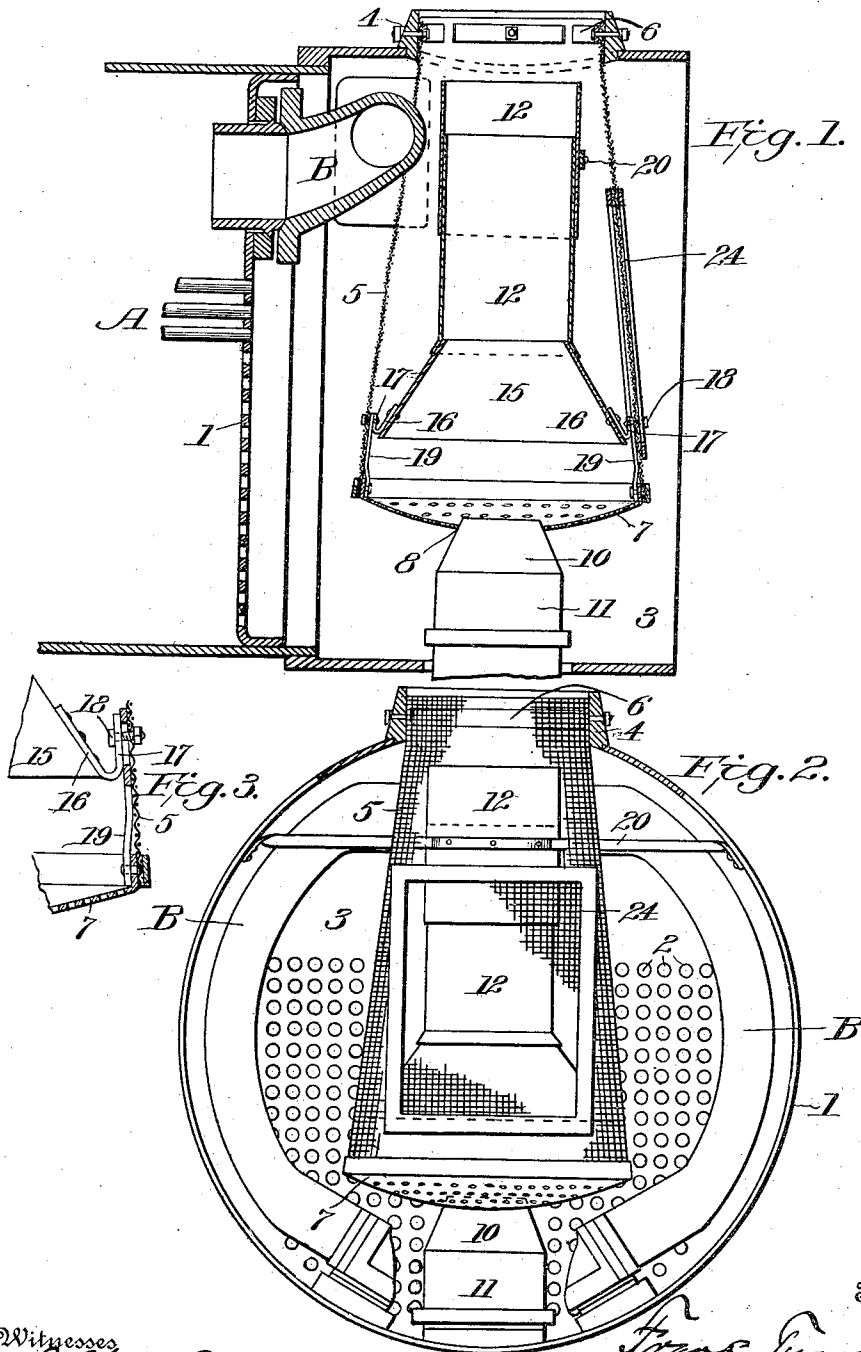


F. TUMA.
 SPARK ARRESTER AND DRAFT REGULATOR FOR LOCOMOTIVES.
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SPARK-ARRESTER AND DRAFT-REGULATOR FOR LOCOMOTIVES.

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To all whom it may concern:

Be it known that I, FRANK TUMA, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Spark-Arresters and Draft-Regulators for Locomotives; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to spark arresters and draft-regulators for locomotives and its primary object is to provide a device of this character which will be simple and compact in construction and which may be inserted at slight expense into the smoke-arch or box of any of the usual types of locomotives.

