

(No Model.)

W. MALAM.
LOCOMOTIVE FIRE BOX.

No. 417,059.

Patented Dec. 10, 1889.

FIG. 1.

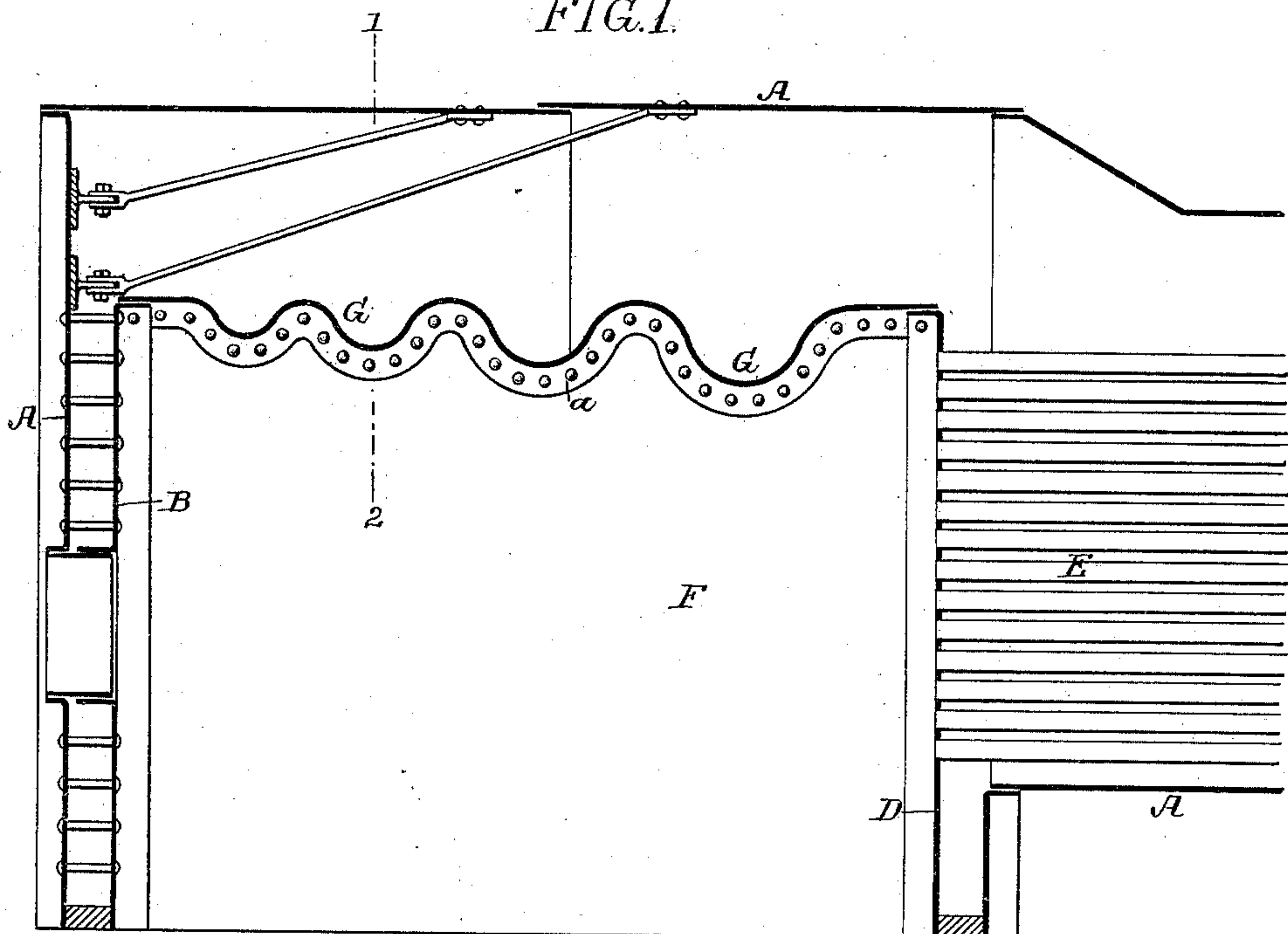


FIG.2.

