

No. 747,830.

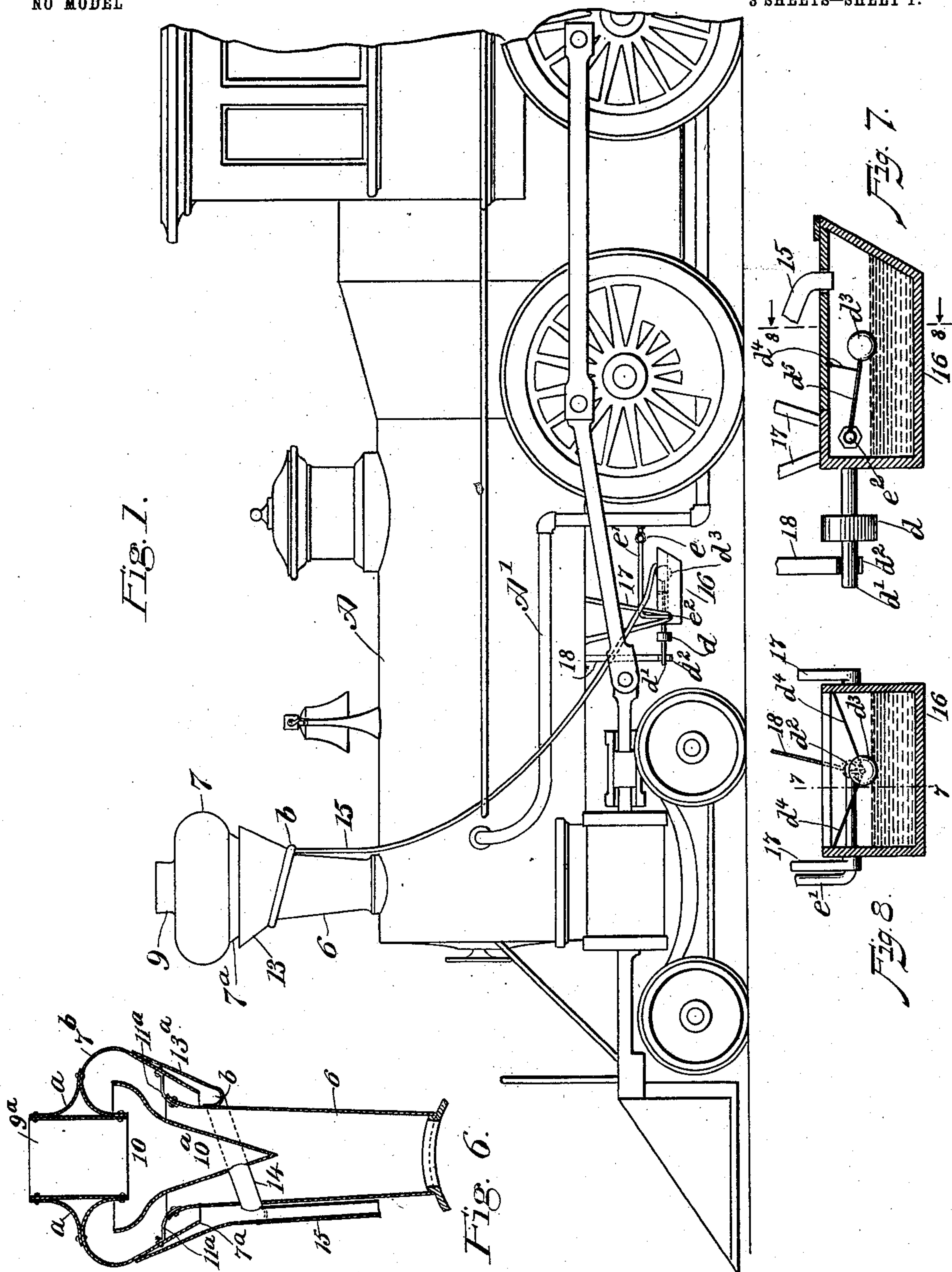
PATENTED DEC. 22, 1903.

A. P. ZINK.  
SPARK ARRESTER AND EXTINGUISHER.

APPLICATION FILED MAY 5, 1903.

