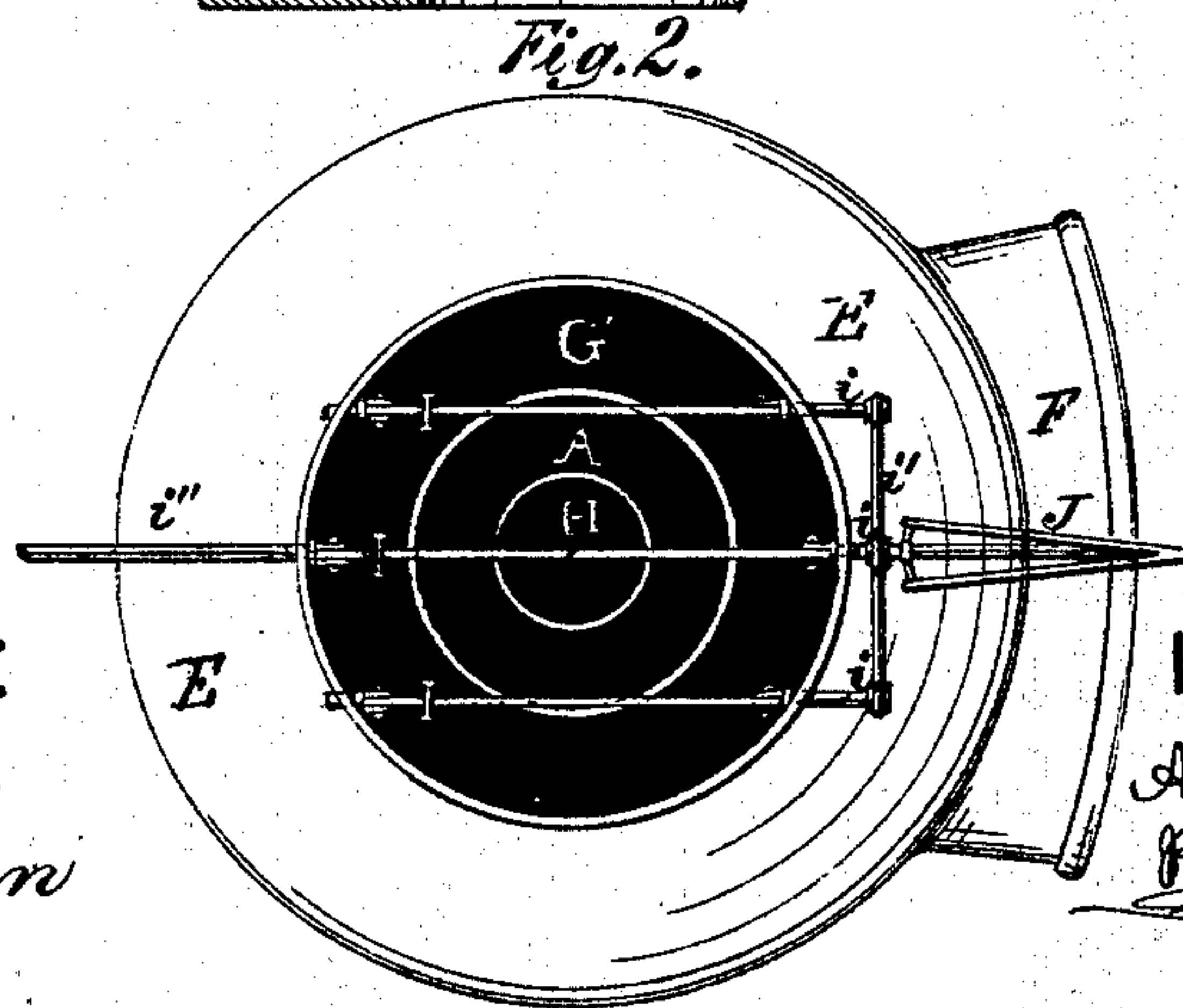
