

Feb. 19, 1952

C. K. STEINS

2,586,109

LOCOMOTIVE

Filed Sept. 1, 1945

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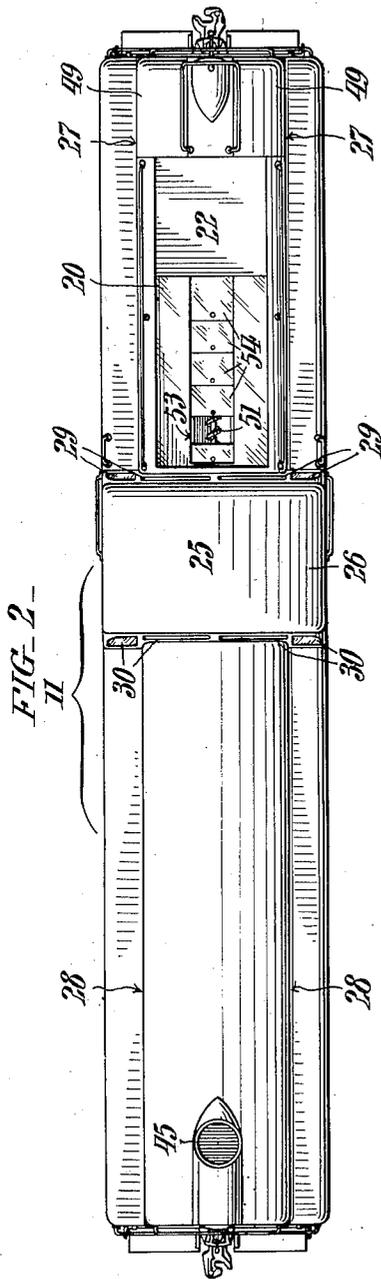


FIG. 2-

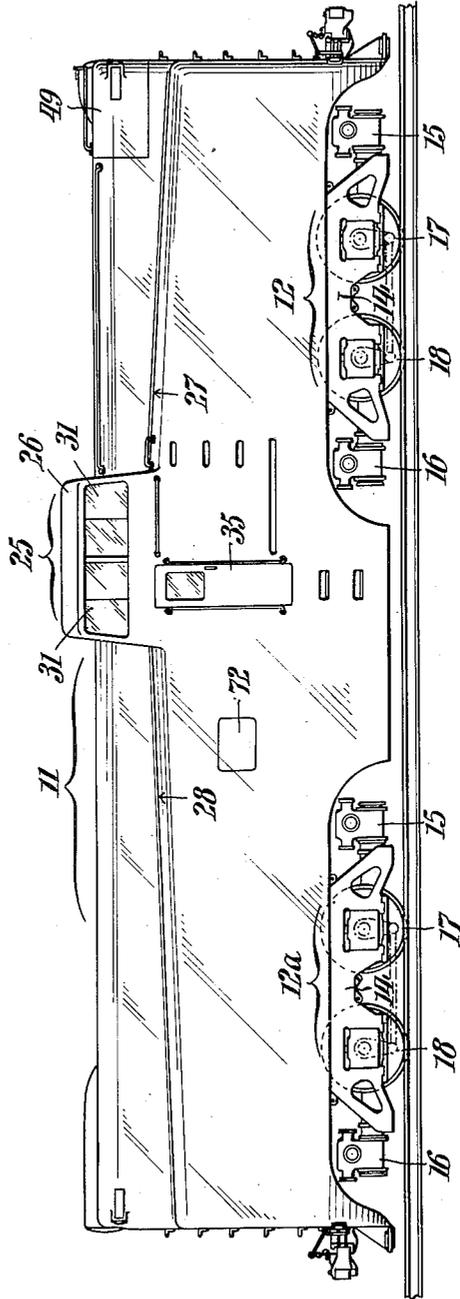


FIG. 1-

WITNESSES  
*Hubert Fuchs*  
*Anthony Del Viscio*

INVENTOR:  
*Carleton K. Steins,*  
 BY *Paul & Paul*  
 ATTORNEYS.

