

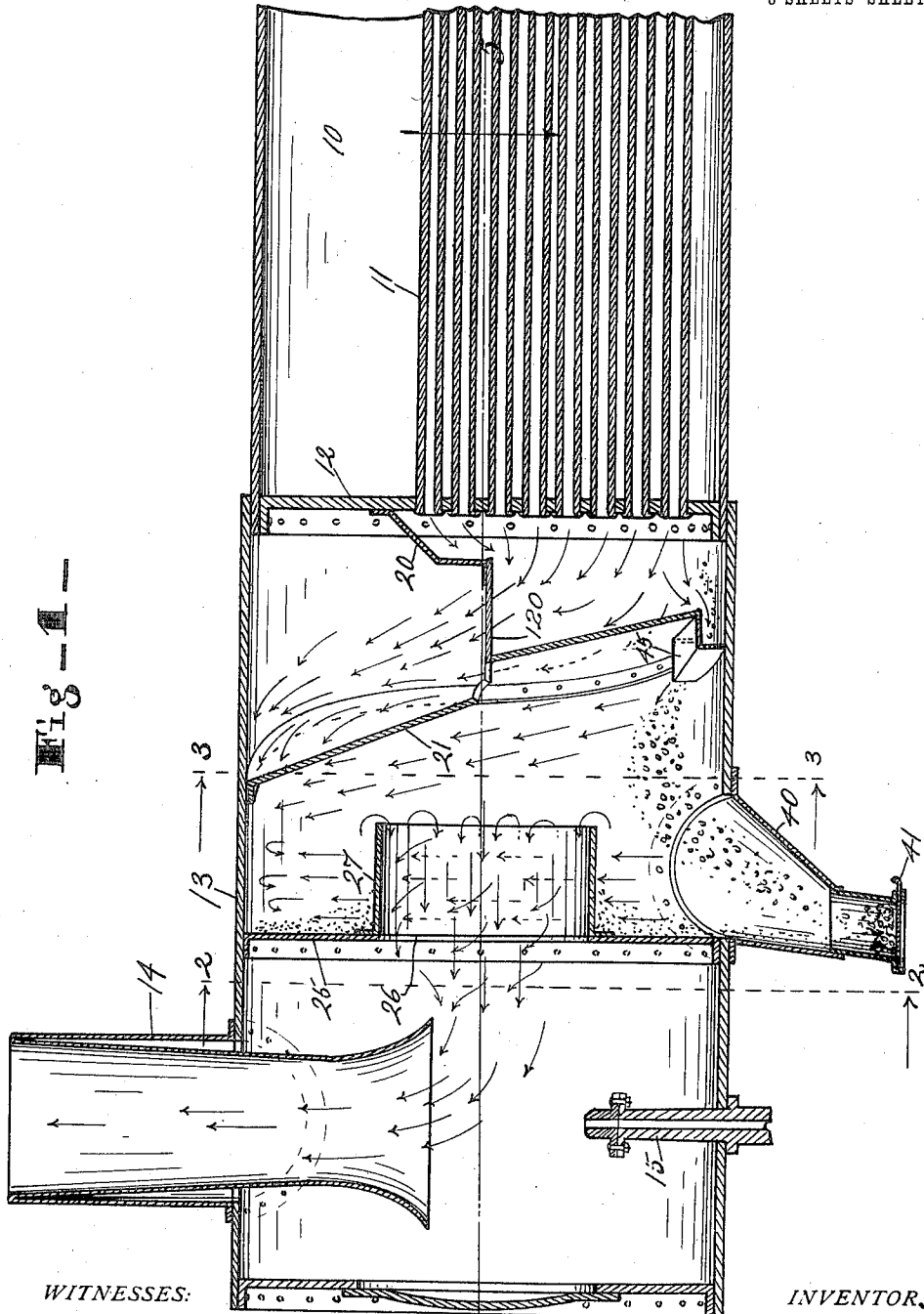
T. M. VAN HORN & L. E. ENDSLEY.
SPARK ARRESTER.

APPLICATION FILED SEPT. 30, 1910.

1,030,947.

Patented July 2, 1912.

3 SHEETS—SHEET 1.



WITNESSES:

W. M. Gentle.

H. W. Wells

INVENTORS

Thomas M. Van Horn and
BY Louis E. Endsley.

V. H. Lockwood
ATTORNEY.

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3 SHEETS-SHEET 2.

