

W. T. URIE.  
Spark-Arrester.

No. 198,919.

Patented Jan. 1, 1878.

Fig. 1.

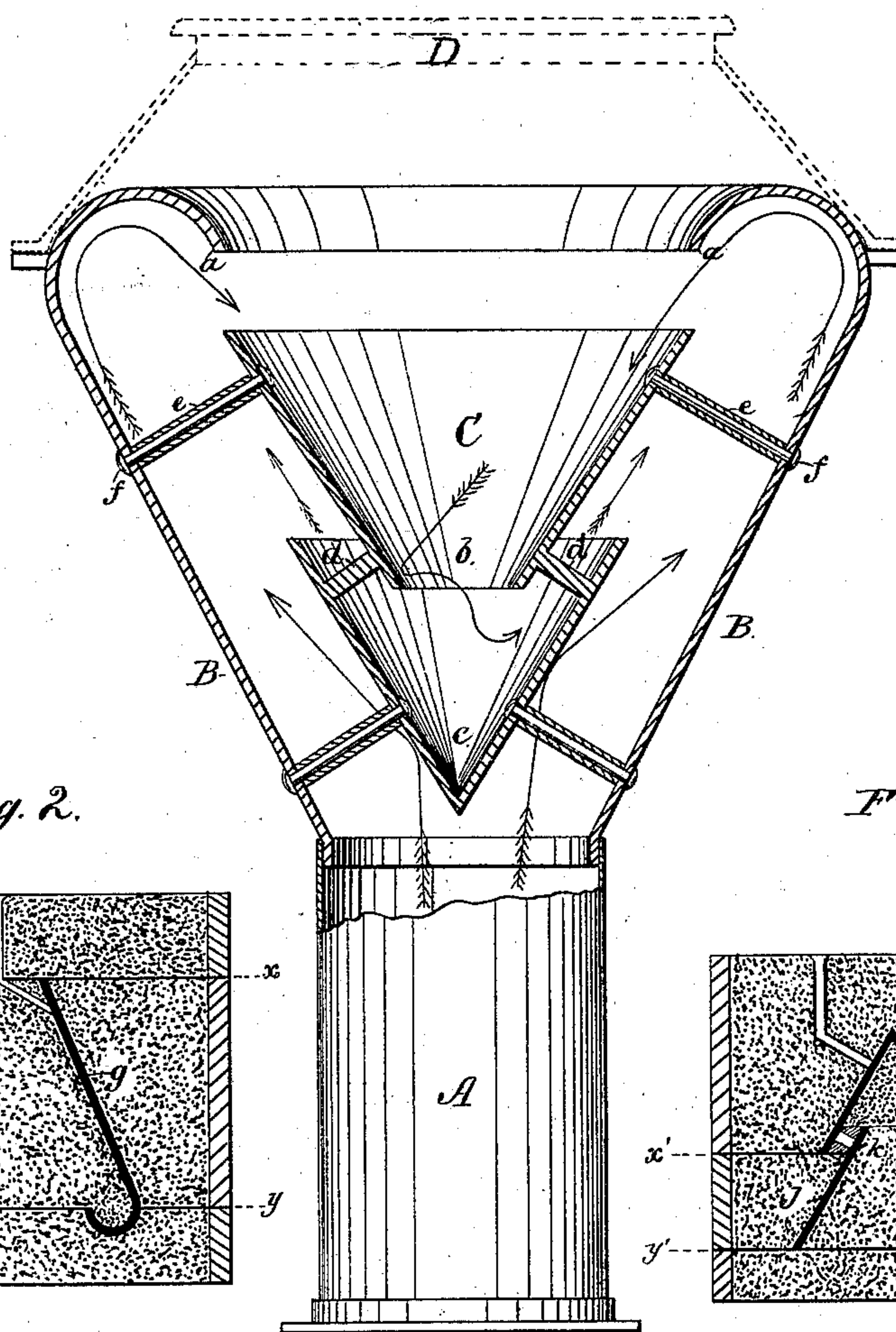


Fig. 2.

