C. E. BROOK.

SPARK ARRESTER.

APPLICATION FILED SEPT. 29, 1910.

978,555.

Patented Dec. 13, 1910.

2 SHEETS—SHEET 1.

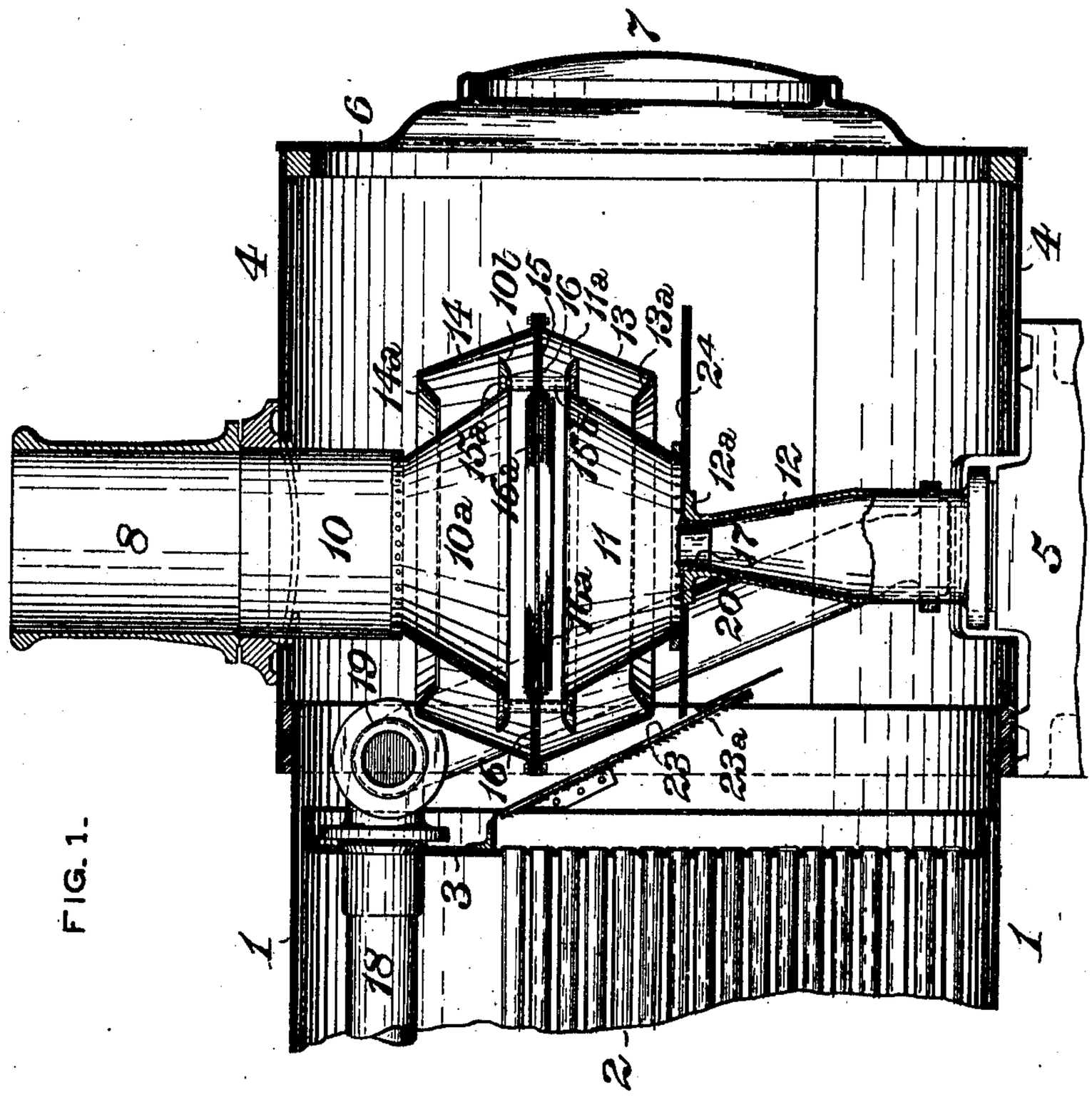

FIG. 1.

