

Sept. 10, 1935.

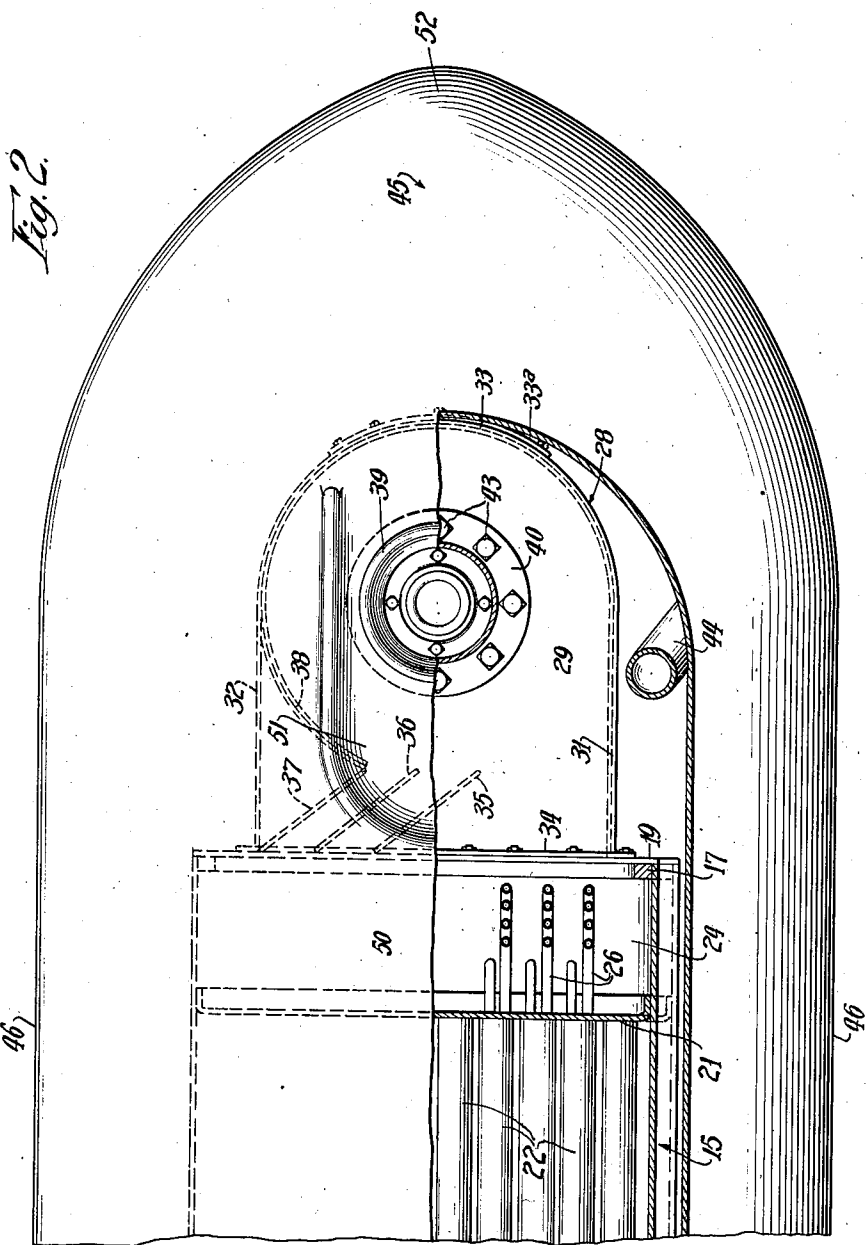
R. A. CARR

2,013,682

LOCOMOTIVE

Filed Dec. 11, 1933

3 Sheets-Sheet 2



Inventor:
Robert A. Carr,
By: Arthur W. Wallace
Att'y.

Sept. 10, 1935.

