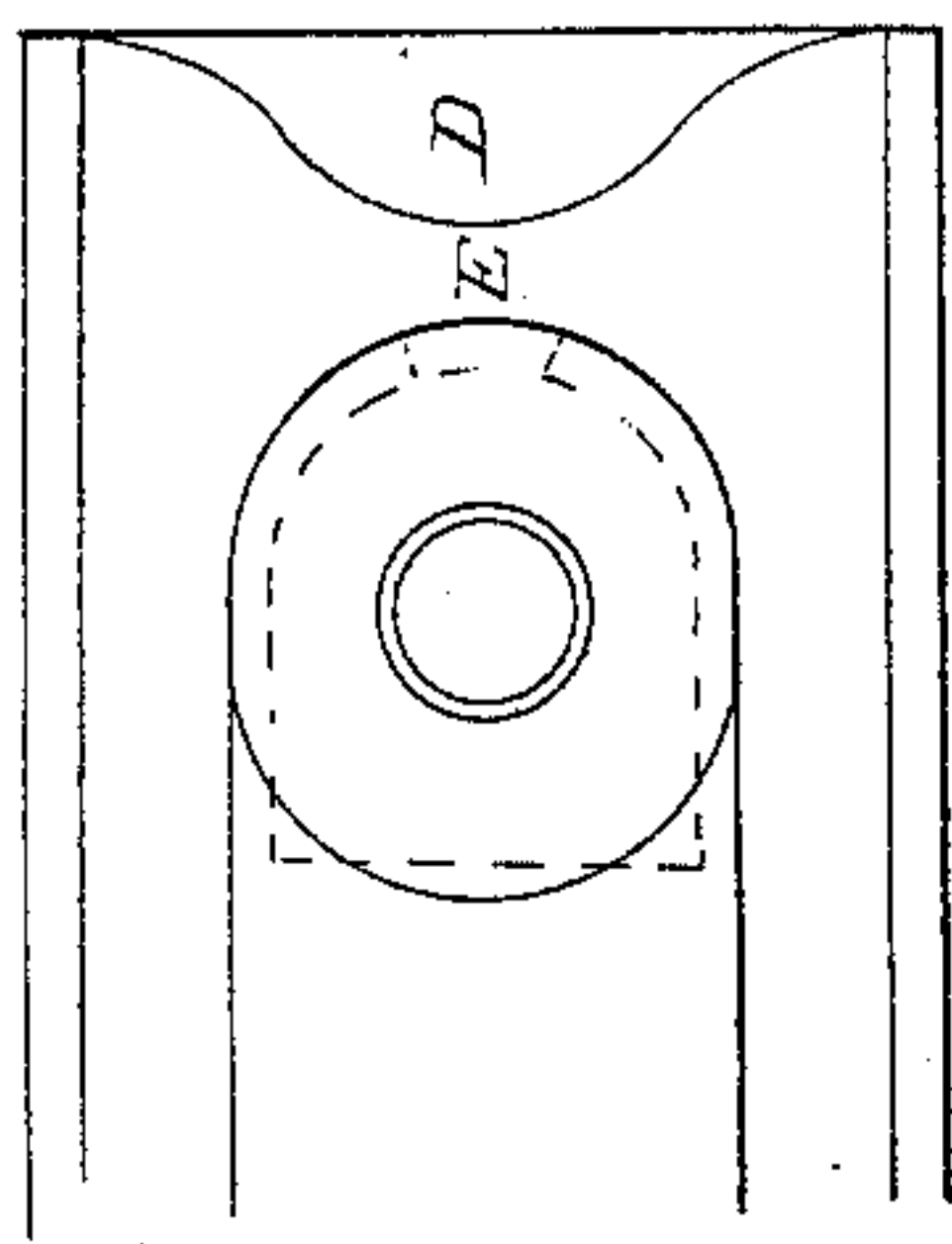


*R. Winans,*  
*Steam-Boiler Furnace,*

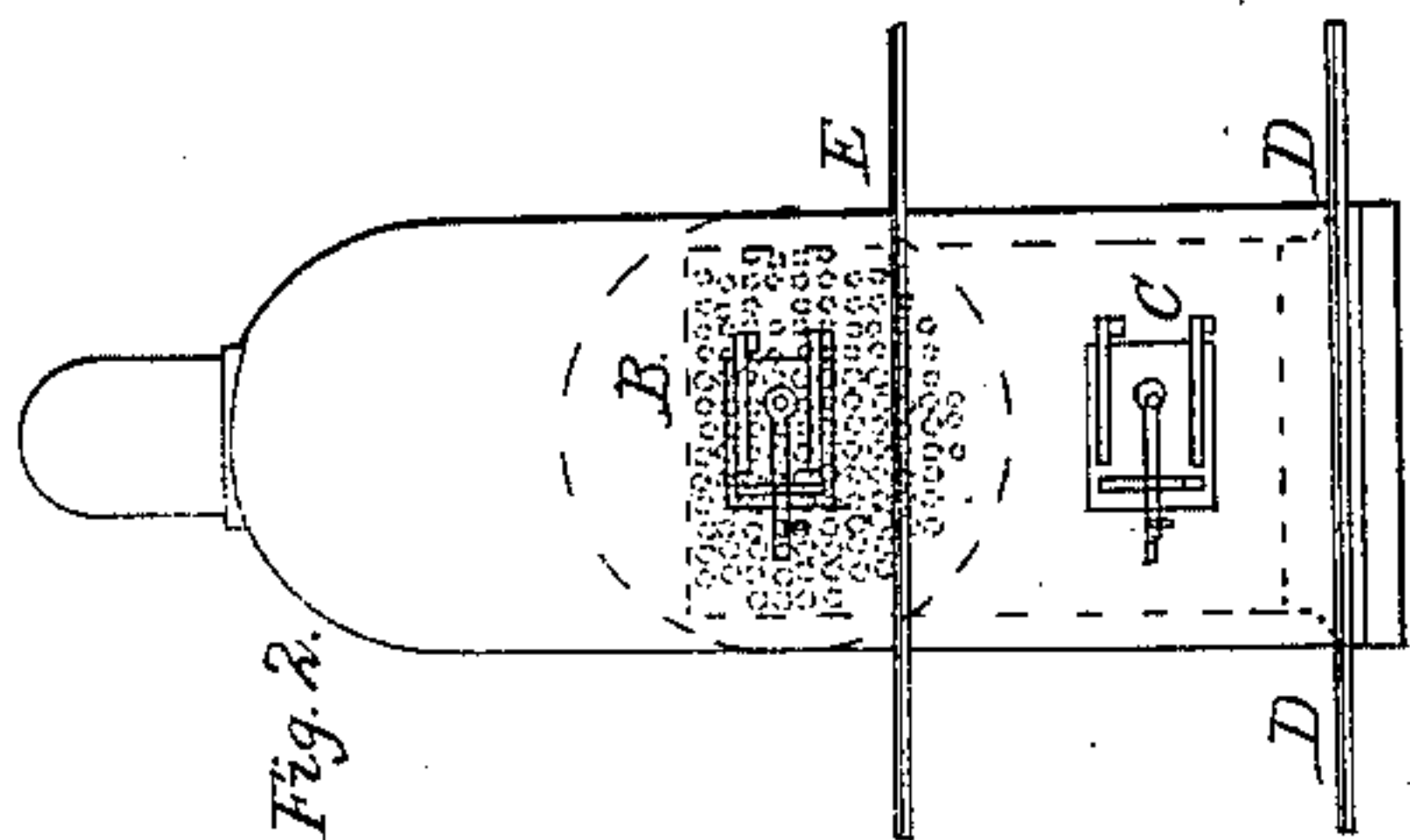
*N<sup>o</sup> 20,114,*

*Patented Apr. 27, 1858.*

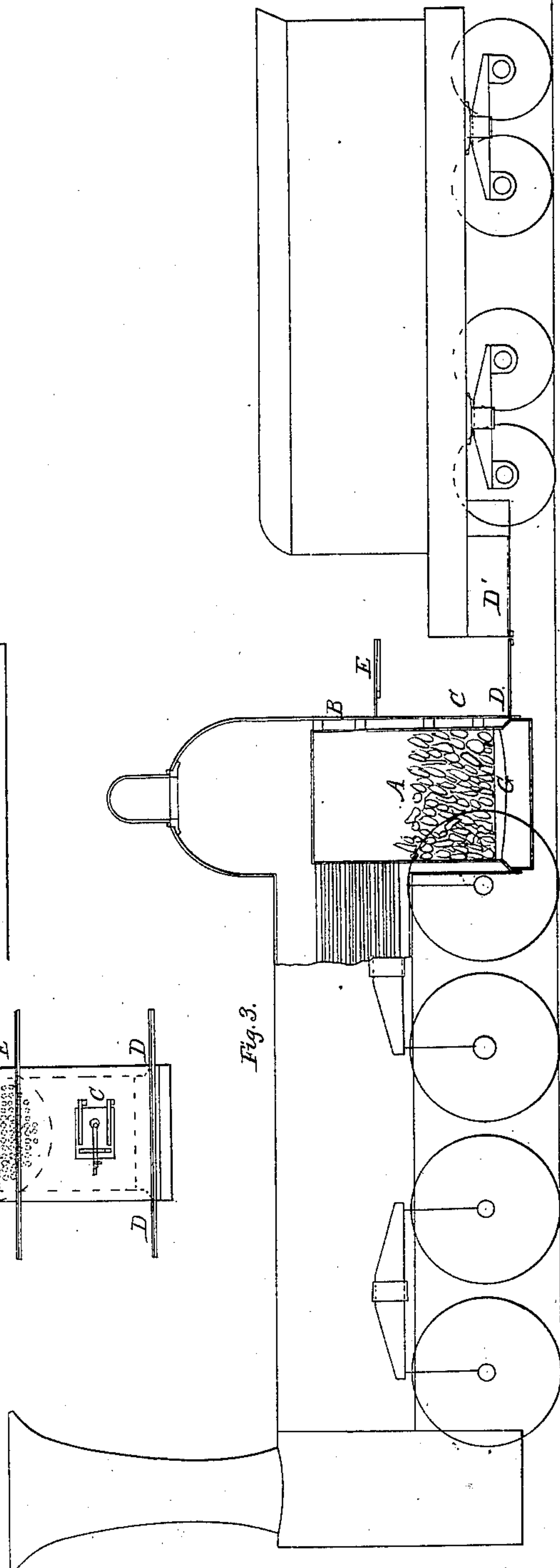
*Fig. 1.*



*Fig. 2.*



*Fig. 3.*



*Witnesses.*

*Wm. H. Ralston*  
*Phil. W. Ralston*

*Inventor*

*R. Winans*

# UNITED STATES PATENT OFFICE.

ROSS WINANS, OF BALTIMORE, MARYLAND.

## FIRE-BOX OF LOCOMOTIVE-ENGINE BOILERS.

Specification of Letters Patent No. 20,114, dated April 27, 1858.

*To all whom it may concern:*

Be it known that I, ROSS WINANS, of Baltimore, in the State of Maryland, have invented a new and useful Improvement in Locomotive-Engines for Railroads, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, in which—

Figure 1, represents a plan of the hinder end of a locomotive, with my invention applied thereto; Fig. 2, an end elevation of the same, and Fig. 3, represents a side elevation of a locomotive and its tender, with a portion of the side of the boiler removed, to show the construction and arrangement of the fire-box and its appurtenances.

The object of my invention is to adapt a locomotive to the employment of both wood and coal as fuel and to the use of either separately, with advantage.