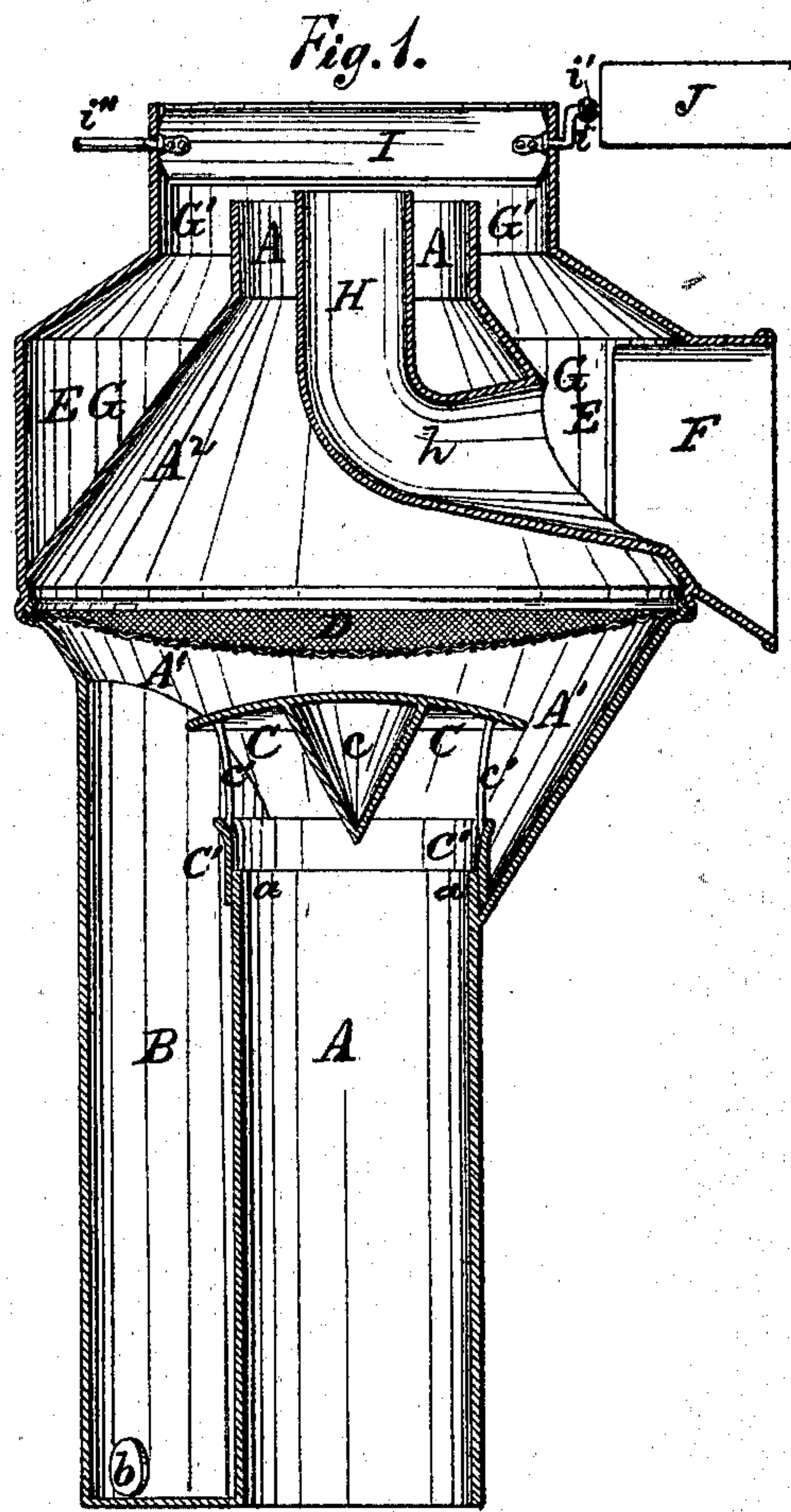