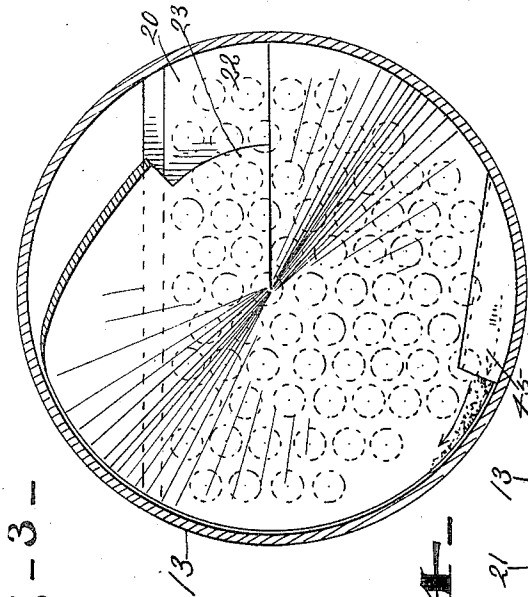


Fig-3-

Fig-4-

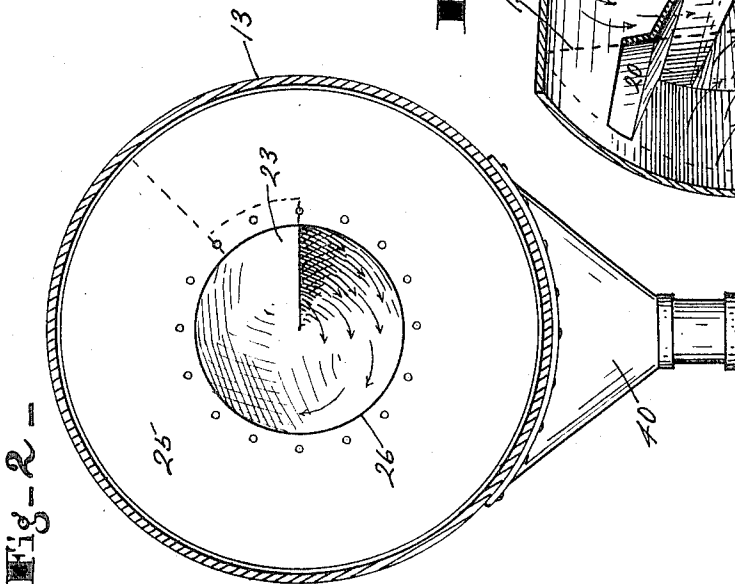
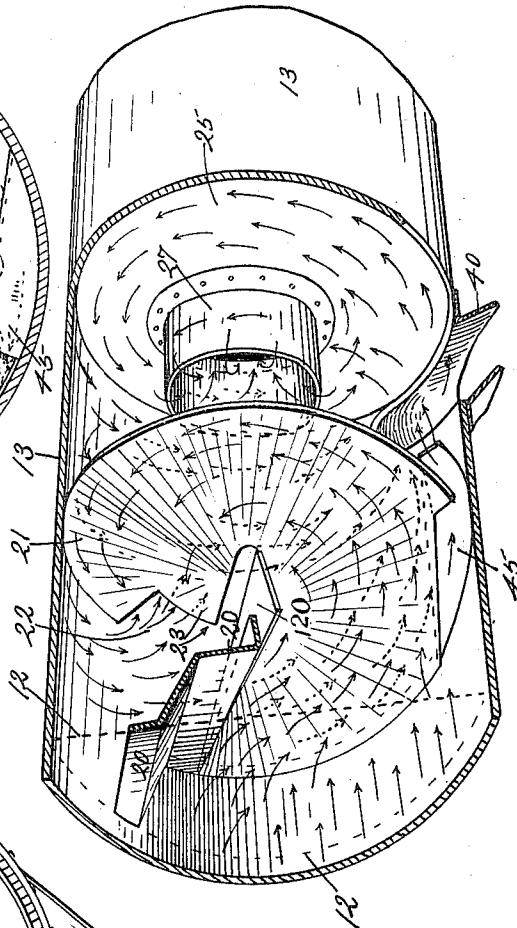


Fig-2-

WITNESSES:

W. M. Gentle.

H. W. Welch

INVENTORS

Thomas M. Van Horn and

BY Louis E. Endsley.

V. H. Lockwood

ATTORNEY.

