H. A. DAILEY.

SPARK ARRESTER.

APPLICATION FILED MAR. 14, 1908.

953,320.

Patented Mar. 29, 1910.

2 SHEETS—SHEET 1.

Fig. I.

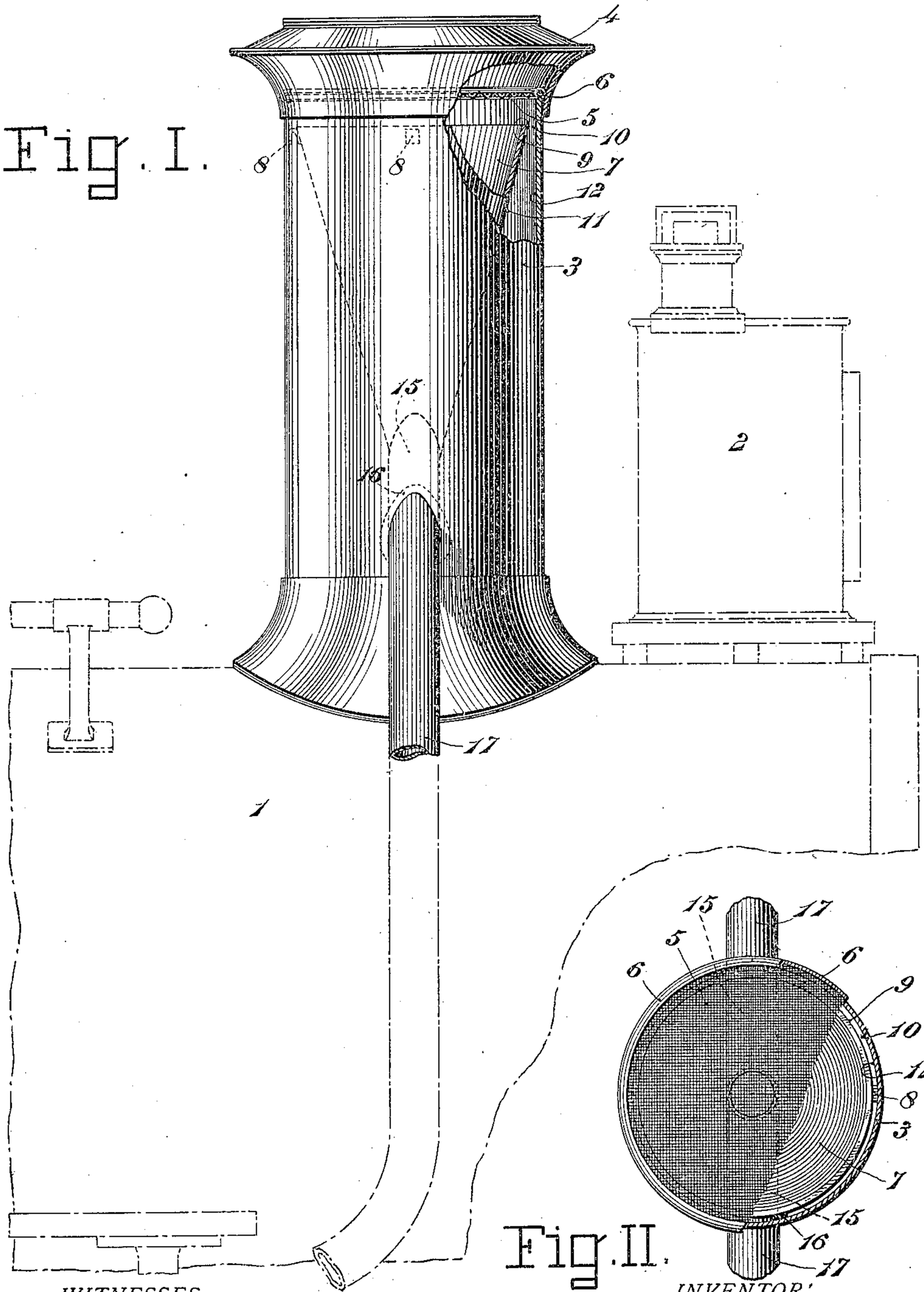

Fig. II.

WITNESSES

Harry King.

M. H. Yates

INVENTOR:

Harry A. Dailey.

By Joseph L. Atkins.

Attorney.

ANDREW B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

H. A. DAILEY.

SPARK ARRESTER.

APPLICATION FILED MAR. 14, 1908.

953,320.

Patented Mar. 29, 1910.