NO MODEL

3 SHEETS—SHEET 1.



WITNESSES:

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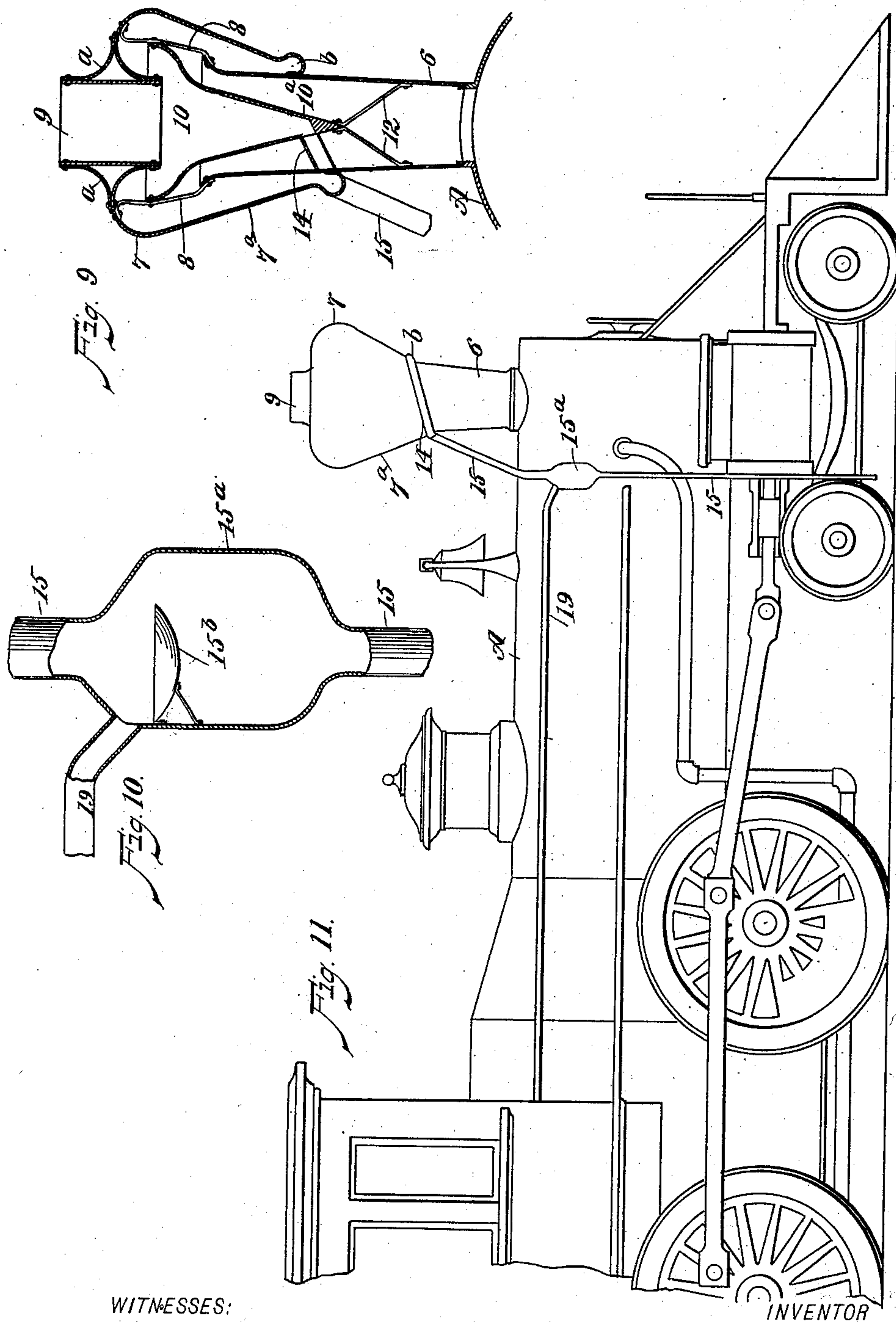
PATENTED DEC. 22, 1903.

A. P. ZINK.  
SPARK ARRESTER AND EXTINGUISHER.

APPLICATION FILED MAY 6, 1903.

NO MODEL.

3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

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## SPARK ARRESTER AND EXTINGUISHER.