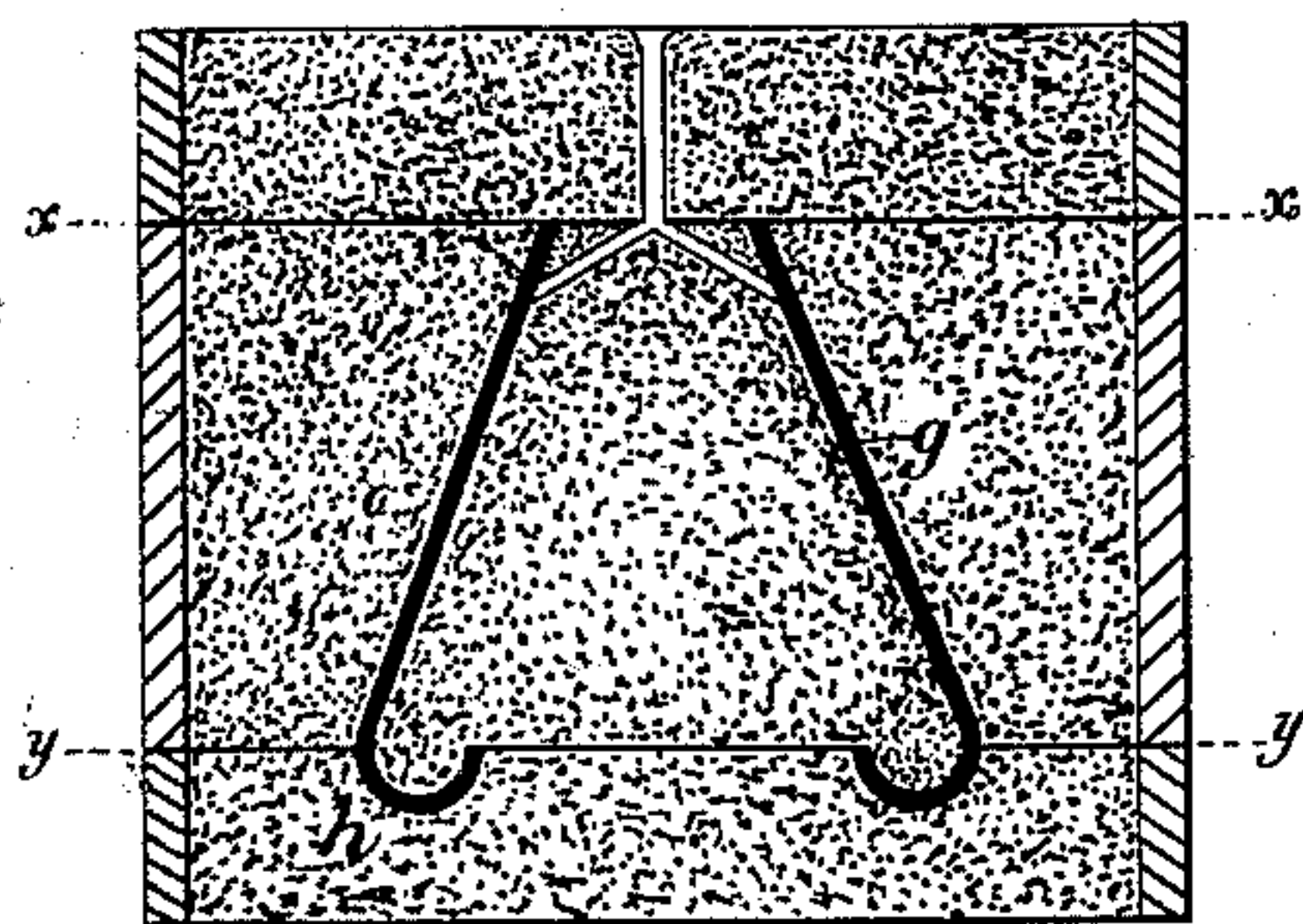
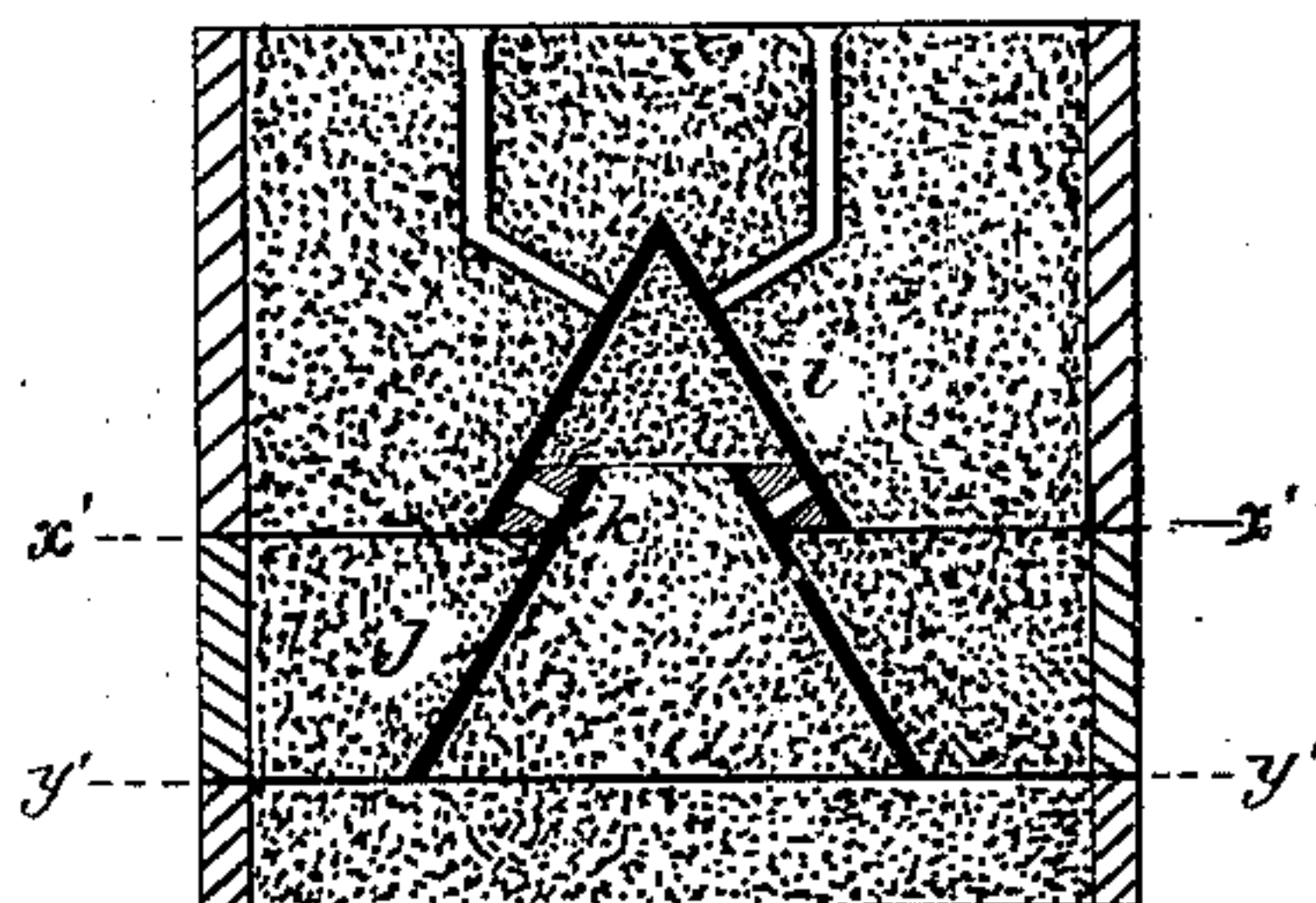