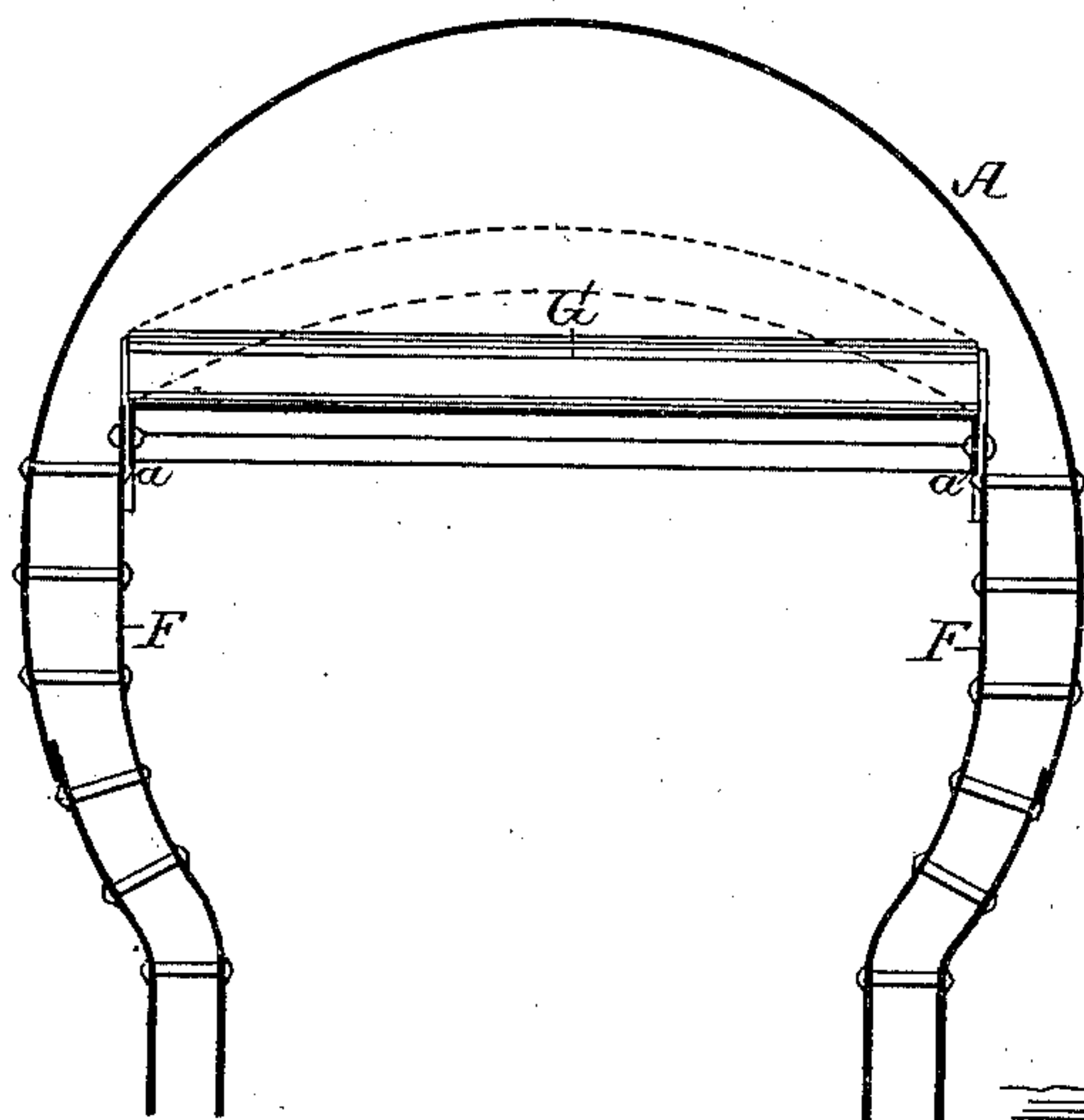


FIG. 4.