2 SHEETS—SHEET 2.

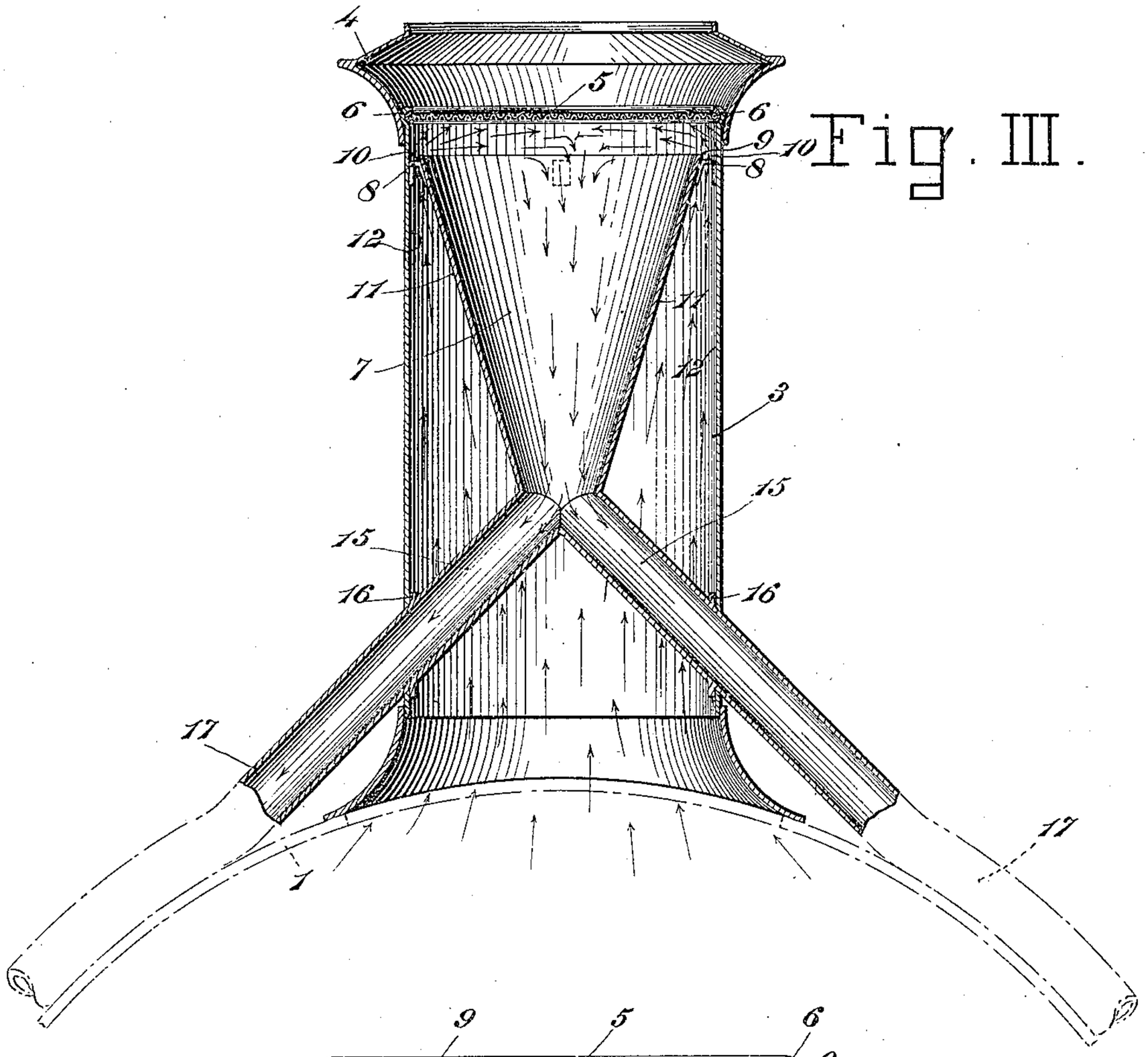

Fig. III.

