

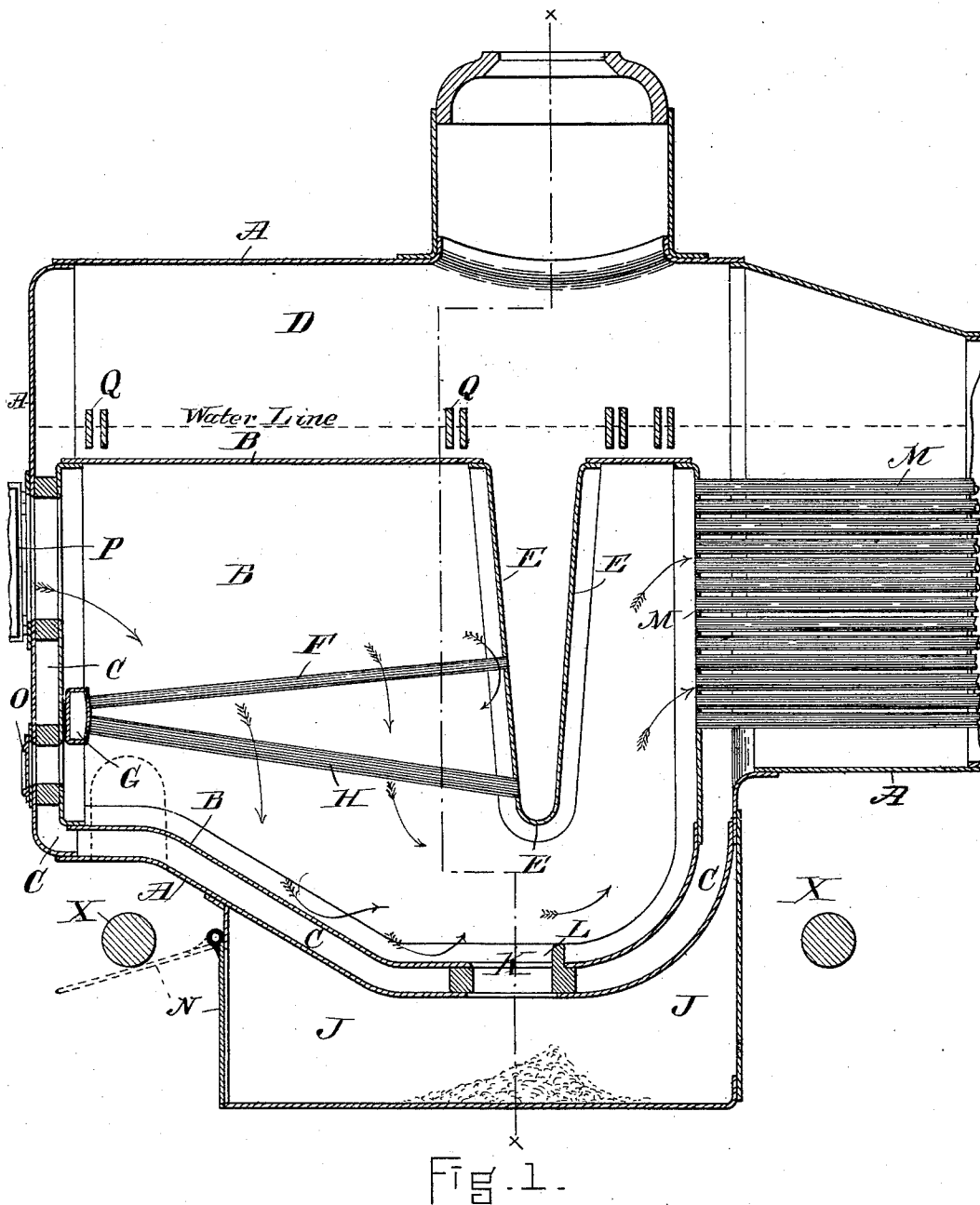
(No Model.)

2 Sheets—Sheet 1.

G. A. AYER.
FIRE BOX FOR LOCOMOTIVE ENGINES.

No. 463,090.

Patented Nov. 10, 1891.