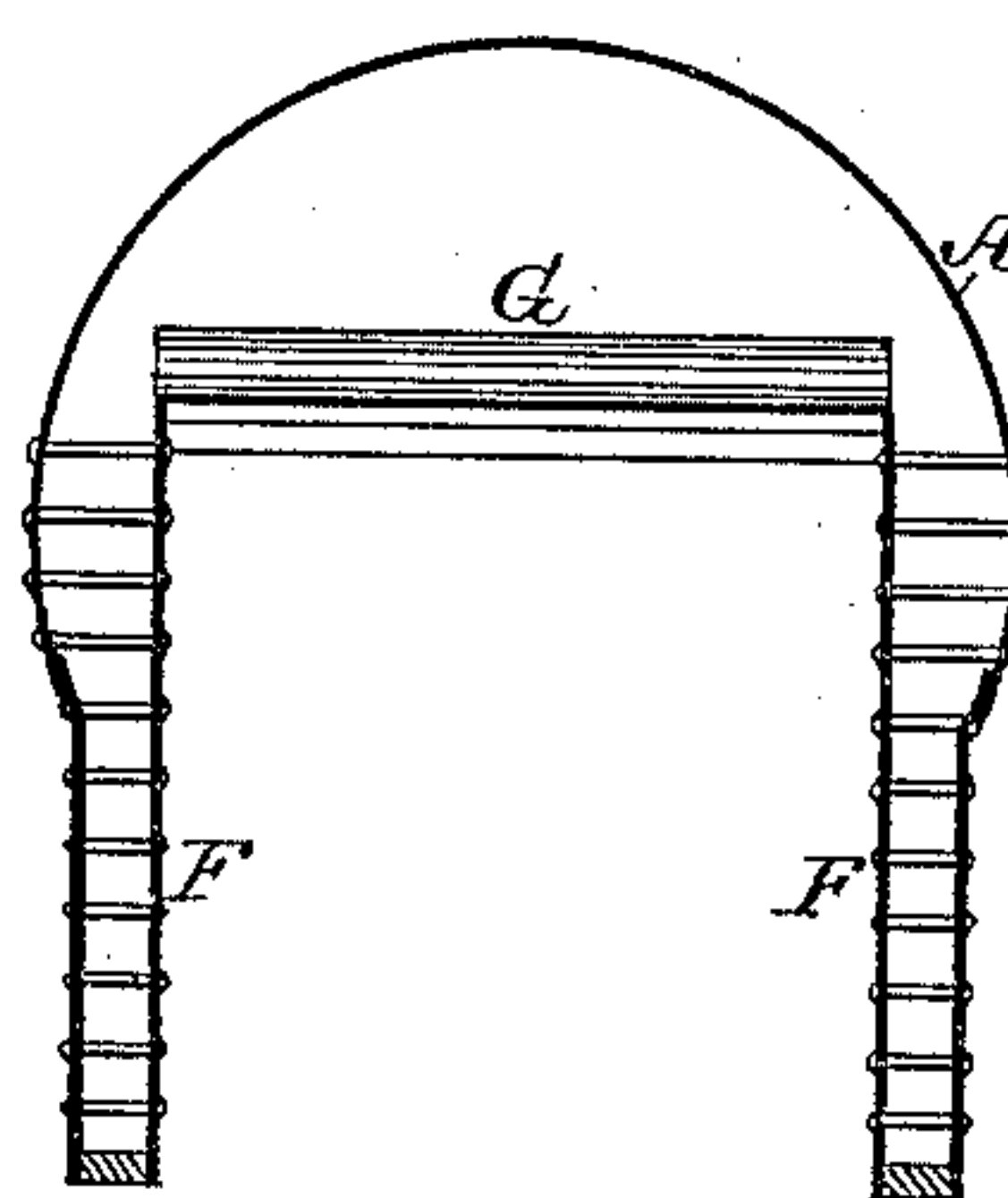