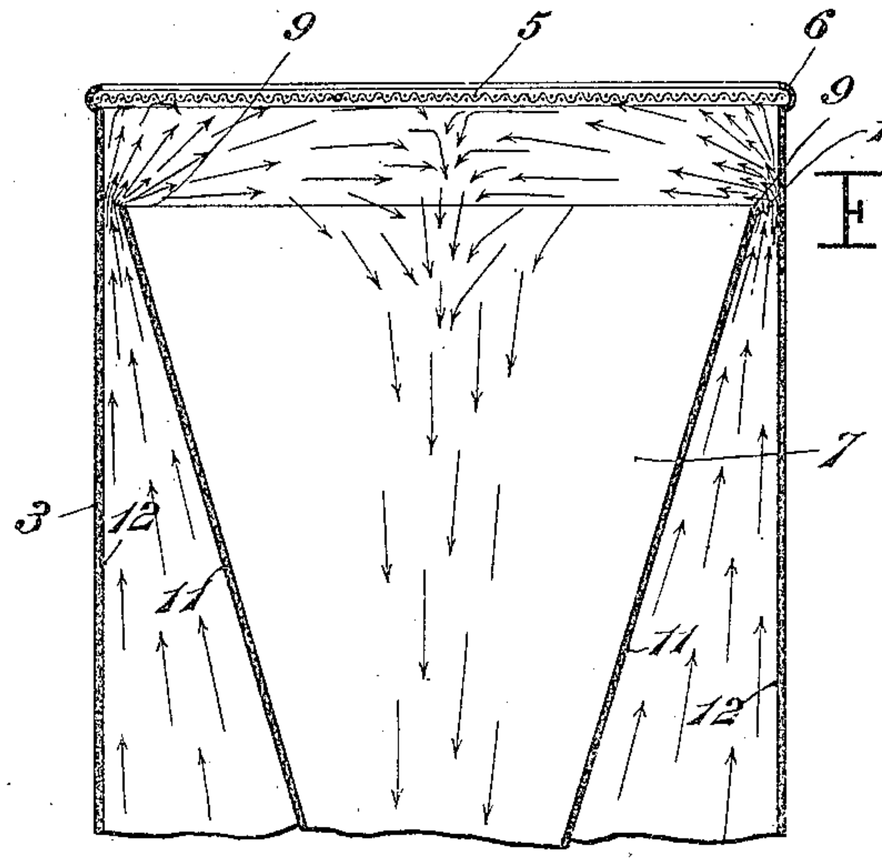

Fig. IV

WITNESSES

Harry King.

M. H. Gates.

INVENTOR:

Harry A. Dailey,

By Joseph H. King,

Attorney.

ANDREW B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

HARRY A. DAILEY, OF WHEELING, WEST VIRGINIA, ASSIGNOR OF ONE-HALF TO WILLIAM G. CALDWELL, OF WHEELING, WEST VIRGINIA.

SPARK-ARRESTER.

953,320. Specification of Letters Patent. Patented Mar. 29, 1910.

Application filed March 14, 1908. Serial No. 421,203.

To all whom it may concern:

Be it known that I, HARRY A. DAILEY, of Wheeling, in the county of Ohio, State of West Virginia, have invented certain new and useful Improvements in Spark-Arresters, of which the following is a specification.

The object of my invention is to produce improvements in spark arresters for locomotive or other furnaces in which, by the aid of appliances located in the stack leading from the furnace, the force of the draft, issuing through the stack and conveying the products of combustion commingled with it, is utilized in a positive and novel manner to separate and discharge out of the commingled mass the more solid products of combustion, which, in their heated condition from the furnace, are designated by the generic term "sparks."

What constitutes my invention will be hereinafter specified in detail and succinctly set forth in the appended claims.

In the accompanying drawings, which constitute a part of this specification, Figure I is a side elevation of a locomotive stack, partially broken away, a portion of the head of the locomotive being shown in dotted lines. Fig. II is a top plan view of the stack shown in Fig. I with the annular rim removed and a portion of the screen which covers the stack cut away. Fig. III is a diametric vertical transverse section of the stack as shown in Fig. I, with a portion of the locomotive head and pipes leading to the spark arrester shown in dotted lines. Fig. IV is a diagrammatical view of so much of the upper portion of the stack as is shown in Fig. II, illustrating, by the aid of arrows, the draft-constricting feature of my invention produced by the nozzle-like coaction of the stack and the funnel of my spark arrester contained therein.

Referring to the numerals on the drawings, 1 indicates the front end of a locomotive of any ordinary or preferred type, which may be surmounted by a head-light 2 and which carries a stack 3. The stack is of any usual or preferred construction, shape, and dimensions, and operatively communicates in any suitable manner, not illustrated, with the furnace of the locomotive, in such manner that the products of combustion generated in the furnace are, by the aid of a natural or forced draft, compelled to issue through it and to discharge into the atmosphere. In the form illustrated, the stack is of general cylindrical contour, and preferably surmounted with an annular rim 4.

Upon the end of the stack and within the rim 4, if it be present, I provide a screen 5 which completely covers the end of the stack. The screen is preferably made of interwoven steel wire of mesh sufficiently fine to prevent the discharge through it of the solid products of combustion, but which affords free egress for air and gaseous products of combustion. The screen is preferably a plane disk, as illustrated, and may be united to the stack by any suitable means, for example, the bead 6 shown in the several figures of the drawings.

Below the screen 5, within the stack 3, I provide a funnel 7, which is rigidly supported, as by lugs 8 secured to the funnel and the inner wall of the stack, co-axially within the stack. The external diameter of the funnel-mouth 9 and the internal diameter of the stack 3 are such as to define a narrow annular discharge orifice 10 between the stack and the funnel, as illustrated in the several figures of the drawings, special reference being had to Fig. II. The conical wall 11 and the circumscribing inner wall 12 of the stack lead toward the orifice 10 through a gradually constricted space defined between said walls, respectively, and produce, in effect, a nozzle-like instrumentality that terminates in the annular discharge orifice 10.