Another object is to provide a front-end draft-regulator that is easily adjusted to meet the draft requirements of all locomotives according to the character of coal burned and to equally distribute the draft throughout all of the fire-tubes and fire-box.

A further object of my invention is to increase the efficiency of the locomotive by providing a draft regulator and spark-arrester in which a relatively large exhaust opening may be employed so as to do away with back-compression in the engine-cylinder and increase the volume and efficiency of the exhaust jet.

With these and other objects in view, my invention consists in the novel construction, combination and arrangement of parts hereinafter described and illustrated (in its preferred form) in the accompanying drawings; but it is to be understood that the construction shown is merely illustrative and open to changes and modifications within the scope of the appended claims although the particular construction illustrated is novel and claimed, and the language used in describing the same is to be construed as exemplary and not in a limiting sense.

In the drawing, Figure 1 is a vertical longitudinal section through a locomotive smoke-arch or box, and showing the spark arrester and draft regulator in full lines;

Fig. 2 is a front elevation of the same; and Fig. 3 a detail view of the draft-pipe adjusting means.

Referring to the drawings, A designates the usual boiler, closed at its forward end by a flue-head 1 and provided with any number of fire-tubes or flues 2, through which the products of combustion pass into the smoke box 3 and out through the smoke-stack (not shown) but which will fit to the saddle base 4, while B represents the usual pipe for leading steam from the boiler to the piston cylinders, which parts may be of any ordinary approved type.

In the embodiment of my invention, I employ preferably a cylindrical or frusto-conical screen 5 of wire netting, the upper end of which may be shaped to conform to the inner wall of the smoke stack or its saddle base and is tightly held against the same by means of an internal annular band 6, preferably made in sections, bolted to the stack base to prevent the passage of sparks or cinders between the wall of the screen and the inner wall of the stack, although it may be otherwise attached. To the lower end of the screen is secured a perforated metallic plate 7 preferably of a dished or convex shape, the radius of which is made to conform to the radius of the smoke box or arch so as to obtain the best results, and provided with a central opening 8 and adapted to seat upon the tapered end 10 of the exhaust or blast-nozzle 11. Within the cylindrical screen 5 and above the exhaust-nozzle 11 is arranged a draft-pipe 12, preferably consisting of a plurality of closely-fitting telescoping sections, the upper section being suitably supported, for instance by a transverse brace 20 secured at opposite points to the wall of the smoke-arch sheet and bolted or otherwise suitably fastened to the draft-pipe to brace the same against lateral movement, and also to insure proper alinement of the sections of draft-pipe, and the other section depending from the upper section and supported by suitable means to allow a sliding movement of one section within the other.

The lowermost section carries a flaring mouth-piece 15 which at its widest portion is of somewhat less diameter than the cylindrical screen 5. Supporting brackets 16 are secured at various points to the flaring mouth-piece 15 and are each provided with

an upright arm 17 through which extend bolts 18 attached to suitable supports, for instance, to plates 19 extending up from the flange of plate 7, or otherwise, and slotted to receive the bolts and adapted to support the draft-pipe while allowing vertical adjustment thereof. A door 24 is provided at a suitable point in the cylindrical casing to allow the removal of cinders, etc. depositing on the perforated plate.

The operation of my device is as follows: The exhaust steam from the engine-cylinder issues through the nozzle 11 and is directed into the draft-pipe producing an entraining effect and tending to draw or impel the incoming products of combustion through the smoke-stack. All cinders, sparks and waste products entering the smoke arch from the fire-box are intercepted and prevented from issuing directly through the smoke-stack by the screen 5, and they impinge against the wall of the screen and drop therefrom to the bottom of the smoke-arch, while any portions passing through the screen contact with the wall of the draft-pipe so as to be broken up by the impact, and are thus also deadened so that danger of communicating fire to anything along the roadway or track is reduced to the minimum. By varying the height of the flaring end of the draft-pipe above the exhaust-nozzle the suction through the fire-tubes and fire box may be regulated and the draft distributed so as to act equally throughout the tubes and fire box. Thus the draft may be regulated to meet the requirements of different engines and of different qualities of fuel. By forming the base of the screen of perforated metal instead of wire the liability of the sparks or cinders lodging beneath a base of wire and burning out the base and affording escape for live sparks or cinders is obviated; and furthermore the metal plate serves as a brace to hold the wire screen in proper shape and prevent the parts warping.