In locomotives, as ordinarily constructed the fire-door or opening through which the fuel is fed into the fire-box is situated near the roof of the fire-box and opposite the open extremities of the tubes or flues through which the flame passes to the smoke-stack or chimney. This location and arrangement of the fire-door is both necessary and desirable when wood is used as fuel, because a great depth of wood has to be maintained in combustion in order to furnish sufficient body of fire to supply the requisite heat, and as this depth of burning fuel is attained by filling the fire-box, as full as possible, with wood, the fresh fuel which has to be thrown on top of that in the fire-box must be fed through a door situated near the roof thereof. In burning coal the circumstances are altered, as coal, and particularly bituminous coal, will burn freely only when distributed in a stratum of a few inches in thickness upon the grate bars. It is also necessary when coal is used that some means should be provided by which the fireman can obtain easy access to the grate bars to clean the fire and to drain it from the fire-box when the day's work is completed or when clinkers have accumulated to such an extent as materially to impede the combustion of the fuel. There is also a difficulty in feeding bituminous coal to the fire-box through a door near the roof thereof, arising from the fineness of many of the particles of the coal. It is well known that when a locomotive is in operation a violent draft is maintained from

the fire-box into and through the flues by the discharge of the exhaust into the chimney. If then fine coal be thrown into the fire-box through a door near the roof thereof, so that in dropping down to the level of the fire the coal has to pass the open extremities of the flues, the fine coal will be carried by the draft into the flues, where it will lodge and materially impede the production of steam. In order to obviate these difficulties and to render a locomotive capable of burning either wood or coal with advantage, which on some of the longer lines of railroad is important, as portions of such roads can be most conveniently supplied with wood while other portions can be more conveniently and economically supplied with coal, I have combined two doors with the fire-box, the one located and arranged near the roof of the fire-box in the usual position and the other near the level of the grate bars thereof, so that while the upper door is in the best position for feeding wood to the fire the lower door is well adapted to the feeding of coal, cleaning the grate bars from clinker, breaking up cakes, raking out the fire, &c.

It is of great advantage in a coal burning locomotive to get up the steam with wood, for coal lights and burns very slowly with the slow draft of the chimney unaided by the exhaust which of course is only available after the steam is raised and the engine in motion. The arrangement I have here devised, of the two doors, admits of the convenient use of wood to get up steam to start the engine. When, however, the locomotive commences running, so that the exhaust is rendered available to produce a sufficient draft to burn coal, the latter may be thrown in upon the wood through the upper door and afterward, when the fire sinks down by the burning away of the wood, the coal can be fed through the lower door, the upper one remaining closed. The location of the lower door near the grate enables the fireman to draw the fire from the fire-box when this operation becomes necessary. It also enables him to break up the cakes of coal and clear the grate bars of clinkers, with a poker, without drawing the fire. Moreover, this lower door is in a convenient position for lighting the fire and gives convenient access to the interior of the fire-box for repairs, even when wood alone is used as fuel.



In the locomotive represented in the accompanying drawing the fire-box (A) is situated as usual, at the hinder extremity of the boiler, and is fitted with a suitable grate (G). The upper fire-door (B) is located near the roof or crown sheet of the fire-box; and the lower door (C) is located near or at the level of the grate-bars. The doors in this instance consist of openings made through the water-space which forms the hinder end of the fire-box, which openings are fitted with hinged doors. In order to charge fuel with more facility through the upper door (B) and to furnish a stand for the engineer a foot-board (E) is located beneath it and a similar foot-board (D) is located beneath the lower fire-door (C). The upper foot-board is indented, as shown in

Fig. 1, to give more room for the fireman when working on the lower foot-board. 20

What I claim as my invention and desire to secure by Letters Patent is—

The combination of a fire-box having one grate and an upper and lower feeding door, so arranged as to adapt it to burning either wood or coal, or a mixture of both, as fuel, with a locomotive tubular boiler having a steam-blast draft substantially as herein set forth. 25

In testimony whereof, I have hereunto subscribed my name. 30

ROSS WINANS.

Witnesses:

OSMUN LATROBE,  
JEWETT GROVE.