Fig. 3.



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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN SPARK-ARRESTERS.

Specification forming part of Letters Patent No. **198,919**, dated January 1, 1878; application filed December 8, 1877.

*To all whom it may concern:*

Be it known that I, WILLIAM T. URIE, of Warrensburg, in the county of Johnson and State of Missouri, have invented a new and Improved Spark-Arrester; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side view of my smoke-stack with a portion thereof in section, showing the construction of the spark-arrester. Fig. 2 is a sectional view of a flask illustrating the mode of casting the upper flared section of the stack. Fig. 3 is a sectional view of a flask illustrating the mode of casting the double funnel portion.

My invention relates to an improvement in spark-arresters, designed more especially for the smoke-stacks of freight-engines, but applicable also to passenger-engines. It is constructed with a view to simplicity, durability, and cheapness, and operates upon the principle of disintegrating or pulverizing the sparks and unconsumed particles of carbon by continued attrition and impact until they are reduced to such a degree of fineness as to pass out with the draft, in which condition they are harmless so far as danger from fire is concerned. In attaining the desired end I dispense with the wire netting, (which obstructs the draft, and also soon wears out,) and arrange, in the outer circumference of the inside upper portion of the smoke-stack a curved downwardly-projecting annular flange, made continuous with the outer flared case of the stack, which flange deflects the sparks downwardly and to the center, and co-operates with a subjacent centrally-arranged two-part hopper, or, rather, a hopper composed of an upper open funnel and a lower closed funnel, to cause the sparks and particles of carbon to be first diverted outwardly, then deflected downwardly and centrally against the inner walls of the upper funnel, whence they fall into the lower closed funnel, and are drawn, by a current induced by the force of the next blast, up between the inner walls of the lower funnel and the outer walls of the upper funnel into the main current, which carries the partially-disintegrated sparks along with the fresh supply

around the deflecting-flange and down into the upper funnel, for a repetition of the same action, the sparks and unconsumed particles of carbon being thus carried in circuit round and round the walls of the upper funnel as an axis, and beaten successively against the upper and lower funnel and deflecting-flange until they are thoroughly comminuted and made fine enough to be carried out by the draft, as hereinafter fully described.