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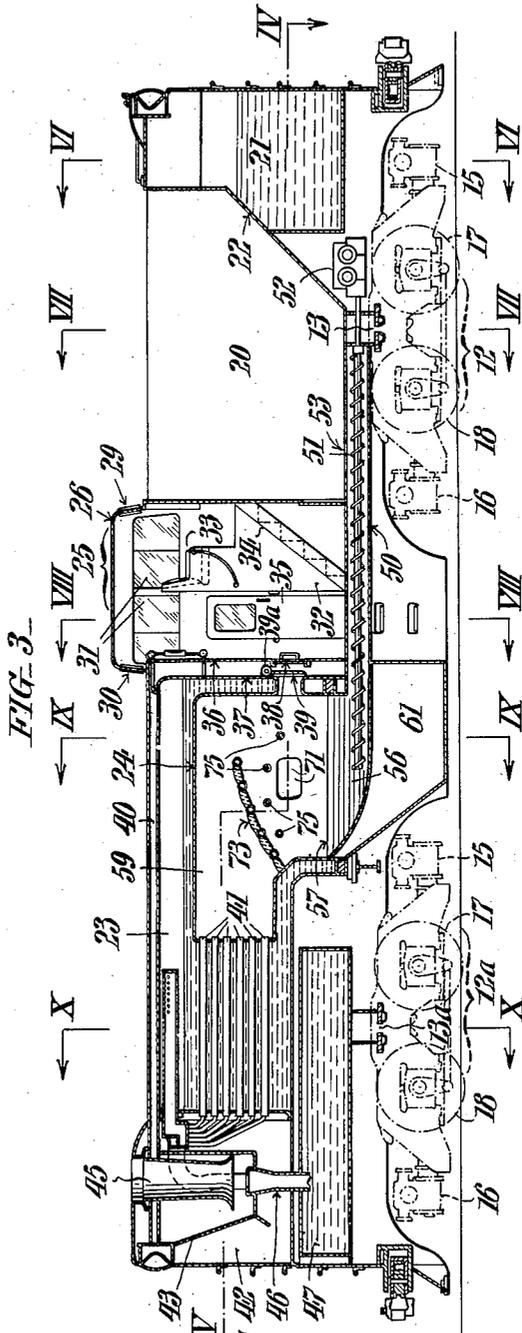
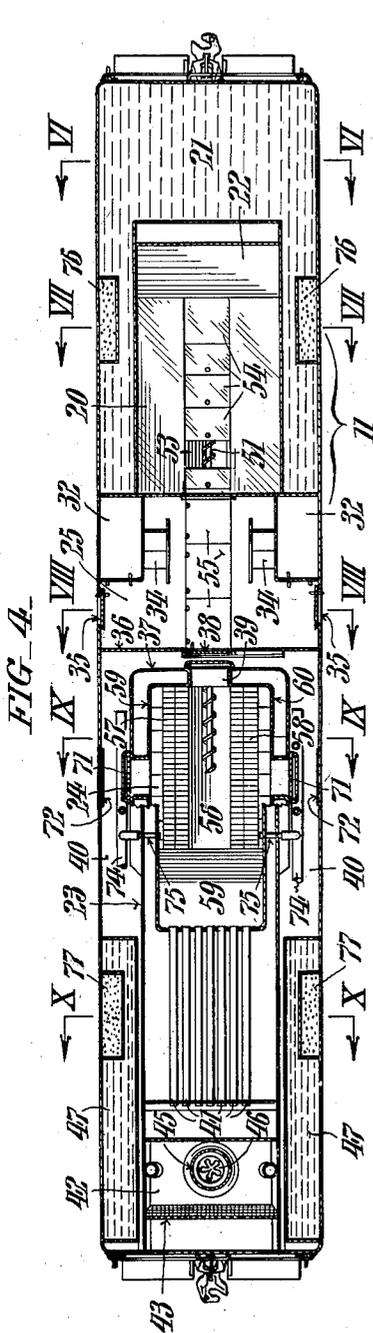
C. K. STEINS

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WITNESSES  
*Hubert Fuchs*  
*Anthony Del Viscio*

INVENTOR:  
*Carleton K. Steins,*  
 BY *Paul Paul*  
 ATTORNEYS.