WITNESSES,

J. Henry Marsh.
Henry H. Aiken.

INVENTOR,

George A. Ayer
by A. H. Brewer
att'y

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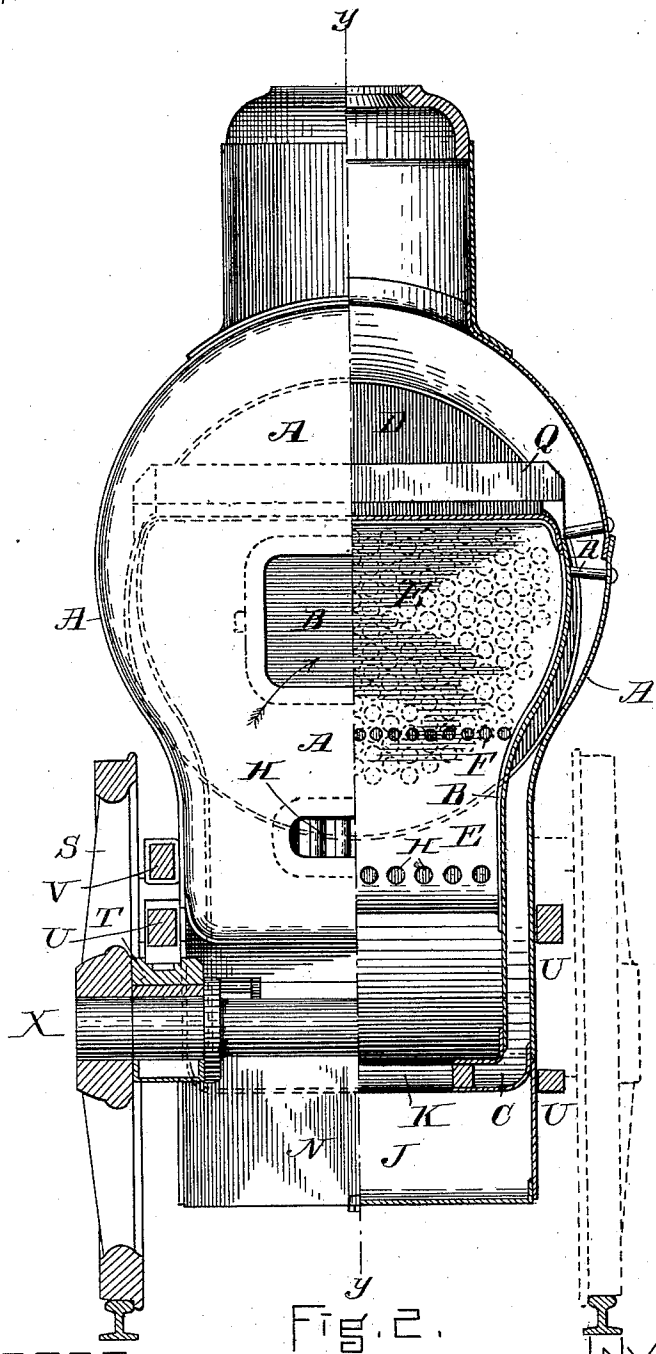


FIG. 2.

WITNESSES.

Henry Marsh.
Henry H. Finken.

INVENTOR.

George A. Ayer
by A. H. Bennett
att'y

UNITED STATES PATENT OFFICE.

GEORGE A. AYER, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO THE
COMPLETE COMBUSTION COMPANY, OF PORTLAND, MAINE.

FIRE-BOX FOR LOCOMOTIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 463,090, dated November 10, 1891.

Application filed October 24, 1890. Serial No. 369,219. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. AYER, of Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Fire-Boxes for Locomotive-Engines, of which the following, taken in connection with the accompanying drawings, is a specification.

The object of this invention is to provide a fire-box adapted to the peculiar requirements of locomotive-engines, whereby such engines may be rendered practically smokeless and highly economical of fuel, while cinders are kept from driving through the flues, and the stack and forward part of the engine may be free from the usual spark-arresting apparatus.

I utilize in my fire-box the principle of the downward draft, illustrated in the patents of Post and Sawyer, No. 351,652, dated October 26, 1886, and Kearney and Hawley, No. 393,336, dated November 20, 1888, the fuel being supported on a tubular water-grate, above which is the feed-door and draft-inlet, so that when the fire is replenished the fresh fuel is spread over the top of the incandescent mass, and the gases evolved and all other combustible products are deflected by a pendent water-leg and drawn downward into the fire and consumed, producing an intense heat in the combustion-chamber below the grate. With this construction but a limited quantity of the fine cinders commonly arrested at the front of the locomotive will be carried from the fire, and of this amount little or none will go through the flues, my improvement providing the combustion-chamber with a water-containing bottom depressed at its forward end to give increased space beneath the water-leg and a closed ash-pit below the combustion-chamber, with a door or opening across the bottom of said chamber and through its water-wall leading to the subjacent ash-pit, which is tightly closed when in use to serve as a spark-arresting chamber.

