

(No Model.)

J. WESTINGHOUSE.

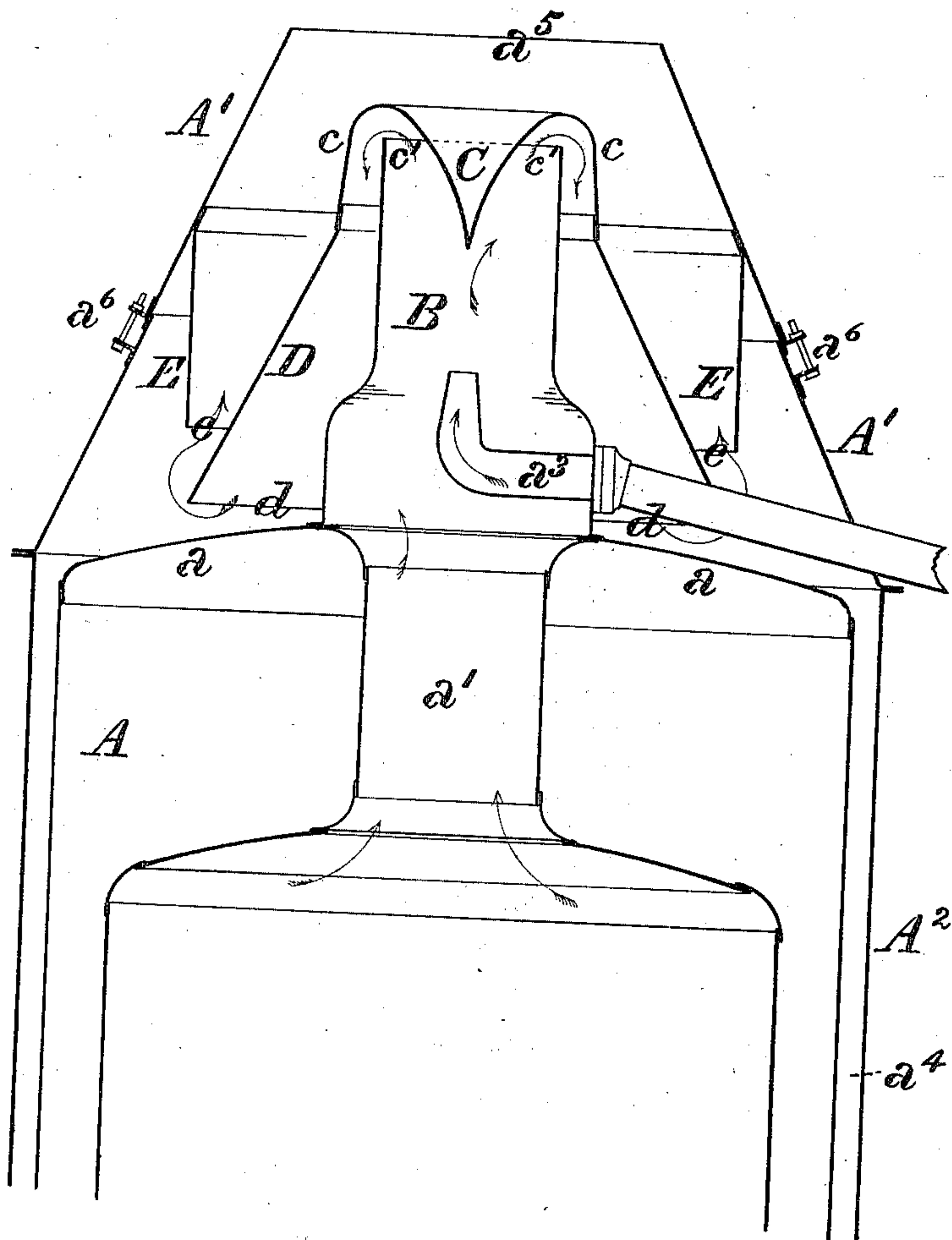
2 Sheets—Sheet 1.

SPARK ARRESTER.