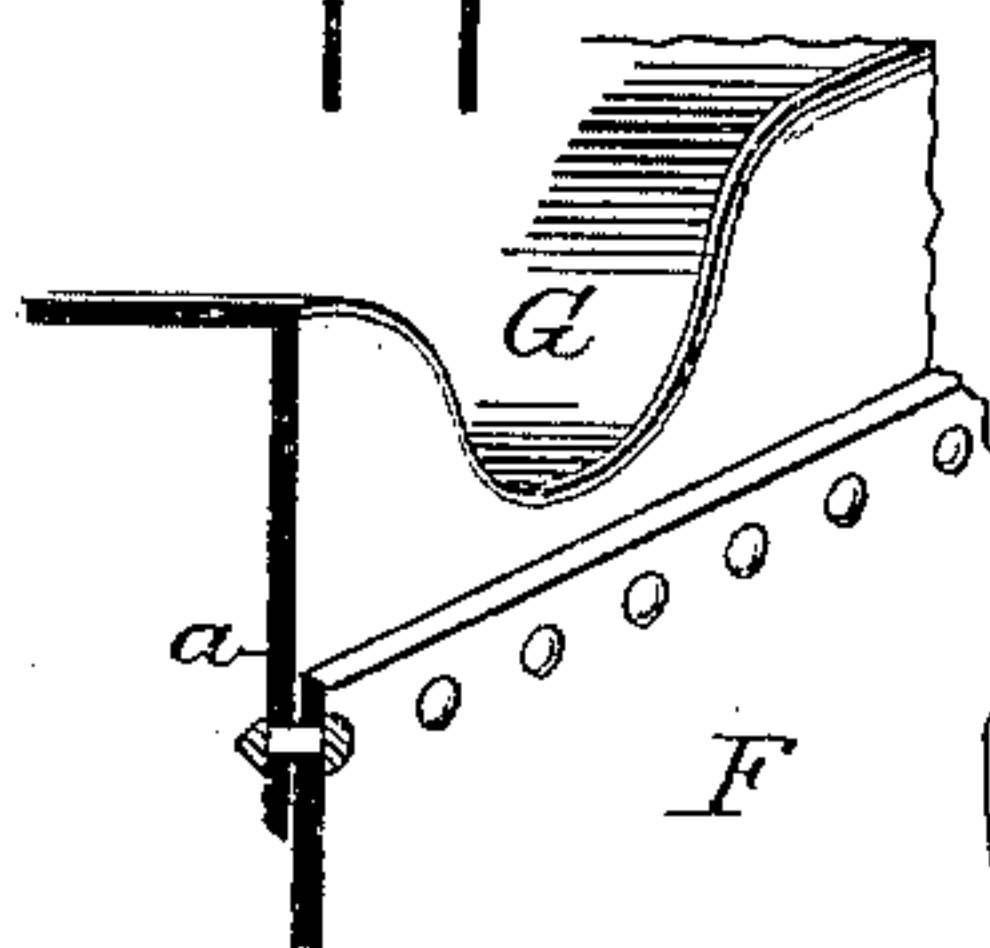


