March 1, 1938. R. W. ANDERSON 2,109,630

LOCOMOTIVE

Filed March 26, 1937 2 Sheets-Sheet 1

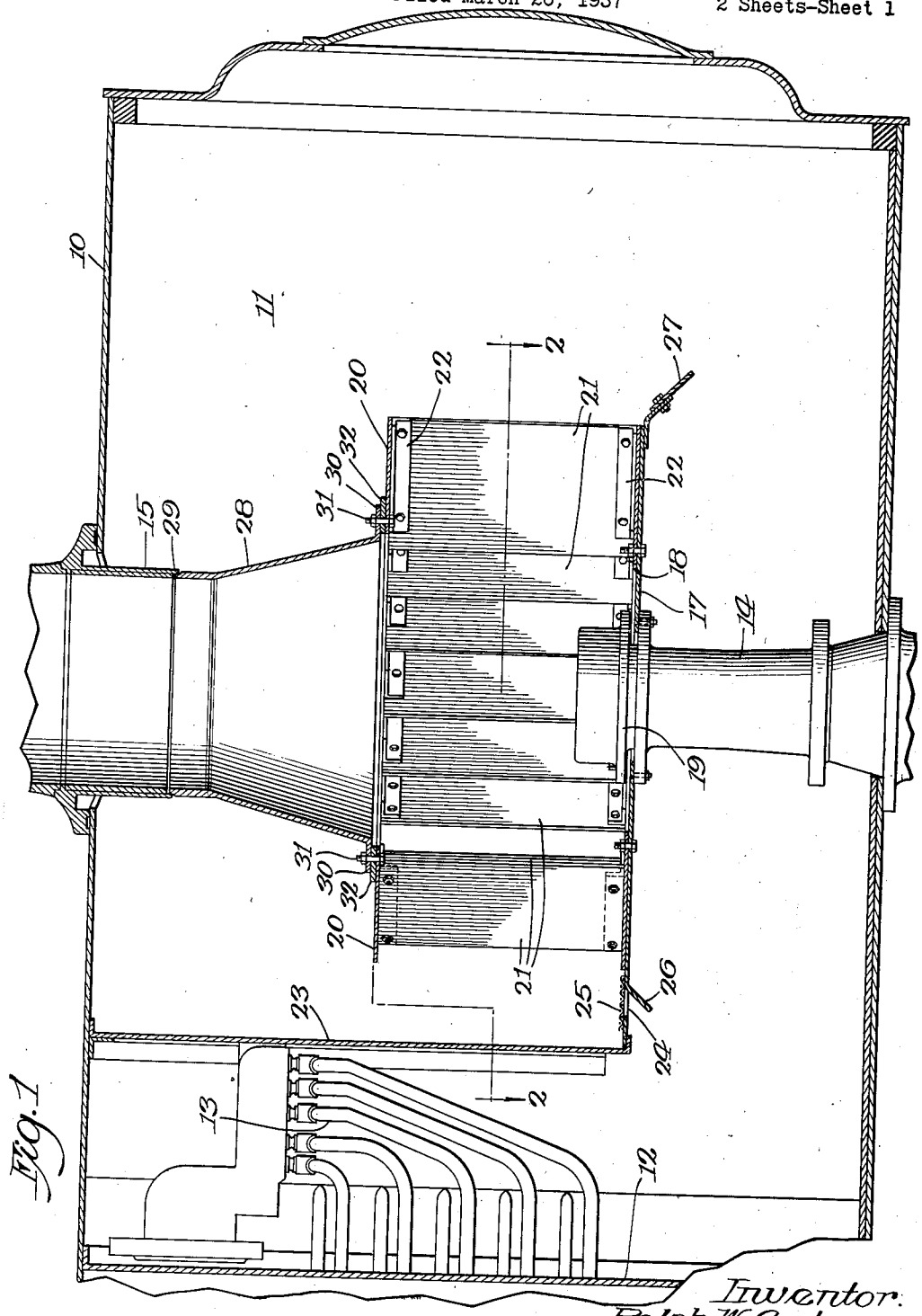


Fig. 1

Inventor:
Ralph W. Anderson
By Gilson, Mann & Gest
Attys.