WITNESSES

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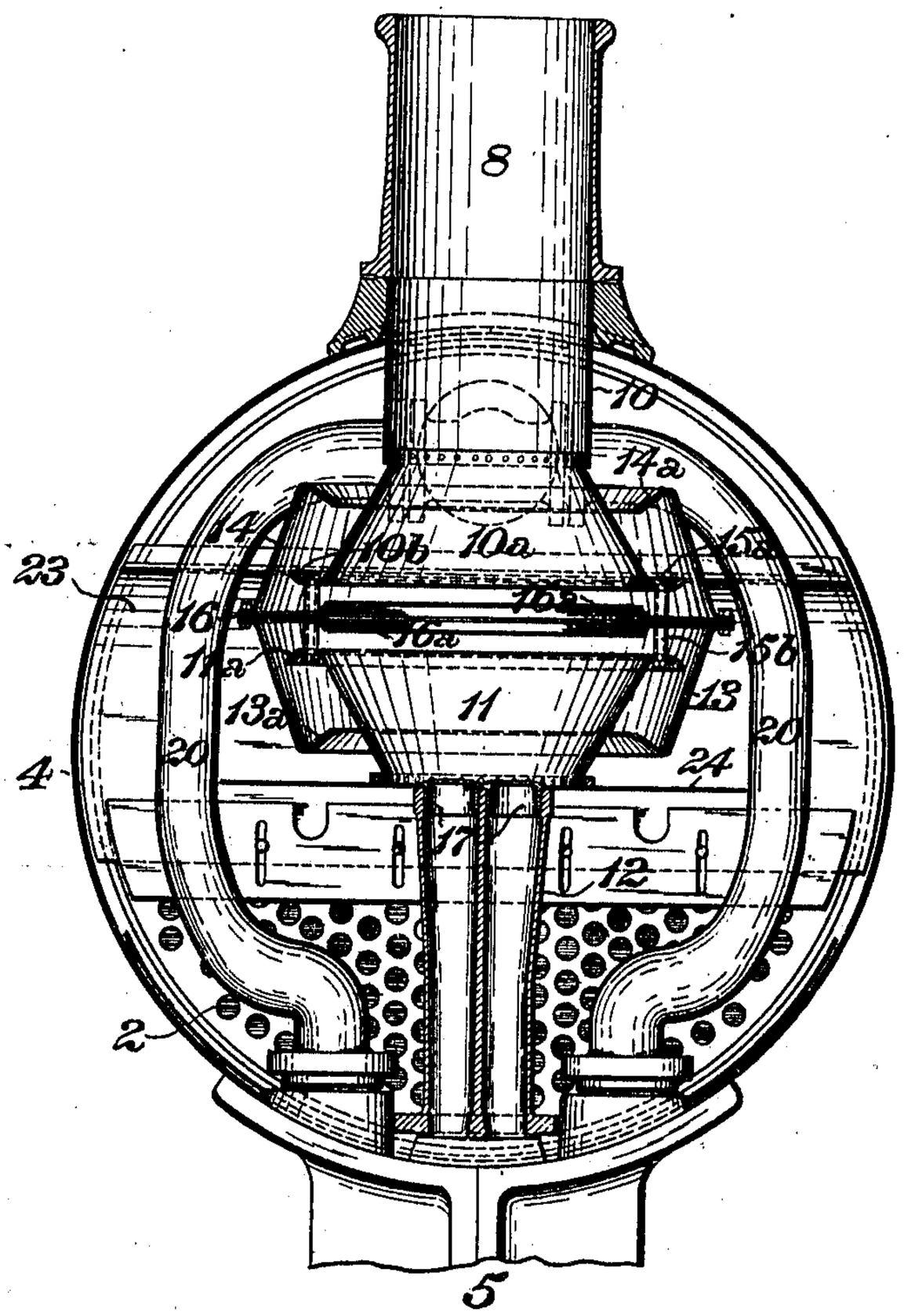
2 SHEETS—SHEET 2.

FIG. 2.



WITNESSES

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SPARK-ARRESTER.