T. M. VAN HORN & L. E. ENDSLEY.

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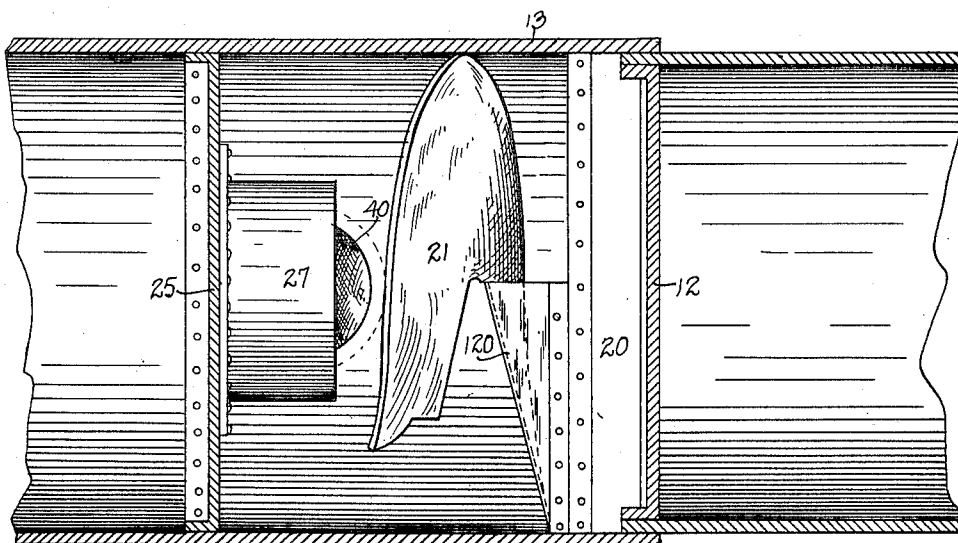
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3 SHEETS-SHEET 3.

Fig - 5 -



WITNESSES:

E. H. Mayo.
O. M. McLaughlin

INVENTOR.
Thomas M. Van Horn
Louis E. Endsley

BY
V. H. Lockwood
ATTORNEY.

UNITED STATES PATENT OFFICE.

THOMAS M. VAN HORN, OF CHICAGO, ILLINOIS, AND LOUIS E. ENDSLEY, OF LA FAYETTE, INDIANA, ASSIGNORS TO AMERICAN SPARK ARRESTER COMPANY, OF INDIANAPOLIS, INDIANA, A CORPORATION.

SPARK-ARRESTER.

1,030,947.

Specification of Letters Patent.

Patented July 2, 1912.

Application filed September 30, 1910. Serial No. 584,732.

To all whom it may concern:

Be it known that we, THOMAS M. VAN HORN and LOUIS E. ENDSLEY, of Chicago, county of Cook, and State of Illinois, and La Fayette, county of Tippecanoe, State of Indiana, respectively, have invented a certain useful Spark-Arrester; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings.

The object of this invention is to improve the construction shown in our former application for Letters Patent on spark arresters, Serial No. 516,852, filed Sept. 9, 1909.

The nature of the invention will be understood from the accompanying drawings and the following description and claims.

In the drawings Figure 1 is a central vertical longitudinal section through the forward portion of a locomotive equipped with said spark arrester. Fig. 2 is a transverse section through the smoke box on the line 2—2 of Fig. 1 looking in the direction indicated by the arrows in Fig. 1. Fig. 3 is a transverse section on the line 3—3 of Fig. 1 looking in the direction indicated by the arrows in Fig. 1. Fig. 4 is a perspective view of a portion of the spark arresting mechanism, parts being broken away, the view being from a standpoint beside the rear part of the boiler and looking forwardly. Fig. 5 is a longitudinal section through a portion of the device on the line 5—5 of Fig. 1.

In the drawings 10 represents a portion of the locomotive boiler, 11 the flue tubes, 12 the tube sheet, 13 the smoke box, 14 the smoke stack and 15 the exhaust steam nozzle which discharges upwardly toward and into the smoke stack. Said parts may be made according to any desired pattern of locomotive or the like, excepting that the smoke box should preferably be extended in length somewhat as compared with its size when not equipped with the spark arrester.

A baffle plate 20 is secured to the front surface of the tube sheet in substantially the same place that baffle plates are usually located. It is forwardly and downwardly inclined as usual, and extends entirely across the tube sheet, and attached to it and in a sense forming a partial continuation of said baffle plate there is a horizontal triangular plate 120 with the apex starting near the

wall of the smoke box 13 at the right-hand 55 of the center when viewed from the standpoint of Figs. 2 and 3, and widening toward the center and extending slightly beyond the center, that is, to the left of the center in said Figs. 2 and 3, but it does not 60 extend entirely across the left-hand portion of the smoke box. A spirally disposed plate 21 auger-like in formation extends entirely across the smoke box and is secured to its wall and extends around the smoke box one 65 time substantially, and has sufficient pitch to afford space between said plate and the tube sheet and baffle plate to allow a passageway for a rather free movement of the smoke and gases without retarding the 70 draft. The shape of this plate is indicated in Fig. 4 and in that figure the dotted lines 12 indicate the location of the tube sheet. The opening marked 22 is the discharge opening of the passageway formed by said 75 spirally disposed plate 21, and it is located in front of the baffle plate 20. A sector-like extension 23 is added to the end of the plate 21 adjacent to the center thereof, as indicated in Figs. 2, 3 and 4, for the purpose of 80 tending to direct the smoke and gases as they leave the chamber formed by said plate 21 outwardly against the wall of the smoke box. Said spirally disposed plate 21 causes the smoke and gas to make a plurality of 85 revolutions within the smoke box before it reaches the stack. The smoke makes practically one revolution within the passageway formed by said plate 21, and the centrifugal movement given to the smoke and 90 gas by said plate causes further revolutions thereof within the smoke box. A chamber having the entire diameter of the smoke box, therefore, is utilized for the revolutions of the smoke and gases. 95