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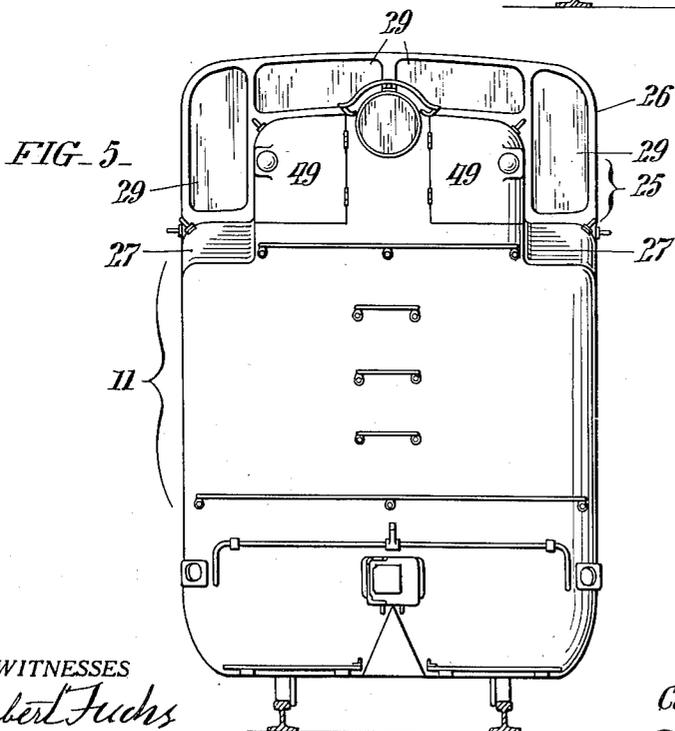
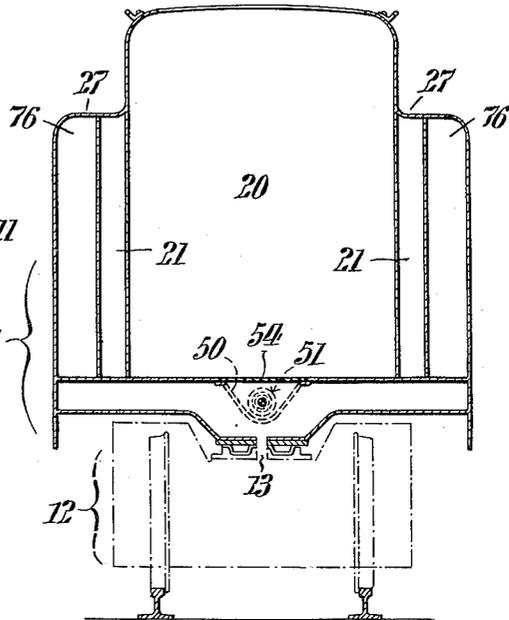
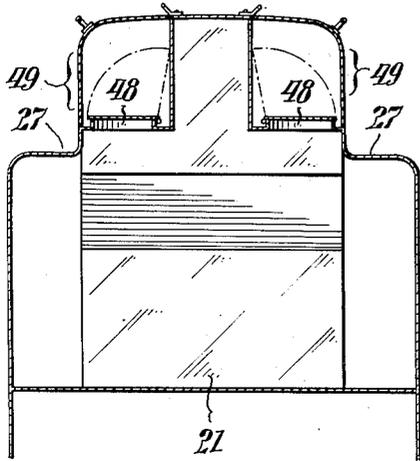
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FIG. 6.

FIG. 7.



WITNESSES  
*Hubert Fuchs*  
*Anthony Del Vescio*

BY

INVENTOR:  
*Carleton K. Steins,*  
*Paul Paul*  
 ATTORNEYS.