By reason of the construction described a larger exhaust opening than ordinarily employed is made possible and the nozzle may also be lower than otherwise, so that proper combustion is obtained, consumption of fuel reduced, emission of black smoke into the stack and throwing of fire and sparks from the stack minimized and the general efficiency of the locomotive increased as well as obtaining increased draw-pull capacity. The construction also gives equally good results on locomotives having short front ends as on locomotives having an extended smoke box or arch. No diaphragms, or deflector or baffle plates are necessary, and the number of parts are reduced and simplified and so disposed as to give the results above specified.

While it is preferred to make the screen cylindrical and tapering from bottom to top

as illustrated yet features of the invention can be employed whatever be the shape of the screen.

A distinctive feature of the invention is a draft-pipe extending from the upper portion of the smoke-box, in substantial alinement with the opening into the smoke-stack, to a point adjacent to the steam-exhaust nozzle, so as to present a substantially continuous wall in front of the boiler flues, and a reticulated shell or screen encircling the exit opening from the smoke-box to the stack and inclosing the draft-pipe throughout its length so that combustion-products will be intercepted by the screen and cinders passing through the screen will be directed against the wall of the draft-pipe and by impact there against be broken into small particles and deadened before escaping through the draft-pipe into the stack. Another distinctive feature is a screen encircling a draft-pipe and the body of which is formed of wire netting, and the bottom of a perforated metallic plate to brace the wire netting and prevent its warping. Another distinctive feature is the screen formed with a convex bottom having substantially the same radius as the smoke-arch or box. Another distinctive feature is the draft-pipe formed of telescoping sections, the upper section being stationary and the lower section adjustable in relation thereto so as to regulate the draft by adjustment of the lower section without disturbing the fixed relation of the upper section to the smoke-stack. Another distinctive feature is the cross-bar which serves to brace the draft-pipe and maintain alinement of its sections.

Having described my invention and set forth its merits, what I claim is:—

1. A spark-arrester and draft-regulator for a locomotive-front, comprising a smoke box having a smoke-exit opening and steam-exhaust nozzle, a hollow screen having a perforated convex bottom, said screen at its upper end being in communication with the smoke-exit opening and having a portion of its open mesh surface facing the boiler flues so that cinders may be projected from the flues through the screen, and its perforated bottom flaring upwardly and outwardly from the steam-exhaust nozzle, and a draft-pipe having a flaring mouth located within the screen in alinement with the steam-exhaust nozzle and smoke-exit opening and presenting a substantially continuous imperforate wall opposite the boiler flues to receive the impact of the cinders projected through the screen, said screen and draft-pipe being spaced apart from each other throughout their length and the draft-pipe at its upper and lower ends being in open communication with the space between the screen and draft-pipe, substantially as described.

2. A spark-arrester and draft-regulator for a locomotive-front, comprising a smoke box having a smoke-exit opening and steam exhaust nozzle, a hollow screen extending
5 from the upper portion of the smoke box to a point below the middle portion thereof, the body portion of the screen being formed of wire netting and its bottom of a perforated metallic plate to which the netting is secured
10 for bracing the netting and preventing the same from warping, and a draft-pipe in alinement with the steam-exhaust nozzle and the smoke exit opening of the smoke box and having its lower open end lying above
15 the perforated metallic plate of the screen, substantially as described.

3. A spark-arrester and draft-regulator for a locomotive-front, comprising a smoke-box having a smoke exit and steam exhaust

nozzle, a telescoping draft-pipe in alinement 20 with the steam exhaust nozzle and smoke exit opening of the smoke-box, a screen inclosing and extended below the draft-pipe and spaced from the lower end thereof, an
25 apertured bottom to the screen, brackets connected to the lower section of the draft-pipe, and supports positioned at the lower portion of the screen and with which said brackets are adjustably connected for adjusting the
30 lower section of the draft-pipe to regulate the draft, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK TUMA.

Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."