In the drawing, A represents the barrel or cylindrical portion of the smoke-stack, and B the enlarged upper or funnel-shaped portion of the same. The upper portion B of the smoke-stack is provided upon its inside circumference with a curved and downwardly-projecting annular flange, *a*, which serves to deflect the sparks downwardly to the center.

C is the two-part hopper, which is arranged centrally in the stack, and consists of an upper funnel, *b*, open at the bottom, and a concentric lower funnel, *c*, having a closed bottom.

Now, as the blast in the smoke-stack forces the sparks and unconsumed particles of carbon up, they are diverted by the bottom of the lower funnel outwardly, and pass up divergently until they reach the deflecting-flange *a*; then they are deflected downwardly and to the center against the inner walls of the upper funnel, and then down into the closed lower funnel. Now, instead of accumulating here or being carried off by a pipe, as has been done heretofore, it will be seen that the next blast in the outer area of the smoke-stack induces between the inner wall of the lower funnel and the outer wall of the upper funnel a current, as indicated by the short arrows, which carries the partially-disintegrated sparks out from the lower funnel into the main outer current again. They are then thrown against the deflecting-flange *a* and downwardly into the two funnels again, thus circulating around the walls of the upper funnel until, by repeated impact, concussion, and attrition, they are reduced to such a degree of pulverization as to be blown out by the draft in a harmless condition.

In the smoke-stack as thus described only three pieces are employed in its construction—the barrel A, upper flared portion B, and the double funnel C—the portion B and the deflecting-flange *a* being cast in one piece, and



the two funnels *b* and *c* of the hopper *C* being also cast in one piece with and connected by the bridge-arms *d*. In fastening the parts together the double-funneled hopper *C* is held in its proper position in the outer portion *B* by means of thimbles *e*, and is securely fastened in such position by rivets *f* passing through the thimbles and the walls of the parts *B* and *C*, and clinched upon their ends.

For greater symmetry an upper section, *D*, surrounded by a marginal ring, as shown in dotted lines, may be attached to the casting *B*, so as to give the diamond shape. This, however, does not constitute an essential feature of the invention, and may be dispensed with.

In casting the outer portion *B* of the smoke-stack (see Fig. 2) the flask is made in three sections, the pattern in two pieces, *g* and *h*, and the parting effected at the lines *x x* and *y y*. In casting the double-funnel portion, Fig. 3, the flask is likewise made in three pieces, the pattern in two pieces, *i* and *j*, with a core at *k*, and the parting effected at *x' x'* and *y' y'*.

This construction of spark-arresting smoke-stacks embodies great simplicity, economy, and durability, and, while leaving a free draft-exit, effectually prevents the discharge of dangerous sparks.

In defining more clearly my invention, I would state that I do not claim, broadly, the curved circumferential deflecting-flange *a*, nor the two-part hopper having open and closed funnel, but only these two elements in combination, the result which arises therefrom being a definite circulation in bulk of the larger particles in the same path around the walls of the upper funnel, which gives a prolonged disintegrating action and a better pulverization of the particles.

In reaching this result it will be seen that both of these elements are essential to this circulation in bulk—that is to say, the deflecting-

flange *a*, made continuous with the side of the tapering case, is necessary to give a single definite current carrying the particles in bulk around the upper edge of the open-bottom funnel, while the construction of the two-part hopper, having an upper open funnel and a lower closed-bottom funnel, is necessary to give the turn around the lower wall of the upper funnel, and thus, with the upper flange *a*, complete the continuous circulation of the particles in an undivided current to prolong the action, while the sharp turns and repeated impacts effect the pulverization of the particles.

Having thus described my invention, what I claim as new is—

1. A three-part spark-arresting smoke-stack, consisting of a barrel portion, a flared upper portion cast with a flange, and a central double-funnel hopper cast in one piece, combined to operate substantially as described.

2. A smoke-stack having a downwardly-projecting deflecting-flange at its upper inside circumference, made continuous with its outer case, combined with a subjacent open-bottom funnel and a second lower closed-bottom funnel, having passage-ways between to permit a circulating current to be induced around the walls of the upper funnel, substantially as and for the purpose described.

3. The combination of the outer casing *B*, cast with a flange, *a*, the double funnel-shaped hopper, *C*, cast in one piece with connecting bridge-arms, the thimbles *e*, and the rivets *f*, substantially as and for the purpose described.

4. As a new article of manufacture, the two-part hopper, consisting of an upper open-bottom funnel, *b*, and a lower closed funnel, *c*, cast in one piece with bridge-arms, substantially as described.

WM. T. URIE.

Witnesses:

EDWD. W. BYRN,  
 SOLON C. KEMON.