

SPARK ARRESTER.

972,583.

FIG. 1.

FIG. 2.

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UNITED STATES PATENT OFFICE.

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SPARK-ARRESTER.

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To all whom it may concern:

Be it known that I, WILLIAM P. STEELE, of Palisade, in the county of Bergen and State of New Jersey, have invented a certain new and useful Improvement in Spark-Arresters, of which improvement the following is a specification.

My invention relates to spark arresting and extinguishing appliances which are more particularly designed for use in locomotive engines burning lignite and other fuels from which considerable quantities of ignited solid matter are drawn into the smoke box by the exhaust blast, and its object is to provide an appliance of such character which shall be of simple and inexpensive construction, of ready adaptability in smoke boxes of the ordinary form and dimensions, and in the operation of which the gaseous and solid products of combustion shall be separated in the smoke box, and the latter be broken up and extinguished before their ejection therefrom while the former are permitted to freely escape from the stack.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings: Figure 1 is a vertical longitudinal central section through the forward portion of a locomotive boiler, illustrating an application of my invention, and; Fig. 2, a transverse section, on the line *a a* of Fig. 1.

Referring to the drawings, my invention is herein exemplified as applied in connection with a locomotive boiler of the type now standard on railroads, having a shell or waist, 1, provided with a plurality of fire tubes, 2, extending from the firebox, which is not shown, to the front tube sheet, 3, through which tubes, the products of combustion pass from the firebox to the smoke box, 4, which is secured, at its rear end, to the front ring of the shell, 1, and, at its bottom, to the cylinder saddles, 5. The forward end of the smoke box is closed by a metal front, 6, having a central door, 7, and it is provided, at its top, with a stack, 8, prolonged into the smoke box by a downward extension or "penetration", 10, having a flaring or conical lower end, of comparatively large diameter. A transverse deflecting plate or diaphragm, 23, extends, as in ordinary practice, across the smoke box, from a level above the top row of boiler

tubes, and is thence downwardly and forwardly inclined, terminating at such level above the bottom of the smoke box as may be determined in the discretion of the constructor, under the conditions of fuel and service. Steam is supplied to the cylinders from a main steam pipe, 11, through a T head, 13, and side or branch steam pipes, 14, and the exhaust steam from the cylinders is discharged into the stack through an exhaust pipe, 12, which may be of any suitable and preferred form.

In the practice of my invention, I connect to the deflecting plate, 23, adjacent to its lower end, a supplemental transverse deflecting plate, 24, which is also downwardly and forwardly inclined, but at a substantially less angle than the plate, 23, and terminates a short distance in rear of the smoke box front, the purpose of the supplemental deflecting plate being to direct the current of mingled gaseous and solid products passing out of the boiler tubes to an avenue of upward discharge as near as may be to the front of the smoke box. An annular exhaust pipe plate, 25, which is preferably, as shown, in the form of an upwardly tapering truncated cone, is fitted around the tip or nozzle, 17, of the exhaust pipe, 12, and a spark separator, 26, extends from the plate, 25, to the periphery of the stack extension or penetration, 10. For convenience and simplicity of illustration, the spark separator is herein shown as a downwardly tapering truncated cone of wire netting, but its specific form is not of the essence of my invention, and any other suitable means of separating the solid from the gaseous products of combustion, many of which are known in the art, as, for example a plate or plurality of plates of perforated metal, may, in the discretion of the constructor, be substituted as a mechanical equivalent, without departure from the spirit and operative principle of my invention.

A horizontal plate, 27, of imperforate metal, corresponding substantially in width with the diameter of the stack extension, 10, extends across the smoke box, in or near the plane of the bottom or mouth of said extension. A floor of cement, 28, may be extended across the central portion of the bottom of the smoke box, and a transverse baffle plate, 29, extends from said floor, or

equivalently from the bottom of the smoke box, if the floor is not used, to the smoke box front, terminating at or near the bottom of the door opening therein. A substantially similar, but oppositely inclined, transverse baffle plate, 30, extends from the top of the door opening to the top of the smoke box, and a similar baffle plate, 31, inclined in the opposite direction to the plate, 30, extends from the top of the deflecting plate, 23, to the top of the smoke box, thereby presenting deflecting and disintegrating plate surfaces to the current of products of combustion at the top and bottom of the front end of the smoke box and the top of the rear end thereof. The area of contacting surfaces for the solid products of combustion is materially increased by the upper transverse plate, 27, and the lower exhaust pipe plate, 25.

In the operation of an appliance substantially as above described, the gaseous and solid products of combustion passing out of the boiler tubes are first deflected downwardly and forwardly by the plates 23 and 24, and then upwardly by the plate, 29, between which and the front of the plate, 24, they pass upwardly. The gaseous products pass freely through the meshes or openings of the spark separator, 26, and the solid products are, by reason of their high velocity and centrifugal force, circulated first upwardly, then horizontally, and then downwardly in the smoke box, and are disintegrated and extinguished by their contact successively with the plates 29, 30, 27, 31, 23, 24, and 25, and with the steam and exhaust pipes in the smoke box, until they are sufficiently fine to be caught by the current of gases passing through the separator, 26, and escape to the stack in such condition as to prevent liability to igniting matter on or adjacent to the railroad right of way.

I claim as my invention and desire to secure by Letters Patent:

1. The combination, with a locomotive smoke box, of an exhaust pipe, inclined deflecting plates extending from the rear of the smoke box to a plane forward of the exhaust pipe, a stack having an inward extension or "penetration", a spark separator interposed between the exhaust pipe and the stack extension, and alternately oppositely inclined baffle plates located, respectively, at the top and bottom of the smoke box front and the top of the smoke box at the rear thereof.

2. The combination, with a locomotive smoke box, of an exhaust pipe, inclined deflecting plates extending from the rear of the smoke box to a plane forward of the exhaust pipe, an annular exhaust pipe plate surrounding the exhaust pipe, a stack having an inward extension or "penetration", a spark separator extending from the exhaust pipe plate to the stack extension, and alternately oppositely inclined baffle plates located, respectively, at the top and bottom of the smoke box front and the top of the smoke box at the rear thereof.

3. The combination, with a locomotive smoke box, of an exhaust pipe, an inclined deflecting plate extending from the rear of the smoke box to a plane forward of the exhaust pipe, a stack having an inward extension or "penetration", a spark separator interposed between the exhaust pipe and the stack extension, and an imperforate plate extending across the smoke box adjacent to the plane of the mouth of the stack extension.

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Witnesses:

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