A. W. CRAM.  
Spark-Arresters.

No. 139,659.

Patented June 10, 1873.



WITNESSES:

*Geo. L. Ewin*  
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# UNITED STATES PATENT OFFICE.

ALONZO W. CRAM, OF LITCHFIELD, ILLINOIS.

## IMPROVEMENT IN SPARK-ARRESTERS.

Specification forming part of Letters Patent No. **139,659**, dated June 10, 1873; application filed October 30, 1872.

*To all whom it may concern:*

Be it known that I, ALONZO W. CRAM, of Litchfield, in the county of Montgomery and State of Illinois, have invented a certain Improved Spark-Arrester for Locomotive Smoke-Stacks, of which the following is a specification:

The first part of my invention consists in combining, with the smoke-stack of a locomotive, an air-funnel, placed above the elevation of the ordinary smoke-stack, and communicating with an upwardly-bent flaring pipe discharging the air centrally in the smoke-stack. The second part of my invention consists in combining with said locomotive smoke-stack an air-chamber, surrounding its upper end, having upon its front side a funnel-shaped or flaring opening to admit air into the chamber, said chamber having at top an annular opening, from which the air is forced upward around the discharge-opening of the smoke-stack. The third part of my invention consists in the combination of a locomotive smoke-stack, spark-receiver, deflector, gauze diaphragm, annular smoke and air chambers, central air-jet, and air-funnel mouth, arranged as described. The fourth part of my invention consists in placing in the contracted top of the stack a number of pivoted plates or deflectors, which are so arranged as to direct the smoke, &c., to the leeward side, so as to cause their more ready escape. These deflectors act automatically and simultaneously by means of a V-formed vane, which is placed on a crank-arm of one of their shafts, said crank being connected by a rod to similar arms on the other shafts, to insure their simultaneous movement.

Figure 1 is a longitudinal vertical axial section. Fig. 2 is a top view.

A is the smoke pipe or stack; B, the spark and dust receiver or chamber, which may surround or be arranged at the back of the pipe A, and which is provided with a proper opening, *b*, for removing the sparks and dust when required. C is a spark-deflector, arranged in the flaring or conical-shaped casing  $A^1$  of the smoke-stack. Said deflector has a conical-shaped projecting core, *c*, to de-

flect the sparks, &c., outwardly from over the smoke-pipe A, the flanged rim still further deflecting the sparks. *c'* is an annular rim surrounding and supported by the extension part *a* of the smoke-stack A, said rim supporting the deflector *c* by means of rods *c'*. D is a dished netting or gauze diaphragm, arranged above the deflector C to prevent the escape of the sparks and dust, and to assist in directing the same into the spark-receiver B. E is a casing or hood, arranged outside of the conical casing  $A^2$  of the smoke-stack A. F is a funnel-shaped opening communicating with the annular air-space G formed by the casings  $A^2$  and E. H is an air pipe or passage, arranged centrally in the top of the smoke-pipe A, and communicating, by a flaring bend, *h*, in front, with the annular air-space G and funnel-opening F.

When the train is in motion the air will be forced into the air-space G, through the funnel-shaped opening F, passes up the central pipe or passage H, and also through the annular passage G', and thus the smoke will be forced or drawn up and out of the smoke-pipe A, in an annular body, by the air escaping from the annular passage G' and the central passage H. I is a series of plates or deflectors, pivoted or journaled in the upper part of the hood E, the journals of one side of which are provided with crank-arms *i*, connected together by a connecting-rod, *i'*. The lower part of said plates may be made somewhat wider or heavier than the upper part, so that they will tend to regain a vertical position after being displaced from the same. J is an inclined or wedge-shaped vane, secured to one of the crank-arms *i*.

When side winds are blowing the vane J will tilt or swing the crank-arms *i*, carrying the plates I, and move or incline the same in the direction the wind is blowing, and thus the side winds may be utilized to assist in promoting the draft of the smoke-stack. When no side winds are blowing the plates I will again assume a vertical position.

In order to operate the plates I by hand either of the journal-pins is connected to a rod, *i''*, extending to the engineer's cab.



I claim—

1. In combination with the smoke-stack A, the air-funnel F and central air-flue H *h*, arranged substantially as and for the purpose set forth.

2. The combination of the smoke-stack A, chambers A<sup>2</sup> and G, air-funnel F, and central air-flue H *h*, substantially as and for the purpose set forth.

3. The combination of the smoke-stack A, dust-receiver B, deflector C, gauze diaphragm D, funnel F, chambers A<sup>2</sup> and G, and central

air-pipe H *h*, all arranged substantially as set forth.

4. The combination, in a locomotive smoke-stack, of the pivoted deflecting-plates I, connected by the rod *i'* and arms *i*, and arranged to operate automatically by means of a vane, J, substantially as set forth.

ALONZO W. CRAM.

Witnesses:

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