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C. K. STEINS

2,586,109

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FIG-8

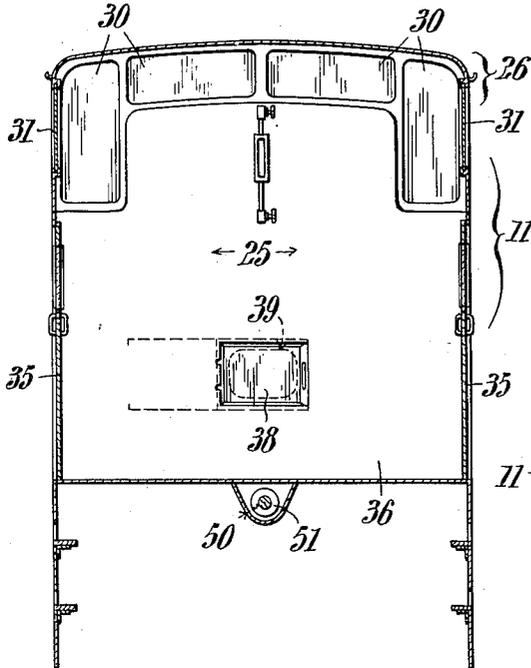


FIG-9

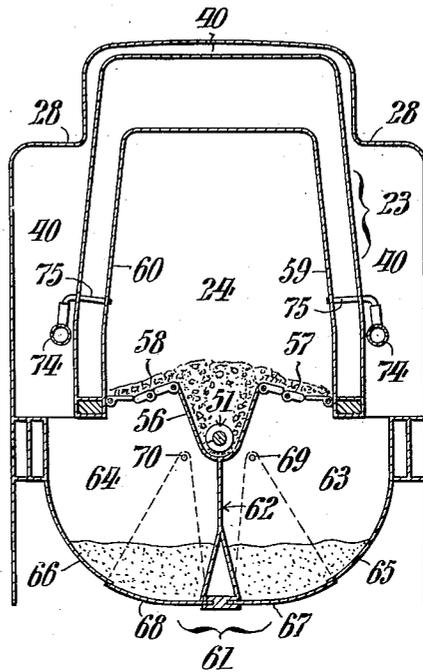
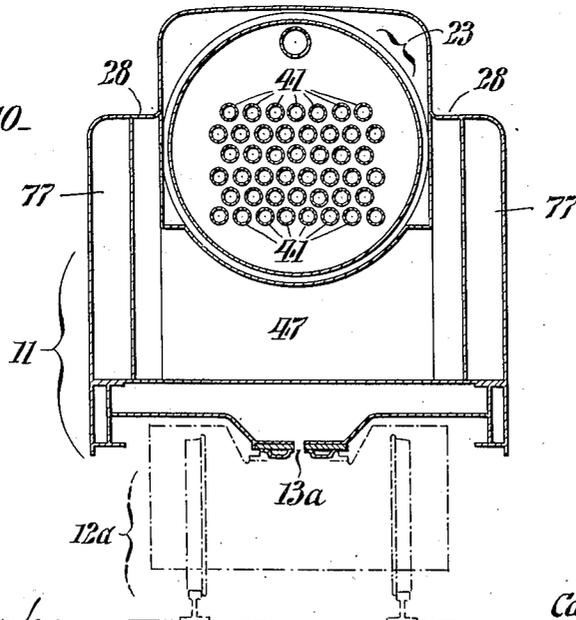


FIG-10



WITNESSES  
*Hubert Fuchs*  
*Anthony Del Vescio*

BY

INVENTOR:  
*Carleton K. Steins,*  
 BY *Paul Paul*  
 ATTORNEYS.

# UNITED STATES PATENT OFFICE

2,586,109

## LOCOMOTIVE

Carleton K. Steins, Philadelphia, Pa., assignor to  
The Pennsylvania Railroad Company, Philadel-  
phia, Pa., a corporation of Pennsylvania

Application September 1, 1945, Serial No. 614,055

9 Claims. (Cl. 105—37)

1

This invention relates to locomotives, and has reference more particularly to steam locomotives of shifter type ordinarily used in railway terminals, freight yards or in making short hauls.