Within the smoke box an annular diaphragm or partition plate 25 is located about midway between the stack and the spiral plate 21, and it has a central opening 26 for the passage of gases from the chamber in 100 the smoke box preceding said diaphragm to the chamber into which the stack projects. A collar-like cylindrical horizontal extension 27 is secured to the diaphragm 25 on the rear side or the side next to the plate 21 105 and surrounding the opening 26. It extends toward the spiral plate 21 for about half the distance between the diaphragm 25 and the

plate 21. The revolving column of smoke and gas in the chamber between the plates 21 and 25 passes around the collar-like extension 27 and is compelled to return somewhat rearwardly in order to escape through said extension 27 and opening 26. With the exception of this return movement of the gas or smoke, in this device the smoke and gas has all the time a forward spirally disposed revoluble movement, and during both of these movements of the smoke and gas, ample opportunity is given for the separation by gravity of the sparks and cinders. This separation is facilitated by the sparks and cinders also coming in contact with the wall of the smoke box and the outer wall of the cylindrical extension 27, so that substantially no sparks or cinders will fail to be separated or will pass out to the smoke stack, and nearly all which pass out through the opening 26 will drop into the forward chamber of the smoke box, although these cinders will constitute but an insignificant fraction of one per cent. of the total amount of the sparks and cinders. Practically no sparks or cinders will enter the smoke stack. A hopper 40 for the sparks and cinders is attached to the smoke box in front of the diaphragm 25 and under the cylindrical extension 27, and at its lower end a gate 41 is provided for removing the same. Since some of the cinders are large and heavy and they are carried around with the smoke with considerable difficulty and drop by gravity before reaching the top of the smoke box, it has been found to be preferable to provide an outlet for said heavy cinders at the lower part of the spiral plate 21. This is accomplished by cutting away some of the lower part of the plate 21, as shown in Fig. 4, and placing a casing 45 forward and to one side of it so that the outlet through said casing from the chamber in front of the plate 21 will permit the centrifugally moving heavy cinders to discharge substantially as indicated in Fig. 1, and they roll over the lower side wall of the smoke box into the hopper 40.

A number of careful tests of this device under all normal working conditions shows that from 95 to 97 per cent. of the total cinders are caught by the hopper and from one to four per cent. fall in the forward chamber of the smoke box, and about one per cent. or less passes the smoke stack, but these latter are extremely small light particles containing no fire, being as light as dust and, therefore, not materially affected by gravity. Said tests also show that the less in vacuum and draft is a little greater,

at least not less, than the loss which is found in the modern locomotive without such spark arrester, that is, it offers no more resistance to the movement of the smoke and gas than the front end of a modern locomotive.

We claim as our invention:

1. The combination with a steam boiler provided with a tube sheet, a smoke box, a smoke stack leading therefrom, and an exhaust steam jet discharging upwardly toward the smoke stack, of a vertically disposed plate extending entirely across the smoke box and secured to the tube sheet and extending forwardly therefrom in spiral form so as to provide a spirally disposed passageway for giving the smoke and gas one or more vertically disposed revolutions within the smoke box.

2. The combination with a steam boiler provided with a tube sheet, a smoke box, a smoke stack leading therefrom, and an exhaust steam jet discharging upwardly toward said smoke stack, of a vertically disposed spiral plate in the smoke box and extending across the same adjacent to the tube sheet for giving the body of smoke and gas one or more vertically disposed revolutions within the smoke box, an opening being provided in the lower part of said plate for the outlet of the heavy cinders, and a hopper leading from the bottom of the smoke box in front of said plate for receiving the sparks and cinders.

3. The combination with a steam boiler provided with a tube sheet, a smoke box, a smoke stack leading therefrom, and an exhaust steam jet discharging upwardly toward said smoke stack, of a vertically disposed spiral plate in the smoke box and extending across the same adjacent to the tube sheet for giving the body of smoke and gas one or more vertically disposed revolutions within the smoke box, an opening being provided in the lower part of said plate for the outlet of the heavy cinders, a casing attached to said plate and smoke box in front of said opening at the bottom of the plate for causing the centrifugal discharge of the heavy cinders, and a hopper leading from the bottom of the smoke box in front of said outlet for receiving the heavy cinders.

In witness whereof, we have hereunto affixed our signatures in the presence of the witnesses herein named.

THOMAS M. VAN HORN.
LOUIS E. ENDSLEY.

Witnesses:

G. H. BOINK,
O. M. McLAUGHLIN.