March 1, 1938. R. W. ANDERSON 2,109,630

LOCOMOTIVE

Filed March 26, 1937 2 Sheets-Sheet 2

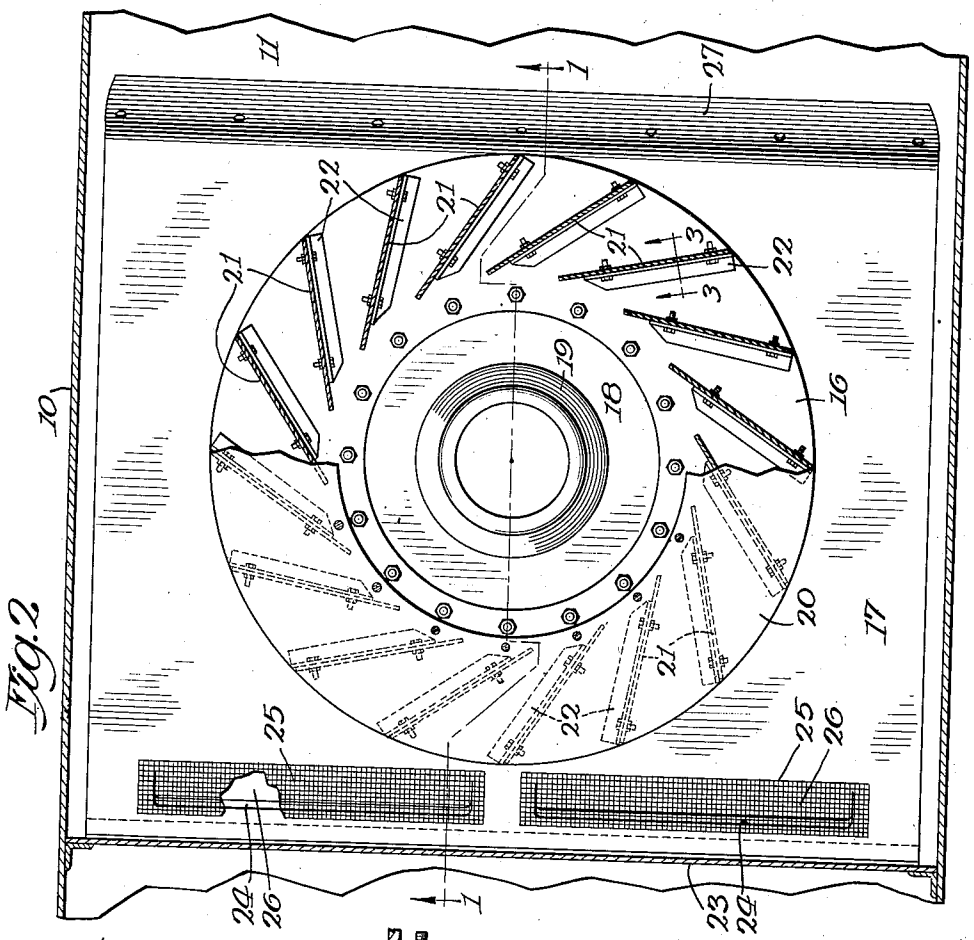


Fig. 2

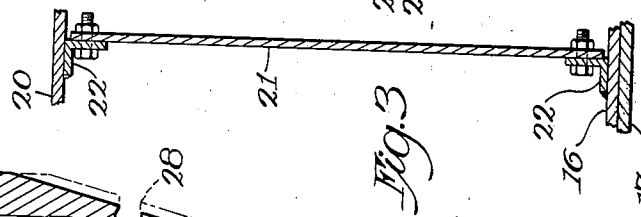


Fig. 3

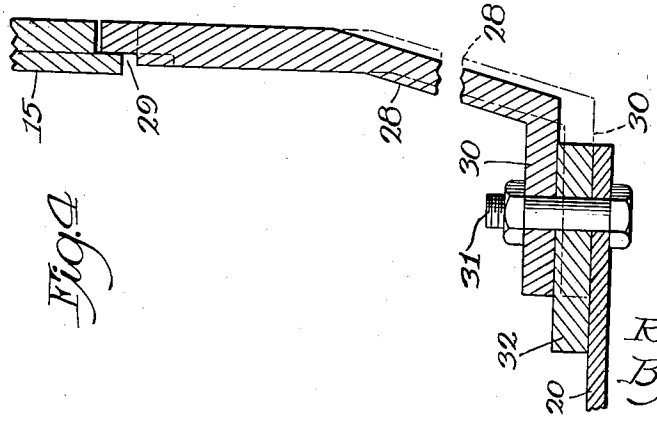


Fig. 4

Inventor.
Ralph W. Anderson
By Gielson, Mann & Co
Attys.

Patented Mar. 1, 1938

2,109,630

UNITED STATES PATENT OFFICE

2,109,630

LOCOMOTIVE

Ralph W. Anderson, Wauwatosa, Wis.

Application March 26, 1937, Serial No. 133,207

3 Claims. (Cl. 230—97)

This invention relates to the front end or smoke-box of steam locomotives.

Its object is to provide improved means for eliminating or reducing sparks; to simplify and cheapen the construction of a spark eliminating member; to provide for the easy replacement of elements of the spark eliminator and of the smoke stack, which are especially liable to wear.

The improvements are fully hereinafter described and illustrated in the accompanying drawings, in which

Fig. 1 is a vertical sectional view on the line 1—1 of Fig. 2;

Fig. 2 is a detail plan section on the line 2—2 of Fig. 1;

Fig. 3 is a cross-section on the line 3—3 of Fig. 2; and

Fig. 4 is a sectional detail showing the attachment of the smoke stack to the spark reducer.

The front end of a locomotive of conventional form is represented at 10, and includes the smoke box 11. The forward flue sheet is shown at 12, and steam pipes for superheating are shown at 13. The exhaust nozzle for the locomotive is represented at 14, and enters through the bottom of the smoke box and discharges upwardly in line with the smoke stack 15, which opens through the top of the smoke box.