SPECIFICATION forming part of Letters Patent No. 747,830, dated December 22, 1903.

Application filed May 5, 1903. Serial No. 155,707. (No model.)

*To all whom it may concern:*

Be it known that I, AUGUSTINE P. ZINK, a citizen of the United States, and a resident of Lorain, in the county of Lorain and State of Ohio, have invented a new and Improved Spark Arrester and Extinguisher, of which the following is a full, clear, and exact description.

The object of the invention is to provide novel simple details of construction for a spark arrester and extinguisher especially well adapted for coaction with the draft-stack of a locomotive and which will effectively arrest all the sparks entering the stack and convey them into a suitable receptacle carried on the locomotive, wherein they are extinguished by water held in the receptacle and at proper intervals are automatically discharged from said receptacle, which when emptied of its contents returns to normal position for renewed service.

The invention consists in the novel construction and combination of parts, as is hereinafter described, and defined in the appended claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side view of a locomotive-engine whereon the invention is mounted for service. Fig. 2 is an enlarged front view of the engine smoke-stack and of the exterior portion of the spark-arrester carried thereon. Fig. 3 is a vertical transverse section of the smoke-stack and details of the improved spark-arrester substantially on the line 3 3 in Fig. 2. Fig. 4 is a sectional plan view of the stack substantially on the line 4 4 in Fig. 3. Fig. 5 is a sectional plan view of the same substantially on the line 5 5 in Fig. 3. Fig. 6 is a vertical transverse sectional view of a modified construction of the improvement. Fig. 7 is an enlarged longitudinal sectional view of the preferred form of the spark-extinguishing device substantially on the line 7 7 in Fig. 8. Fig. 8 is a transverse sectional view substantially on the line 8 8 in Fig. 7. Fig. 9 is a vertical transverse sectional view of a modified form of the spark-arrester on a stack. Fig. 10 is an enlarged partly-sectional side view of a differently-

constructed spark arrester and extinguisher, and Fig. 11 is a side view of a locomotive-engine having the spark arrester and extinguisher represented in Figs. 9 and 10 mounted thereon.

The improvement is available for coactive service with the draft-stacks of locomotives, traction-engines, portable engines, and other steam-generators where it is desirable to arrest sparks that ordinarily escape from the draft-stack. The preferred use of the improvement is for the arrest and extinguishment of sparks that ordinarily escape from the draft-stack of a locomotive, and the novel device is herein shown as so applied and embodies the following details of construction.

A indicates a locomotive-engine wherein an enforced draft is preferably employed that projects the unconsumed products of combustion into the draft-stack and from which they escape in objectionable amount when the common arrester is employed for their restraint.

The draft-stack 6 is a coniform shell of suitable dimensions and for service is mounted and secured upon the front end of the boiler of the locomotive A over the smoke-box for the reception of the gases and heavier products of fuel combustion, as usual.

A hood 7, of sheet metal, is provided, shaped as shown in Figs. 1 and 2 and having an oblate spheroidal form of a diameter that exceeds that of the upper end of the draft-stack 6, the lower portion of the hood merging into the upper end of an inverted coniform depending extension 7<sup>a</sup>, the lower end of which is open when constructed as shown in Figs. 1, 3, and 6.

The hood 7 is supported concentrically, encircling the upwardly-flaring upper end of the draft-stack shell 6 by a plurality of spaced upright stanchions 8, secured at their lower and upper ends, respectively, upon the upper end of the draft-stack 6 and the interior upper surface of the hood 7, and it will be seen in Fig. 2 that the lower end of the depending coniform extension 7<sup>a</sup> is thus held annularly spaced from the wall of the stack 6 at a suitable point below the flaring upper end of the draft-stack.

An escape-pipe, that may flare upward and outward slightly, as shown in Fig. 2, or be



cylindrical, as represented in Figs. 6 and 9, is secured in a central opening in the top wall of the hood 7 and is rendered stable in position by an annular fillet  $a$  or other means.

5 A spark-receiver 10, preferably in cup form and having a downwardly-converging tubular extension or leg  $10^a$  centrally projected therefrom, may be held within and partially above the draft-stack 6 at the vertical axis  
10 of said stack by two sets of strut-braces 11 and 12, or the stanchions 8 and braces 12 may be employed for holding the spark-receiver centered in the draft-stack, as indicated in Fig. 9.