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To all whom it may concern:

Be it known that I, CHARLES E. BROOK, of Miles City, in the county of Custer and State of Montana, 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 vertical transverse section in the central plane of the stack and exhaust pipe.

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 downwardly extending sleeve or "penetration," 10, which terminates in an outwardly and downwardly tapering truncated cone draft pipe section, 10^a, having an upwardly turned peripheral flange, 10^b, secured adjustably to its lower end. 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. The deflecting plate is preferably lined with a roughened plate, 23^a. Steam is supplied to the cylinders from a main steam pipe, 18, through a T head, 19, and side or branch steam pipes, 20, 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 type.

In the practice of my invention, a substantially horizontal table plate, 24, is bolted to a flange, 12^a, at the top of the exhaust pipe, 12, the table plate having an opening through which the exhaust nozzle or nozzles 17, pass, and a tight joint being made between the plate and flange. The table plate abuts, at its rear end, on the deflecting plate, 23, and extends forwardly therefrom to a transverse plane in the smoke box located at such a distance from the front thereof as will afford sufficient space for the traverse of the products of combustion to the stack, this distance being, as in ordinary practice, dependent upon conditions of aggregate area of transverse section of the boiler tubes, fuel and service, and being determined in the discretion of the constructor. An outwardly and upwardly tapering truncated cone draft pipe section, 11, having a downwardly turned flange, 11^a, connected to its upper end, is secured upon the top of the table plate, 24, the axis of said section being coincident with that of the upper truncated cone draft pipe section, 10^a, and of the exhaust pipe and stack, and space being left between the facing ends of the sections, 10^a and 11.

The lower truncated cone draft pipe section, 11, is surrounded for the major part of its height, by an outwardly and upwardly tapering lower truncated cone casing section, 13, having an inwardly and upwardly tapering flange, 13^a, on the inside of its lower end, and the upper truncated cone draft pipe section, 10^a, is surrounded, for the major portion of its height, by an inwardly and upwardly tapering upper truncated cone casing section, 14, having an inwardly and downwardly tapering flange, 14^a, on the inside of its upper end. The casing sections,

13 and 14, and their flanges, 13[a] and 14[a], are separated from the draft pipe sections, 11 and 10[a], by intervening spaces, of annular section in horizontal planes, and the facing ends of the casing sections, are secured to an annular connecting plate, 15, located about midway between the draft pipe sections, and supported thereon by bolts, 15[a], passing through thimbles or distance pieces, 15[b]. The upper and lower sides of the connecting plate are preferably, as shown, faced with rings of wire netting, 16, having upwardly and downwardly turned flanges, 16[a], on their inner sides.

In the operation of an appliance substantially as above described, the gaseous and solid products of combustion which are drawn through the boiler tubes by the exhaust blast, are first deflected downwardly and forwardly by the deflecting plate, 23, and table plate, 24, between the front of which and the smoke box front, they pass into the upper portion of the smoke box. They are thence drawn downwardly and inwardly by the exhaust blast, to the annular spaces between the casing sections and the draft pipe sections, through which spaces they pass into the upper draft pipe section, and thence into and out of the stack. In this traverse of the products of combustion, the solid portions are disintegrated by their impact against the smoke box front and door, the outer surfaces of the casing sections and their flanges, and the connecting plate and flanges of its wire netting facings. The gaseous products pass freely through the spaces between the casing sections and draft pipe sections, and the solid products are so finely broken up and fully extinguished in their traverse, that they escape from the stack in such condition as to prevent the liability of igniting matter on or adjacent to the railroad right of way.

It will be seen that the application of my invention does not involve any change in the form, or extension of the normal dimensions of, the smoke box, nor any interference with the standard disposition of steam and exhaust pipes therein. Further, the parts of the apparatus are inexpensive in construction, exempt from liability to breakage or derangement, and may be readily inserted and removed as required. An additional advantage, which will be recognized by those familiar with the operation of locomotives, is presented in the fact that no intercepting screens or netting are embodied or required in the apparatus, as has been satisfactorily demonstrated by its performance in regular railroad service.