Amongst the aims of my invention are to attain in locomotives of the kind referred to, the advantages resulting from greater compactness; to secure increased tractive power with greater economy in fuel consumption; to so construct and arrange their various appurtenances in such a way that the load may be most effectively apportioned at all times between the driving wheels; and to afford greater comfort as well as forward, rearward and lateral visibility to the crew incident to the operation of such locomotives.

How the foregoing and other objects and attendant advantages can be readily realized in practice will appear from the following detailed description of the attached drawings, wherein:

Fig. 1 is a view showing my improved locomotive in side elevation;

Fig. 2 shows the top plan of the locomotive.

Fig. 3 shows the central longitudinal section of the locomotive.

Fig. 4 is a horizontal section taken as indicated by the angled arrows IV—IV in Fig. 3.

Fig. 5 shows the front end elevation of the locomotive.

Figs. 6, 7, 8, 9 and 10 are transverse sectional views taken as respectively indicated by the angled arrows VI—VI, VII—VII, VIII—VIII, IX—IX, and X—X in Figs. 3 and 4.

As herein delineated, my improved locomotive has its body 11 supported adjacent the front and rear ends by four wheeled trucks 12 and 12a which have swivel connections at 13 and 13a (Fig. 3) with said body. Mounted on the frame 14 of each truck are two engines 15 and 16 each of which, through suitable gearing (not illustrated), drives the wheels 17 and 18. The wheels 17 and 18 may be link connected as shown, and the engines operated in out of phase relation. Although the engines 15 and 16 are shown as being of the reciprocating type, rotary or turbine engines may be substituted. As another alternative, a single larger engine may be employed on each truck with the wheels connected by side rods, and the trucks provided with additional driving wheels if desired.

Within the body 11, at the front end over the truck 12, are a fuel compartment 20 and a water compartment 21, which latter is U-shaped in plan as best seen in Fig. 4, and extends across the front and along the sides of said fuel compartment. The fuel compartment is so propor-

2

tioned as to hold a supply sufficient to operate the locomotive for several days. When used for coal as in the present instance, the fuel compartment 20 is left open at the top and provided with a slope 22 for deflecting the coal rearward as it is being used up. Longitudinally arranged within the other end of the body is a horizontal boiler 23 with its fire box 24 forward; and intermediate the fuel storage compartment 20 and said boiler approximately mid-way of the length of the locomotive, the body affords a compartment or cab 25 for the engine crew. As shown, the cab 25 is extended upward above the main portion of the body as at 26, and said body is recessed longitudinally of its opposite sides at the top both forwardly and rearwardly of the cab as at 27 and 28. From this construction result forwardly and rearwardly extending cat-walks which are slightly sloped downwardly toward the opposite ends of the locomotive as best seen in Fig. 1, with clearances for the unobstructed vision in both directions from the cab 25, which, in its upwardly projecting portion 26 is provided with windows 29 and 30, front and back, as well as with windows 31 at the sides.

Set apart by partitioning within the cab 25 to opposite sides of a center aisle are locker cabinets 32 for use by the locomotive crew; and surmounting these cabinets are seats 33 for the locomotive crew which are reached by individual ladders indicated at 34. The cab 25 is entered from either side of the locomotive by way of doors 35 in the side walls of the body 11. The rear wall partition 36 of the cab 25 is spaced a very liberal distance from the front wall 37 of the fire box 24 of the boiler 23, and is provided with a laterally sliding transparent closure 38 (Figs. 3 and 8) permitting access to the furnace door 39 when necessary. This furnace door is likewise endwise slidable and operable by a motor conventionally indicated at 39a in Fig. 3 and controlled through suitable means (not shown), from within the cab 25. The interval thus provided acts as a barrier to prevent radiation of the heat from the fire box 24 to the cab 25 for the greater comfort of the crew, and in practice, may be packed, together with the space 40 (Figs. 3, 4, 9 and 10) at the sides and over the top of the boiler, with asbestos wool or other suitable thermal insulation.