No. 298,807.

Patented May 20, 1884.

Fig. 1.



WITNESSES:

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(No Model.)

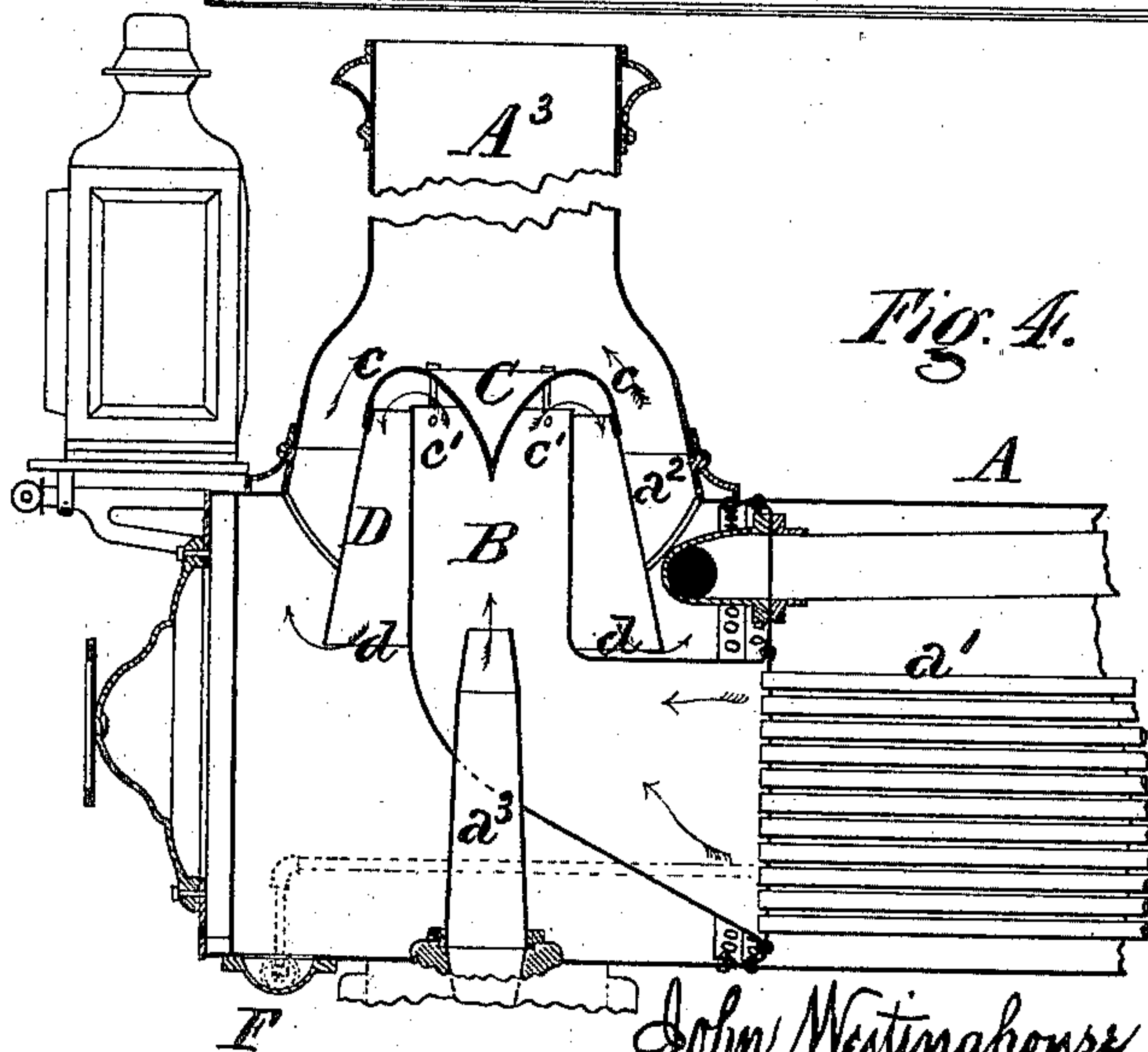