The spark eliminator comprises a pair of annular plates, one thereof, designated 16, being supported upon and bolted to the table plate 17, its central aperture 18 including the exhaust nozzle 19; the other plate, 20, being connected with the smoke stack 15, its central aperture registering with and being of equal diameter with the lower end of this stack. An annular series of vertical deflector plates 21, of any preferred number, is mounted between the plates 16 and 20. The deflector plates extend inwardly from the margins of the top and bottom plates, and are located on chords thereof which define like arcs and pass slightly outside of the plate apertures. Each of the deflector plates is bolted to the vertical flange of an angle bar 22, the horizontal flange of which is permanently attached to one of the plates 16, 20, as by welding.

The usual diaphragm plate 23, crossing the smoke box between the superheating element 13 and the smoke stack, is spaced apart from the rear side of the spark eliminating element, and is joined at its lower end with the rear end of the table plate 17. The wall comprising the table plate and diaphragm plate is apertured, as indicated at 24, such apertures being preferably located adjacent the rear end of the table plate and being covered by reticulated screens 25, lips 26 preferably projecting downwardly and backwardly from the forward margin of these apertures. The usual forwardly projecting and downwardly inclined draft plate 27 is attached to the forward end of the plate 17.

The main section of the smoke stack 15 is permanently attached to and terminates somewhat below the top sheet of the smoke box; and a downward extension 28 interfits the main section with a rabbeted joint, as indicated at 29. This lower section of the stack is supported by the upper plate 20 of the spark eliminating element, its lower end being of substantially the same diameter as the aperture therein and having an outstanding flange 30, which is bolted to the plate, as indicated at 31. A metal spacing washer 32, of slightly greater thickness than the depth of the rabbeted joint 29 is interposed between the flange 30 and the plate 20.

The lower stack section, because of its tapering form, contributes to the reduction of the sparks and cinders, and, by reason of their abrasive action, it is subject to wear, and replacement may become necessary. The described construction renders this quite easy.

In locomotives constructed as described the smoke entering the smoke box through flue openings (not shown) in the flue plate 12 passes forwardly under the table plate 17, a portion of it, however, going through the aperture 24, and is drawn into the stack through the spark eliminating element throughout its entire circumference. The smoke carries with it out of the fire-box of the locomotive very considerable quantities of solid particles, all of which are included in the term sparks—some of them, however, being cinders, while others are composed of inflammable material, such as carbon, and are in a state of combustion. The smoke enters between the vanes of the spark eliminating element and solid particles are reduced or ground up by violent contact with the vanes 21, or by their abrasive action upon each other.

The momentum of these particles which are of any substantial size overcomes the draft and causes them to be impinged violently upon a number of the deflecting plates. As they are reduced in size by such action they yield to the draft and are carried up and discharged from the stack, but are of such small size as they issue therefrom that the sparks proper are consumed and the temperature of the cinders is reduced below the danger point, before they reach the ground or come in contact with any inflammable

material along the right of way. The solids pass up the stack adjacent to its walls, and the inclination of the walls of the lower section of the stack causes a continuation of the abrasive action.

The openings 24 contribute to the efficiency of the spark eliminator in part by breaking up the larger particles as they pass through the reticulated screens shown as covering these openings, and by distributing the reducing action of the eliminator throughout its entire circumference. It is obvious that unless the smoke were to some extent given direct access to the rearward side of the spark eliminator most of it would enter through its forward and lateral openings, and the efficiency of the device would be lessened.

By the means herein shown and described for attaching the deflecting plates and the lower stack section it is clear that they may be installed and replaced with very little labor, and without withdrawal of the locomotive from service for any great length of time.

The details of construction are not of the essence of the invention in these broad aspects, and may be varied within the scope of the appended claims.

I claim as my invention—

1. In a locomotive, in combination with the exhaust nozzle and smoke stack, a spark eliminator comprising a pair of annular horizontally disposed plates attached, respectively, to the smoke stack and the exhaust nozzle, an annular series of vertical deflector plates located between the annular plates and on similar chords thereof, and a series of angle bars permanently attached to the inner faces of the annular plates and to which the deflector plates are detachably secured.

2. In a locomotive, in combination with the exhaust nozzle and smoke stack thereof, a spark eliminator interposed between such parts and having an annular upper horizontal plate, the smoke stack comprising a fixed upper section and a lower section loosely telescopically interfitting the fixed section and having at its lower end an outstanding flange, a spacing washer located between the flange and the named plate of the eliminator, such washer being of greater thickness than the length of the joint connecting the two sections, and removable bolts for connecting together the flange, the washer and the plate.

3. In a locomotive having a smoke box, an exhaust nozzle discharging into the box and a smoke stack leading therefrom and aligned with the nozzle, a vertical diaphragm plate back of the nozzle and a table plate crossing the box the rearward end of the latter plate meeting the diaphragm plate and being apertured adjacent its juncture, and a spark eliminator interposed between the nozzle and stack and being circumferentially open.

RALPH W. ANDERSON.