The boiler 23 is represented as being of the fire tube type with its rear end portion extending over the truck 12a of the locomotive. The products of combustion, after having traversed the fire tubes 41, enter a smoke box 42 at the extreme

rear end of the body, and pass by way of a screen 43 into the bottom of a depressed stack 45 within said smoke box. An upwardly directly nozzle 46, connected to one or more of the truck engines by suitable conduiting (not shown), discharges exhaust steam into the bottom of the stack 45 for the purposes of draft acceleration.

Also located in the rear end of the body 11 over the rear truck 12a is an auxiliary water compartment or tank 47 which extends crosswise beneath, as well as upward of, opposite sides of the boiler 23 and the smoke box 42 (Figs. 3 and 10). Due to this construction and arrangement the water to be used in the boiler is effectively pre-heated before its injection which may be accomplished in a well known way. In actual practice, provisions (not illustrated) are made by which water may be transferred either under manual or automatic control from the rear water compartment 47 to the front water compartment 21 to compensate for the loss in weight of the fuel as it is being consumed, and transferred back to said front compartment from the said rear compartment when the locomotive is refueled, so that the load may be effectively distributed between the two trucks 13 and 13a at all times. This last described feature, per se, constitutes the subject matter of a separate patent application Serial Number 557,814, filed by me on October 9, 1944, now U. S. Patent No. 2,413,119, dated December 24, 1946. As shown in Figs. 1, 5 and 6, the front water compartment 21 has filler openings 48 which are accessible upon retraction of the hinged shoulder portions 49 of the body shell. The water in the rear compartment 47 may be replenished through similar construction at the rear end of the locomotive.

The coal is transferred from the storage compartment 20 to the fire box of the boiler 23 through a longitudinally-arranged conduit 50 which extends beneath the cab 25 and in which operates a screw conveyer 51 driven by a small engine or motor indicated at 52 in Fig. 3. The coal gravitates into the conduit 50 by way of a central slot 53 in the bottom of the storage compartment 20, said slot having a plurality of covers 54, varying numbers of which may be retracted or withdrawn as necessary for maintenance of the desired rate of feeding. Removable cover plates 55 are also provided in the floor of the cab 25 permitting access to the conduit 50 when necessary or desired. By action of the screw conveyer 51, the fuel is delivered into a longitudinally-arranged trough 56 centrally of the bottom of the fire box 24 (Figs. 3 and 9) from which it spills over laterally onto outwardly and downwardly inclined grates 57 and 58 bridged between the side edges of the trough top and the side walls 59 and 60 of the fire box (Fig. 9). As the coal is consumed, the ashes pass through the grates 57 and 58 and drop into an underlying ash pan 61 which extends downwardly from the car body 11 in the interval between the two trucks 12 and 12a. As shown in Fig. 9, the ash pan 61 is subdivided, by a central lengthwise-extending partition 62, into two pockets 63 and 64 whereof the bottoms are complementally rounded as at 65 and 66 and provided with dump openings having suspended closures 67 and 68 pivoted respectively at 69 and 70 which may be arranged for either manual or power operation. The ash pan 61 is so dimensioned as to hold the ashes corresponding to a full loading of the coal, so that dumping need not be resorted to until re-fueling of the locomotive is necessary. At each side, the fire

box 24 has a clean out door 71 which may be reached by opening a panel door 72 in the corresponding side wall of the locomotive body, see Figs. 1, 4 and 9. For the purposes of increased efficiency, the fire box is moreover provided with a transversely-extending baffle or arch 73 of fire brick which defines a circuitous course for the gaseous products of combustion, and, for the purposes of smoke abatement, with tubes 74 having nozzles 75 for injecting additional combustion-supporting air over the fuel bed from opposite sides, see Figs. 3, 4 and 9. It is to be noted that the tubes 74 extend longitudinally of the locomotive within the intervals 40 between the sides of the fire box and the side walls of the body 11.

For convenience of carrying sand, I have set apart at each side of the locomotive within the water compartments 21 and 47 and in the transverse planes through the truck centers, vertical hollows serviceable as sand storage boxes which are respectively shown at 76 and 77 in Figs. 4, 7 and 10.