In practice, the funnel-mouth 9, which defines the circumjacent orifice 10, is located a sufficient distance below the bottom of the screen 5 to accommodate the nozzle-like instrumentality, above referred to, and the screen to the performance of their respective functions hereinafter enlarged upon. In practice, in stacks of ordinary dimensions of the type illustrated, the distance between the top of the funnel, or in other words the funnel-mouth 9, and the bottom of the screen is about four inches.

The funnel 7, being a conical receptacle of unobstructed internal capacity adapted for the reception of solid products of combustion after they are separated and discharged into it, must be provided with means of keeping it clear for the performance of its function as such receptacle. To

that end, I prefer to provide means of discharge communicating with the bottom of the funnel, such means preferably consisting of a pair of upwardly inclined conduits or pipes 15. Each conduit 15 extends preferably through the stack 3 which it meets preferably at an angle of forty-five degrees, and is preferably provided with a collar 16 by which it may be firmly secured to the wall of the stack. The means of discharge employed, or more specifically the conduits 15, afford, in addition to their function of keeping the funnel clear, means for securing the lower end of the funnel rigidly disposed in proper relationship, to the stack. The conduits 15 are preferably continued in pipes 17, which lead back to the ashpit of the locomotive, or any other suitable or preferred point of discharge, not illustrated.

The operation of my device is as follows. The commingled products of combustion, gaseous as well as solid, are, when the furnace of the locomotive is fired, discharged in the direction of the upwardly pointing arrows shown in Figs. III and IV into the stack 3. As they approach the discharge orifice 10 the combined effect, upon the fluid mass constituted of gaseous products and solid products suspended therein, of the cooperative constricting members 11 and 12, is to condense the mass as it passes toward the discharge orifice 10, through which it is forcibly driven upon the same principle as water or air may be delivered through a nozzle as from a water-main or bellows, respectively. Immediately upon issuing through the orifice 10, the fluid mass instantaneously expands. The force of expansion being resisted on one side by the cylindrical solid wall of the stack 3, finds least resistance in the direction of the open space above the open mouth of the funnel. The screen 5 affords resistance to the escape of the solid products of combustion, but permits free egress of the gaseous products. The effect of the blast issuing through the orifice 10 is positive to deflect the solid products of combustion toward the center to precipitate them into the funnel and driving the blast transversely across the under surface of the screen to keep the same clear and prevent the adherence of solid matter thereto.

The operation above described is diagrammatically illustrated in Fig. IV, in which the upshoot of the fluid mass of commingled products of combustion, or draft discharge is shown in upwardly pointing arrows. The condensation of the draft discharge is indicated by convergence of those arrows toward the orifice 10. The deflection of a part of the draft discharge, consequent upon expansion, is indicated by the bent arrows surrounding the funnel-mouth 9, and the downshoot of the solid products of combustion into the funnel, whereby they are separated for ultimate discharge through the conduits 15, is shown by the downwardly pointing arrows.

It may be observed that while it is obvious that the presence of a suitable screen 5 may serve in itself to prevent escape from an inclosed structure, such as the stack 3, of the solid products of combustion, such a screen without other provision would very speedily produce the effect of stopping up the stack and choking the draft. It is by the aid of the instrumentalities above specified in their construction and relationship one to another that simple but effectual means are provided for separation and discharge of the solid products of combustion, and that by an agency which, without injuriously affecting the draft through the stack in the first moment of its installation, tends toward and effectually accomplishes the keeping open of a free draft outlet through the stack. To more particularly explain the meaning of the last observation, it may be added that the correlative constriction of the members, which eventuates in the orifice 10, promotes a discharge through said orifice with a force sufficient not only to insure centripetal discharge into the funnel of the solid products of combustion after they pass through the orifice 10, but also to keep the orifice clear, unclogged, and unobstructed.

What I claim is:

1. In a spark arrester, the combination of a stack, a plane screen placed across the stack, a receptacle for receiving the solid products of combustion located in the stack and having its upper end opening under the bottom of the plane screen and spaced apart from the stack, forming between the receptacle and stack an annular discharge orifice, said orifice serving to make a direct discharge against the screen and at the same time to drive a blast transversely across the under surface of the screen to keep it clean and unobstructed.

2. In a spark arrester, the combination of a stack, and a plane screen placed across the stack of a funnel located below the screen and defining with the stack an annular nozzle-like orifice, said orifice serving to make direct discharge against the screen and at the same time to drive a blast transversely across the under surface of the screen to keep it clean and unobstructed.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

HARRY A. DAILEY.

Witnesses:
CHAS. W. FRANZHEIM,
WILLIAM E. KRUPP.