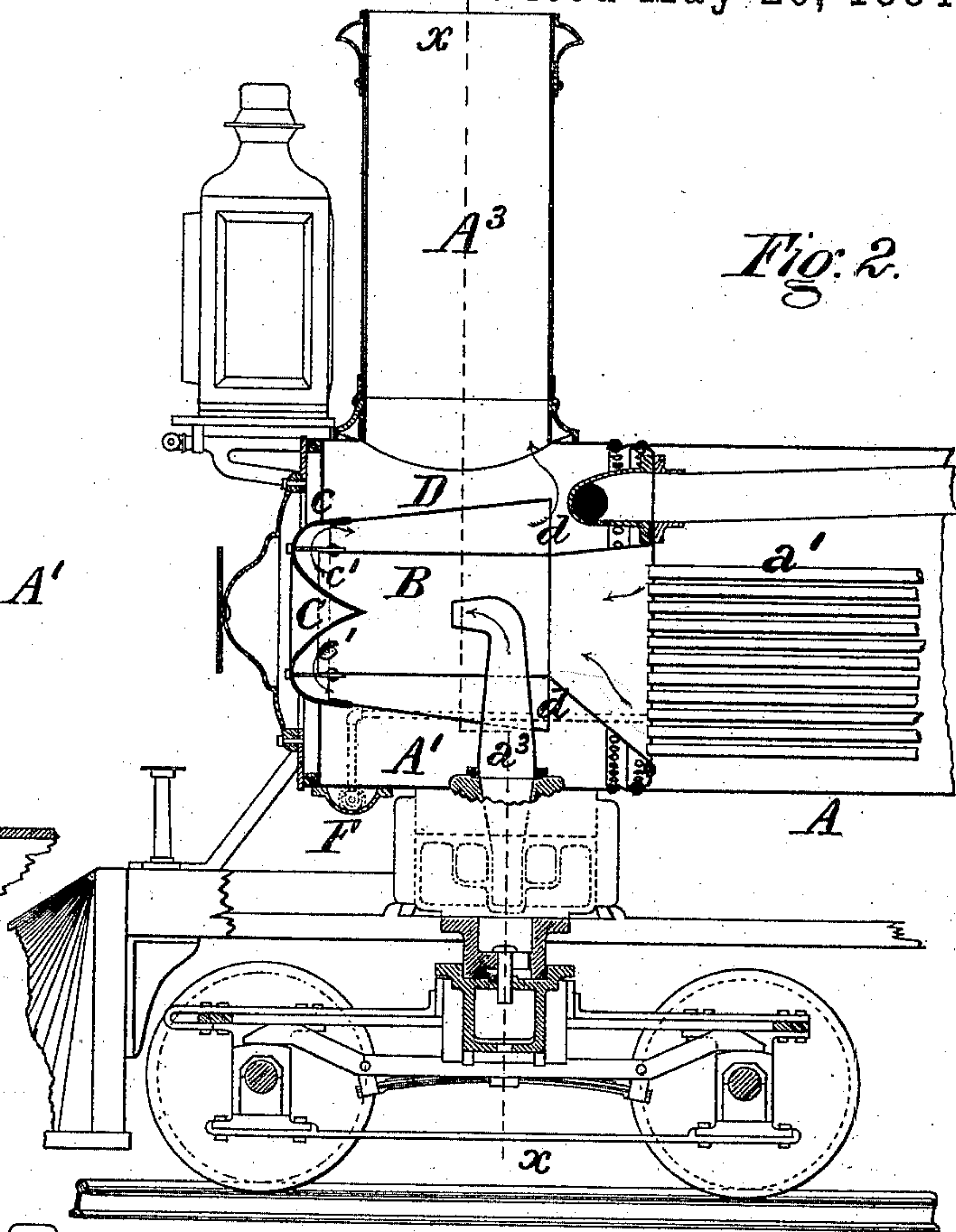
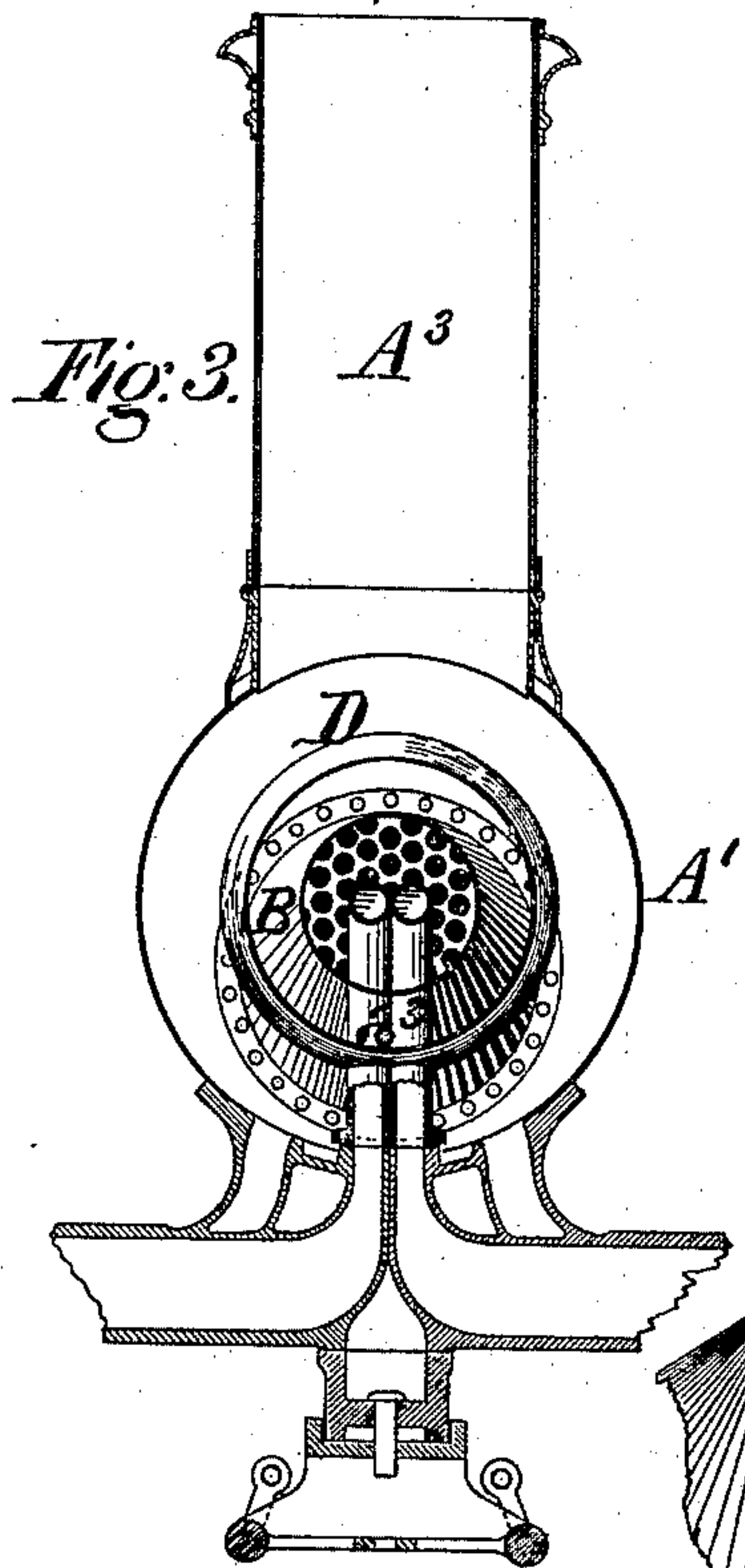
2 Sheets—Sheet 2.