FIG.3.



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UNITED STATES PATENT OFFICE.

WILLIAM MALAM, OF EDGEMOOR, DELAWARE.

LOCOMOTIVE FIRE-BOX.

SPECIFICATION forming part of Letters Patent No. 417,059, dated December 10, 1889.

Application filed November 1, 1888. Serial No. 289,719. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM MALAM, a subject of the Queen of Great Britain and Ireland, residing at Edgemoor, New Castle county, Delaware, have invented certain Improvements in Locomotive Fire-Boxes, of which the following is a specification.

One object of my invention is to so construct a corrugated crown-sheet for the fire-box of a boiler of the locomotive type that pressure upon the crown-sheet will not cause any other than a direct vertical strain upon the side sheets of the fire-box or upon the joint formed between the upper edges of the side sheets and the flanges of the crown-sheet, a further object being to so form the corrugated crown-sheet as to insure the best heating effect.

In the accompanying drawings, Figure 1 is a longitudinal section of sufficient of a boiler of the locomotive type to illustrate my invention. Fig. 2 is a transverse section on the line 1 2, Fig. 1. Fig. 3 is a section of part of the fire-box casing on a still larger scale, and Fig. 4 is a similar view on a smaller scale and illustrating another form of fire-box to which my invention may be applied.

A represents part of the outer shell or casing of the boiler; B, the rear sheet of the fire-box; D, the front or tube sheet; E, the tubes; F F, the opposite side sheets of the fire-box, and G the crown-sheet, which is corrugated transversely, so as to impart to it such rigidity as will render unnecessary the employment of the usual crown-bars and stays for the crown-sheet.

In the boiler shown in Figs. 1 and 2 the crown-sheet has at each side a vertical flange *a*, which is riveted to the upper edge of the side sheet F of the fire-box, and the corrugations in the crown-sheet are carried out full to these flanges, so that throughout the entire length of the crown-sheet—that is to say, from the front end to the rear end of the same—the ends of the corrugations are in the same vertical planes as the sides of the fire-box. By this means the rigidity of the crown-sheet, due to the corrugating of the same, is maintained up to the very edges of the sheet; hence there is no weakening of

the sheet at or near the edges, so that the pressure upon the crown-sheet is transmitted to the side sheets of the fire-box in a true vertical plane, or in a direction transversely to the axes of the rivets. The separation of the crown-sheet from the sides of the fire-box will thus necessitate the actual shearing off of these rivets, and accidental rupture or straining of the joint is rendered extremely improbable. The opposite flanges *a* of the crown-sheet preferably follow the corrugated contour of the same, so that a longer line of rivets can be used for securing the crown-sheet and side sheets of the fire-box than if the flange and securing line of rivets were straight. A straight flange and straight line of rivets may, however, be employed without departing from my invention. (See Fig. 3, for instance.)

It will be observed, on reference to Fig. 1, that the depth of the corrugations in the crown-sheet gradually increases from the rear to the front of the fire-box—that is to say, the shallowest corrugation is adjacent to the rear plate B of the fire-box, and the deepest corrugation is adjacent to the flue-sheet D of the same—so that the deeper corrugations and the greater surface exposed to the action of the products of combustion are presented at those points where the products of combustion are hottest.

In carrying out my invention, however, it is not absolutely necessary that the corrugations should be graduated nor that the crown-sheet should be separate from the side plates of the fire-box; and in Fig. 4 I have shown an instance in which the crown-sheet and side plates are in one piece, this structure, however, showing the essential feature of the invention—that is to say, the carrying of the corrugations of the crown-sheet fully out to the edges of the same, so that the ends of said corrugations shall be in the same plane as the side sheets of the fire-box.

Although the crown-sheet shown is in one piece extending from front to rear of the fire-box, it may in long fire-boxes be composed of several sections suitably secured together. It is advisable, however, in all cases to make the crown-sheet continuous from

side to side of the fire-box; but the sheet may in some cases be arched transversely, as shown by dotted lines in Fig. 2, for instance.

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

1. The combination, in a locomotive fire-box, of the side sheets and a transversely-corrugated crown-sheet having the corrugations carried out full to the ends of the sheet
10 and sides of the box, the ends of the corrugations being in the same plane as the sides of the fire-box, substantially as specified.

2. The combination, in a locomotive fire-box, of the side sheets and transversely-corrugated crown-sheet, the corrugations of the
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crown-sheet increasing in depth from the rear to the front of the fire-box, and being carried out full to the ends of the crown-sheet and sides of the box, whereby the ends of the corrugations are in the same plane as
20 the sides of the fire-box, substantially as specified.

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

WILLIAM MALAM.

Witnesses:

WILLIAM D. CONNER,
HARRY SMITH.