15 The braces 11 when employed project diagonally inward and upward from the stanchions 8 and are secured to the upper part of the receiver 10, the braces 12 extending from the lower end of the leg  $10^a$  to have secured  
20 engagement with the draft-stack 6.

A funnel-shaped conductor-trough 13 is held concentrically spaced from the exterior of the draft-stack 6 and coniform hood extension  $7^a$  by an attachment of its lower portion  
25 upon the exterior of the draft-stack, and it will be seen that a concaved channel  $b$  is formed as a bottom wall for the conductor-trough 13, said bottom portion having an inclination from a horizontal plane.

30 It will be seen in Fig. 6 that the conductor-trough  $13^a$  is extended upward sufficiently to have contact with the hood  $7^b$ , and in Fig. 9 the hood extension  $7^a$  is extended down to merge into the channel  $b$ , either of these constructions effecting the same purpose.

35 A spout 14 extends from the lower end of the hollow portion of the depending leg  $10^a$ , inclining outward and downward, the outer end thereof having communication with the concaved channel  $b$  through an opening  $c$  in the wall of the draft-stack 6.

The opening  $c$  is formed in the stack-wall 6 opposite the lowest point in the inclined bottom channel  $b$ , and from the lower side of  
45 the latter a spark-conveying pipe 15 is downwardly extended to discharge into a receptacle 16. As shown in Fig. 1, the receptacle 16 may be held to rock from a horizontal plane by its pivotal support on a bracket-  
50 frame 17, that depends from the locomotive A, said receptacle being normally maintained level by a counterbalance  $d$ .

As best shown in Figs. 7 and 8, the weight  $d$  is mounted upon an arm  $d'$ , extended from  
55 the receptacle 16, at the end thereof which is nearest to the pivot-support of said receptacle.

A spring-arm 18 depends from the boiler A of the locomotive and is provided with an  
60 open hook  $d^2$ , that will arrest the arm  $d'$  when the receptacle is empty, and the weight  $d$  is permitted to rock it into a horizontal position, said arm being suitably inclined to permit a free rocking movement of the receptacle. There may be a water-supply pipe  
65  $e'$ , extended from another water-supply A', having a stop-valve  $e$  therein, said pipe  $e'$  be-

ing extended to the frame 17 for support of its outer end and passing through the trunnioned end of one member of the frame 17  
70 into the receptacle 16. On the inner end of the pipe  $e'$  a valve  $e^2$  is mounted, said valve being controlled by the float  $d^3$ , that is connected with the valve  $e^2$  by a rod  $d^5$ . The float  $d^3$  is held from dropping too far by the  
75 braces  $d^4$ , that extend from the float-supporting rod  $d^5$  to the upper portions of the side walls of the receptacle 16, whereon these braces are secured by their extended ends.

It will be seen that the weight of the float  
80  $d^3$  and the rod  $d^5$  hold the valve  $e^2$  closed while the receptacle 16 is empty or but partly filled with cinders from the spark-arresting device; but when a sufficient quantity of cinders is deposited in the receptacle to form a  
85 bed, which by the jolting of the engine raises the float, then the valve  $e^2$  will be opened to supply water for quenching the sparks that have entered the receptacle 16.

In operation the force of exhaustion of the  
90 locomotive-engine projects the products of combustion up into the draft-stack 6, striking the outwardly and upwardly trending wall of the cup-like receiver 10 and thence passing outward into contact with the concave  
95 surface of the hood 7. The light gases and exhaust-steam mixed therewith pass upward and toward the center of the escape-pipe 9 over the upper edge of the receiver 10 and through said escape-pipe into the open air.  
100 The impact of cinders heavy and light on the curved wall of the hood 7 will arrest their outward passage and by their gravity the heavier products of combustion are caused to drop into the receiver 10 and thence pass  
105 down and out into the conveying-pipe 15 and ultimately be discharged therefrom into the receptacle 16. Furthermore, the sparks or cinders that from their weight fail to pass over the upper edge of the receiver 10 im-  
110 pinge upon the concave side of the hood 7, fall down into the hood extension  $7^a$ , and from the latter pass down into the trough 13 and thence into the conveyer-pipe 15.