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SPARK ARRESTER.

No. 298,807.

Patented May 20, 1884.



WITNESSES:

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UNITED STATES PATENT OFFICE.

JOHN WESTINGHOUSE, OF SCHENECTADY, NEW YORK.

SPARK-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 298,807, dated May 20, 1884.

Application filed January 23, 1884. (No model.)

To all whom it may concern:

Be it known that I, JOHN WESTINGHOUSE, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented or discovered a new and useful Improvement in Spark-Arresters; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—like letters indicating like parts—

Figure 1, Sheet 1, is a vertical central section through the upper portion of a vertical steam-boiler, illustrating an application of my invention; Fig. 2, Sheet 2, a vertical longitudinal central section through the forward portion of a locomotive-boiler, showing a modification of my invention; Fig. 3, a vertical transverse section through the same at the line $x x$ of Fig. 2; and Fig. 4, a vertical longitudinal central section through the forward portion of a locomotive-boiler, showing a further modification of my invention.

The object of my invention is to effectively prevent the escape of sparks, cinders, and particles of unburned fuel from the chimneys of steam-boilers, and to diminish the loudness and harshness of a forced-blast exhaust without acting detrimentally on the draft of the furnace.

To these ends my improvement, generally stated, consists in the combination, with the smoke-box of a steam-boiler, of a discharge-flue, a deflecting-cone located adjacent to the out end thereof, and a tapering casing forming an extension of the deflecting-cone, and providing at its opposite end an annular opening, through which the products of combustion, after being diametrically reversed in direction and checked in velocity, are discharged directly into the smoke-box; also, in the combination, with members as set forth, of an auxiliary deflector and a spark-receptacle.

The improvement claimed is hereinafter fully set forth.

To carry out my invention I secure to the flue or tube head a of a steam-boiler, A, a discharge-flue, B, of cylindrical section at its outer or exit end, and of such transverse form and dimensions at its opposite end as to

completely surround the opening of the tube or tubes a' , through which the products of combustion escape from the fire-box, a tight joint being made between the flue-head a and flue B, which latter thus serves as a common conduit for the gaseous and solid matters drawn through the tubes. The discharge-flue B extends through the smoke-box A' from the flue-head to a point of discharge, which may be either within the smoke-box proper, as in Figs. 1 to 3, or within a supplemental casing, a'' , communicating therewith and forming a part thereof, as in Fig. 4. The exhaust-pipe a^3 of the engine passes through an opening in the side of the flue B, and its nozzle or contracted orifice is turned in the direction of and concentric with the exit end thereof.

A deflecting-cone, C, formed of a conical plate of metal having an outwardly and downwardly curved rim, is connected to the discharge-flue B adjacent to its exit end, the apex of the cone being located within and concentric with the flue, so as to form an annular discharge-opening, c' , around the same, and a casing, D, which is open at both ends, and in the form of a frustum of a cone, is connected at its smaller end to the rim c of the deflecting-cone C. The inclined sides of the casing D present a passage of gradually-increasing transverse area for the products of combustion around the outside of the discharge-flue B, said passage terminating in an annular opening, d , through which the products escape directly into the smoke-box A' at points as close as may be to the top or front of the flue-head, the location of the discharge-opening being such that the solid matters tend, both by the downward or backward impulse imparted to them by the reversal of the direction of their movement and by their own gravity, to be deposited in the lower portion of the smoke-box or in any suitable reservoir connected thereto, while the smoke and gases pass around the outside of the casing D and escape freely through an opening at the top of the smoke-box A' or through a proper stack or chimney communicating therewith.

Fig. 1 illustrates the application of my improvement to a vertical boiler of a type employed for operating portable and stationary

engines, and in such case I preferably employ as a receptacle for deposited sparks and cinders a compartment, a^4 , formed between the shell of the boiler and an outer sheet-metal jacket, A^2 , inclosing the same and connected to the bottom of the smoke-box A' . The smoke-box tapers inwardly and upwardly to a central exit-opening, a^5 , through which the smoke and gases pass off to the atmosphere, the provision of the casing D , with a discharge adjacent to the flue-head, enabling the ordinary stack to be dispensed with.

