of cone *a*.

Another object I have in making cone *d* broad at its bottom is, when the water of condensation accumulates in the chamber formed by the cone, the bottom, being broad, gives a greater heating-surface for converting the water into steam, and thus keeping it dry.

My principal object, however, is to provide for the free and uninterrupted exhaust by preventing the choking of the exhaust or exit pipe, as hereinbefore explained.

I am aware that conical inverted perforated tubes have been in use, but their construction and mode of attachment being so different from mine I lay no claim to such; but

What I do claim, and desire to secure by Letters Patent, is—

1. In a spark-arrester for locomotives, the combination of the stack *b* and the perforated cone *a* with the imperforated cone *d*, they being arranged in reverse order, and being provided with bands and fastenings, all the parts united in such a manner as to prevent the escape of sparks and cinders and allow a free and uninterrupted exhaust, substantially as herein set forth.

2. The combination, with the smoke-stack of a locomotive, of the pendent inverted cone *a*, secured by band or bands *h*, the lower cone, *d*, provided with a wide bottom, and forming a water-chamber, and secured to the small end of the upper cone by means of band *g* and exhaust-nozzles *c*, all constructed and arranged to operate substantially as set forth and described.

3. The combination of a locomotive smoke-stack, consisting of stack *b*, cones *a* and *d*, arranged in reverse order, bands *h* and *g*, exhaust-pipes *c c*, and spark-receptacle provided with valve *e*, whereby the sparks and cinders may be deflected, arrested, and discharged without interfering with the free exhaust of the steam, substantially as set forth and shown.

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