It will be seen that when an accumulation  
115 of the sparks conveyed from the spark-arrester exceeds the heft of the counterpoise  $d$  said sparks, along with the water that has extinguished the sparks, will be dumped by the tilting of the receptacle 16, whereupon the  
120 latter will resume a level condition, and the proper quantity of water will be automatically supplied thereto by the coöperative action of the float-controlled valve  $e^2$ , as before explained.

125 In Fig. 6 is shown a slightly-modified construction. As shown, the spark-conducting trough  $13^a$  is extended upward and outward, so as to have contact with the exterior of the hood  $7^b$ , thus closing the annular space that  
130 intervenes said parts, as shown in Fig. 3. The braces  $11^a$  take the place of the stanchions 8 and braces 11, said braces  $11^a$  extending between the upper end of the stack 6 and



the depending extension 7<sup>a</sup> of the hood, which serves to space the hood extension from the stack at the upper end of the latter. The escape-pipe 9<sup>a</sup> may in this construction be given cylindrical form.

In Figs. 9 and 10 another form of the spark-arrester details is shown. In this construction the braces 8 extend upward from the upper edge of the stack 6 and at their upper ends are affixed upon the hood 7, said braces or stanchions 8 being secured between their ends upon the upper portion of the spark-receiver 10.

In Figs. 10 and 11 the construction and application of another style of spark-arrester is shown. In this device a chamber 15<sup>a</sup> is formed or secured in the spark-conveying pipe 15, that is positioned a suitable distance below the stack 16, and from the chamber the pipe 15 is extended to a point near the ground or road-bed of the railway. In the chamber 15<sup>a</sup> a pan 15<sup>b</sup> is supported horizontally beneath the inlet end of a steam or water pipe 19, that extends from the boiler at the rear under control of the engineer, and a small stream of water enters the pan, mixing with cinders that fall therein and from the pan are washed down the pipe for discharge at the lower end of the same.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A spark arrester and extinguisher, comprising a draft-stack, an oblate spheroidal hood held concentric with and exterior of the upper end of said stack, a spark-receiver having a hollow leg and supported from the draft-stack, an escape-pipe above the receiver and on the hood, and means for conveying sparks from the hollow leg and hood to a spark-extinguisher.

2. A spark arrester and extinguisher, comprising a draft-stack, an oblate spheroidal hood encircling the upper end of the draft-stack and held concentric therewith, a cup-like spark-receiver having a hollow depending leg, and supported from the draft-stack and hood, an air-escape pipe on the hood and above the spark-receiver, and means for con-

veying sparks from the leg of the receiver and the open lower end of the hood to a spark-extinguisher.

3. A spark arrester and extinguisher, comprising a draft-stack flaring upward and outward, an oblate spheroidal hood held at the upper end of the stack and concentric therewith, an escape-pipe central on the top of the hood, a cup-shaped spark-receiver hung below the escape-pipe and having a hollow depending leg, an annular trough on the exterior of the draft-pipe, adapted to receive sparks from the hollow leg of the receiver and also from the lower end of the hood, and means for conveying sparks from the trough to a spark-extinguisher.

4. A spark arrester and extinguisher, comprising a draft-stack flaring upward and outward, an oblate spheroidal hood, stanchions supporting the hood concentric with and upon the upper end of the draft-stack, an escape-pipe on the hood at its center, a cup-shaped spark-receiver hung by braces from the hood and draft-stack within said hood and stack, a hollow leg on the lower end of the receiver-cup, an annular trough exterior of the draft-stack and having an inclined concave bottom wall, a downwardly-inclined spout extended from the lower portion of the hollow leg to communicate with the lower portion of the trough, an opening in the draft-stack, and a conveyer-pipe extended from the concave inclined bottom of the trough to a spark-extinguishing device.

5. In a spark arrester and extinguisher, the combination with a spark-arrester and a spark-conveyer pipe extended therefrom, of a spark-extinguisher, comprising a rockable receptacle into which the conveyer-pipe discharges, a counterpoise on the receptacle, and a water-supply for said receptacle, controlled by a float-actuated valve.

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

AUGUSTINE P. ZINK.

Witnesses:

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JOHN ZINK.