In order to obtain ready access to the parts whenever desired, the smoke-box A' may be formed in two sections connected by bolts a^6 , and, to provide for the interception of light sparks that may be drawn up with the escaping gases, a supplemental deflector, E , of cylindrical form, is secured to the inside of the smoke-box surrounding the casing D , and forming an annular opening, e , around the same, above the discharge-opening d of the casing D , for the passage of the smoke and gaseous products, while the outside of the deflector serves to arrest and cause the subsidence of any sparks that may rise therewith and which tend to move outwardly toward the sides of the smoke-box.

The rim c of the deflecting-cone C may be downwardly prolonged in substantially cylindrical form, as shown, so as to prevent the expansion of the column of gases until they enter the casing D , and thereby to correspondingly increase the force with which the solid matters are projected downwardly toward the flue-head a and compartment a^4 , while maintaining proper draft.

The application of my invention to a horizontal tubular boiler of the locomotive type is shown in Figs. 1, 2, 3, and 4, the openings of the discharge-flue and casing being located in vertical planes in Figs. 2 and 3 and in horizontal planes in Fig. 4, and the discharge of the products of combustion being effected directly into the smoke-box A' in each case. The sparks, cinders, and particles of unconsumed fuel which pass out of the opening of the casing D are projected backwardly and downwardly toward the bottom of the smoke-box, and are deposited thereon in position where they are practically exempt from the lifting action of the exhaust-blast. The deposited solid matters may be blown out of the smoke-box from time to time, as they accumulate, by an ejector, F , or dropped into any suitable receptacle connected to the smoke-box. In the construction shown in Fig. 4 the discharge-flue B and deflector C are, in order that the casing D may be made of sufficient length, extended upwardly into a supplemental casing, a^2 , communicating at bottom with the smoke-box and forming part thereof. The stack A^3 , which should be of a sufficient

diameter to permit the passage of the gases without increase in velocity, is secured either to a base on the top of the smoke-box or to the casing a^2 , as the case may be, and the height thereof need only be sufficiently great to carry the escaping smoke and gases above the cab of the engine.

I am aware that deflecting-cones of various forms have been long known and used in the stacks of locomotive-engines, and am also aware that an outwardly-flanging casing connected to a cone above the top of an inside stack, so as to deflect the products passing out of said stack to a point below the top thereof, was known at the date of my invention. I do not, therefore, broadly claim either a deflecting-cone or an extension or casing connected thereto.

I claim herein as my invention—

1. The combination, with the smoke-box of a steam-boiler, of a discharge-flue connected to the flue or tube head, and communicating thereat with the flue or flues affording passage to the products of combustion, a deflecting-cone located in line with and adjacent to the opposite end of said discharge-flue, and an outwardly-tapering casing connected to the periphery of the deflecting-cone and forming around the discharge-flue an annular passage opening directly into the smoke-box, substantially as set forth.

2. The combination, with a steam-boiler, of a smoke-box, a jacket forming an annular compartment around the boiler-shell, communicating at the top with said smoke-box, a discharge-flue connected to the flue-head and surrounding the end of the fire flue or flues, a conical deflector located above the opening of said discharge-flue, and an outwardly-tapering casing connected to the periphery of the deflecting-cone and forming around the discharge-flue an annular passage opening into the smoke-box adjacent to the lower end thereof, substantially as set forth.

3. The combination, with a steam-boiler, of a smoke-box communicating at bottom with an annular compartment surrounding the boiler, a discharge-flue connected to the flue-head and extending upwardly in the smoke-box, a conical deflector located above the opening of the discharge-flue, an outwardly and downwardly inclined casing connected to said deflector, and a supplemental deflector projecting from the inside of the smoke-box and forming an annular passage around and above the lower end of the inclined casing, substantially as set forth.

In testimony whereof I have hereunto set my hand.

JOHN WESTINGHOUSE.

Witnesses:

LORENZO STEWART,
JAY WESTINGHOUSE.