In the drawings, Figure 1 is a longitudinal vertical section of my improved fire-box; and Fig. 2, an end elevation, partly in vertical section.

A is the external shell of the boiler, and B the shell of the fire-box inclosed therein. Be-

tween these metallic shells is the water-space C, constituting a water-wall on all sides of the fire, this space increasing in width at the swell of the boiler each side of the fire, so as to give abundant escape for the steam into the steam-space D above the shell B.

E is the depending water-leg forming the inner end of the fire-box B and having upwardly-diverging walls secured to the crown-sheet and curved side walls of the fire-box and communicating freely with the steam and water spaces D C. The water-grate F projects rearwardly from the face of this water-leg to the water-box G, which is disconnected from the water-walls C and is supplied with water from said leg through the oblique circulating-pipes H in the same manner as a similar grate is supplied from the water-back in the United States patent of Post and Sawyer, No. 394,131, dated December 4, 1888. I therefore do not claim the form of grate shown and described.

The fire-box, consisting of the fuel-chamber above the grate and the combustion-chamber below it, is closed at the bottom by the water-wall C, below which is a closed ash-pit J, forming a spark-arresting chamber. A door K leads through the bottom wall C, forming a connecting-opening from the lower part of the combustion-chamber to the ash-pit or spark-chamber J. The door K extends from side to side at a point nearly beneath the water-leg E and constitutes, with the ash-pit J below it, a trap and receptacle for any small cinders or fuel particles carried downwardly by the draft. The ashes are also swept into this chamber by the current passing downwardly through the grate and over the door K to the flues M, thus leaving the caloric current deflected by the water-leg E to impinge with full force and heating power upon the practically clean water-wall C at the bottom of the combustion-chamber.

A very great increase in the steaming capacity of the boiler results from this construction, since the water contained within this bottom wall is heated not only by the direct action of the downward current but by the reflex action of the hot ashes below it in the chamber J, which, in addition, prevents exposure of the bottom wall C to the outer air

with the cooling effect incident thereto. The inclination of a portion of this bottom wall promotes circulation of the water and facilitates the removal of ashes from its surface by the caloric current. At the forward edge of the door K a transverse ledge L, of fire-brick or of water-wall, may be raised somewhat above the general level to arrest particles driven forward by the blast and permit them to drop downwardly into the pit J. The ashes are removed at the roundhouse through a door N at the rear end of the pit J. Any remaining in the combustion-chamber may be dislodged by opening a door O at its rear end below the grate. These doors N O are kept closed during the running of the engine. The draft is through the feed-door P, and thence downwardly through the fire and between the several tubes F of the grate and the several circulating-pipes H, as indicated by the arrows, Fig. 1. The usual artificial draft is employed. The boiler will have crown-bars Q and stay-bolts R when required.

Part of a wheel S and journal-bearing T are represented in Fig. 2 with frame-bars U and spring V in section.

X is the axle.

The inclination of the bottom wall of the combustion-chamber has the further advantage of enabling the rearward portion to be above the axle X, to be reached from the cab through the door O, while the forward part droops to a point well below and midway between the two axles, giving space beneath the grate and each side of the water-leg for combustion of the gases, the inclined bottom wall deflecting the downward caloric current toward the front. Workmen can enter this de-

pressed portion of the combustion-chamber for setting the flue or grate tubes by means of the door N of the ash-pit and the door K through the bottom wall C.

Forward of the door K the bottom water-wall inclines upwardly on a curve, and this portion of the wall receives the impact of the caloric current as it passes beneath and behind the water-leg to the horizontal flues M.

I claim as my invention—

1. In a locomotive fire-box, the fuel-chamber closed at its inner end by a depending water-leg with a water-grate extending rearwardly therefrom, and a draft-door above such grate, in combination with the combustion-chamber below the grate and the water-wall C, forming the bottom of said chamber, depressed at its forward end between the axles of the locomotive and inclined upwardly toward its rear end, substantially as set forth.

2. In a locomotive fire-box, a water-grate and a depending water-leg enforcing a downward draft through said grate, in combination with a water-wall forming the bottom of the fire-box, a door or opening through such wall at the foot of its inclined rear portion, and a closed ash-pit beneath such door and wall, substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 25th day of September, A. D. 1890.

GEORGE A. AYER.

Witnesses:

GEORGE W. NORTON,
JOHN B. KELIVE.