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

1. The combination, with a locomotive smoke box, of an exhaust pipe, an inclined transverse deflecting plate at the rear of the smoke box, a table plate extending from the deflecting plate around and beyond the exhaust pipe, a stack having an inward extension or penetration, truncated cone draft pipe sections, secured, at their narrower ends, to the table plate and stack penetration, respectively, and separated by a space, and truncated cone casing sections of larger diameter than the draft pipe sections, said casing sections surrounding the draft pipe sections and being connected, at their larger ends, intermediate the latter.

2. The combination, with a locomotive smoke box, of an exhaust pipe, an inclined transverse deflecting plate at the rear of the smoke box, a table plate extending from the deflecting plate around and beyond the exhaust pipe, a stack having an inward extension or penetration, truncated cone draft pipe sections, secured, at their narrower ends, to the table plate and stack penetration, respectively, and separated by a space, truncated cone casing sections of larger diameter than the draft pipe sections and surrounding said draft pipe sections, and an annular connecting plate, projecting over, but not closing, the spaces between the draft pipe sections and casing sections, and secured to the larger ends of the casing sections.

3. The combination, with a locomotive smoke box, of an exhaust pipe, an inclined transverse deflecting plate at the rear of the smoke box, a table plate extending from the deflecting plate around and beyond the exhaust pipe, a stack having an inward extension or penetration, truncated cone draft pipe sections, secured, at their narrower ends, to the table plate and stack penetration, respectively, and separated by a space, truncated cone casing sections of larger diameter than the draft pipe sections, said casing sections surrounding the draft pipe sections and being connected, at their larger ends, intermediate the latter, and flanges projecting inwardly from the narrower ends of the casing sections.

4. The combination, with a locomotive smoke box, of an exhaust pipe, an inclined transverse deflecting plate at the rear of the smoke box, a table plate extending from the deflecting plate around and beyond the exhaust pipe, a stack having an inward extension or penetration, truncated cone draft pipe sections, secured, at their narrower ends, to the table plate and stack penetration, respectively, and separated by a space, peripheral flanges connected to the larger ends of said draft pipe sections, and truncated cone casing sections of larger diameter than the draft pipe sections, said casings surrounding the draft pipe sections and being connected, at their larger ends, intermediate the latter.

5. The combination, with a locomotive

smoke box, of an exhaust pipe, an inclined transverse deflecting plate at the rear of the smoke box, a table plate extending from the deflecting plate around and beyond the exhaust pipe, a stack having an inward extension or penetration, truncated cone draft pipe sections, secured, at their narrower ends, to the table plate and stack penetration, respectively, and separated by a space, an annular connecting plate located intermediate of, and projecting over, the draft pipe sections, inwardly flanged facing rings secured to the connecting plate, and truncated cone casing sections surrounding the draft pipe sections, and secured, at their larger ends, to the connecting plate.

6. The combination, with a locomotive smoke box, of an exhaust pipe, an inclined transverse deflecting plate at the rear of the smoke box, a table plate extending from the deflecting plate around and beyond the exhaust pipe, a stack having an inward extension or penetration, truncated cone draft pipe sections, secured, at their narrower ends, to the table plate and stack penetration, respectively, and separated by a space, an annular connecting plate located intermediate of, and projecting over, the draft pipe sections, distance pieces interposed between said connecting plate and draft pipe sections, bolts passing through said distance pieces and securing the connecting plate to the draft pipe sections, and truncated cone casing sections surrounding the draft pipe sections and secured, at their larger ends, to the connecting plate.

7. The combination, with a locomotive smoke box, of an exhaust pipe, an inclined transverse deflecting plate at the rear of the smoke box, a table plate extending from the deflecting plate around and beyond the exhaust pipe, a stack having an inward extension or penetration, truncated cone draft pipe sections, secured, at their narrower ends, to the table plate and stack penetration, respectively, and separated by a space, peripheral flanges connected to the larger ends of said draft pipe sections, an annular connecting plate located intermediate of, and projecting over, the draft pipe sections, inwardly flanged facing plates secured to the connecting plate, truncated cone casing sections surrounding the draft pipe sections and secured, at their larger ends, to the connecting plate, and flanges projecting inwardly from the narrower ends of the casing sections.

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Witnesses:
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