The intended normal direction of the locomotive is rightward in Fig. 3, although, as will be readily seen, it can be as easily run in the opposite direction since the cab is provided with windows at the back as well as at the front.

From the foregoing it will be evident that I have provided a shifting locomotive which is small and compact, having a relatively short wheel base for capacity to take track curves of short radius; which is none the less powerful and economic from the standpoint of steam generation; and in which the crew is shielded from the head radiated from the boiler and its fire box.

Having thus described my invention, I claim:

1. In a locomotive, a body supported at opposite ends by separate powered wheel trucks; a boiler extending longitudinally of the body, with provision of interspaces between it and the opposite side walls of the body, and having its fire box located between the trucks; clean out doors at opposite sides of the fire box; and aligned doors in opposite sides of the body by way of which access is had to said clean out doors.

2. In a steam locomotive, a closed body supported at opposite ends by powered bogie trucks, a fuel storage compartment in one end portion of the body, a horizontal boiler longitudinally within the other end portion of the body, a cab for the operating crew medially of the body between the fuel compartment and the boiler, the fire box end of the boiler being contiguous to the cab, and a feed water storage compartment extending crosswise of the locomotive between the bottom of the boiler and the corresponding truck and also upward of opposite sides of the boiler in longitudinal spaces between the boiler and the side walls of the body.

3. A steam locomotive according to claim 2, with a main water storage compartment extending crosswise of one end and along opposite sides of the fuel compartment.

4. A steam locomotive according to claim 2, with a main water storage compartment extending crosswise of one end and along opposite sides of the fuel compartment, and with vertical hollows for sand storage disposed within the side portions of the two water storage compartments in the transverse planes through the truck centers.

5. In a steam locomotive, a body supported at opposite ends by powered bogie trucks, a fuel storage compartment in one end of the body, a horizontal boiler longitudinally within the other

5

end of the body, a cab for the operating crew medially of the body between the fuel compartment and the boiler, the fire box end of the boiler being contiguous to the cab and the smoke box and flue being at the opposite end of the boiler, and a feed water storage compartment extending crosswise of the locomotive between the bottom of the boiler and the corresponding truck and upward of opposite sides of the boiler and of the smoke box.

6. In a steam locomotive, a body supported at opposite ends by powered bogie trucks and having straight flush side walls from end to end, a fuel compartment in one end portion of the body, a horizontal boiler disposed longitudinally within the other end portion of the body with spaces intervening its side walls and the side walls of the body, a cab for the operating crew medially of the body between the fuel compartment and a feed water storage compartment extending crosswise of the locomotive between the bottom of the boiler and the corresponding truck and having portions extending upward in the spaces between the opposite side walls of the body and of the boiler.

7. In a steam locomotive, a body supported at opposite ends by powered bogie trucks and having straight flush side walls from end to end, a fuel compartment in one end portion of the body, a horizontal boiler disposed longitudinally within the other end portion of the body, spaces intervening the side walls of the body and the side walls respectively of the fuel storage compartment and of the boiler, a main water storage compartment with portions extending up within the intervals between the side walls of the body and the fuel compartment, and an auxiliary water compartment with a portion extending crosswise of the locomotive between the bottom of the boiler and the corresponding truck and portions extending upward into the spaces between the opposite side walls of the body and of the boiler.

8. A locomotive according to claim 7, where-in partitioning within the upwardly extending

6

side portions of the water compartments at opposite ends of the body set apart vertical hollows for sand storage in the transverse planes of the respective end trucks.

9. In a steam locomotive, a body supported at opposite ends by powered bogie trucks, a fuel storage compartment in one end portion of the body, a horizontal boiler longitudinally within the other end portion of the body, a cab for the operating crew medially of the body between the fuel compartment and the boiler, the fire box end of the boiler being contiguous to the cab, conveyor means for feeding fuel from the fuel storage compartment beneath the cab and into the fire box of the boiler; an ash pan extending down from the fire box between trucks, clean out doors at opposite sides of the fire box, and aligned doors at opposite sides of the body by way of which access is had to said clean out doors.

CARLETON K. STEINS.

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