R. A. CARR

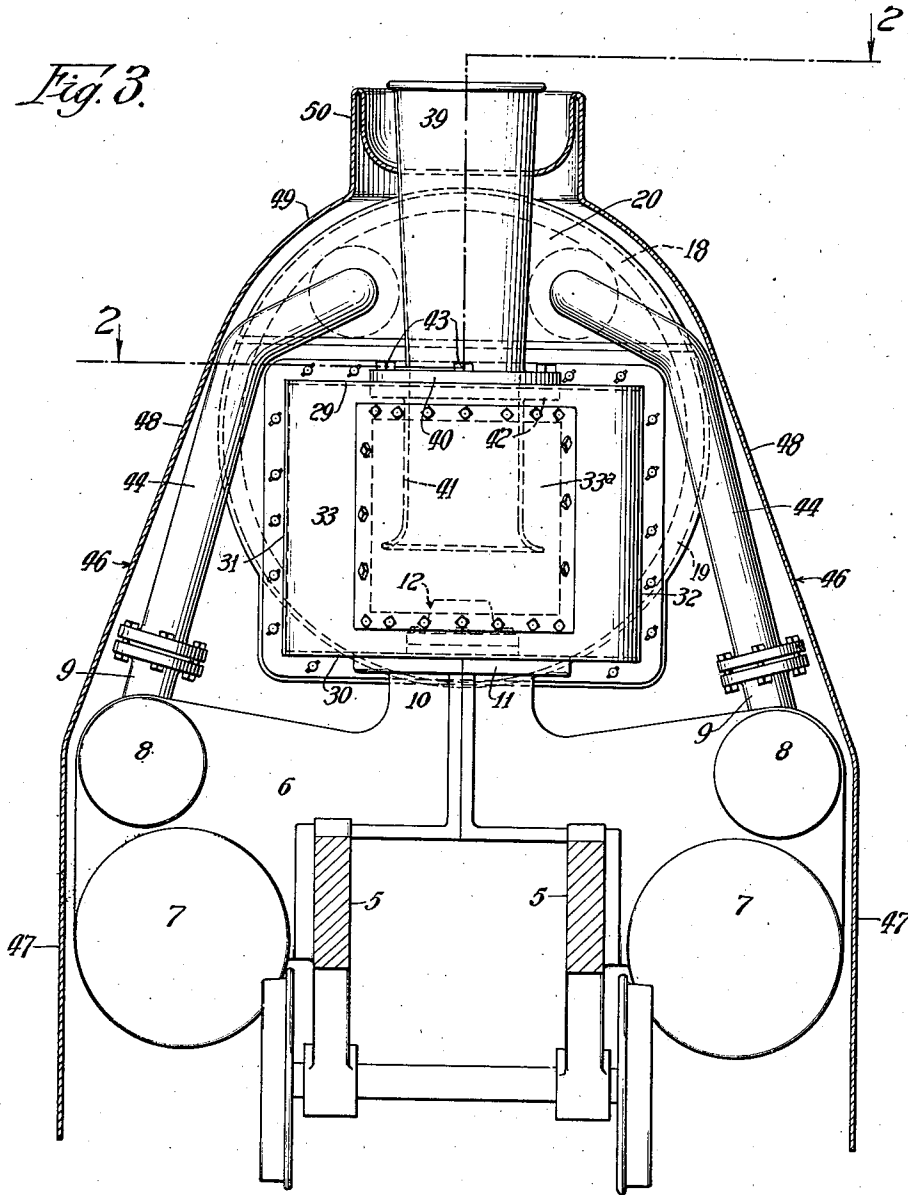
2,013,682

LOCOMOTIVE

Filed Dec. 11, 1933

3 Sheets-Sheet 3

Fig. 3.



Inventor:
Robert A. Carr,
By: Arthur W. Helms,
Att'y.

UNITED STATES PATENT OFFICE

2,013,682

LOCOMOTIVE

Robert A. Carr, Chicago, Ill., assignor to Locomotive Firebox Company, Chicago, Ill., a corporation of Delaware

Application December 11, 1933, Serial No. 701,734

3 Claims. (Cl. 105—2)

This invention relates to improvements in locomotives and it consists of the matters hereinafter described and more particularly pointed out in the appended claims.

5 Heretofore locomotive development has been devoted to heavy power for handling heavy freight and passenger equipment in long trains. With the advent of new materials and devices there has been a new interest taken in light weight, high speed passenger equipment that can be handled efficiently with lighter locomotives, having both a lower initial and operating cost than locomotives as now used.

10 One of the objects of the present invention is to provide a locomotive having a front end structure that radically differs from the conventional front end and which can be produced at a lower cost and eliminates much unnecessary dead weight at the front end of the locomotive.

15 Another object of the invention is to provide a locomotive, the front end of which is more flexible in its adaptability to streamline form.

20 A further object of the invention is to provide a locomotive wherein the conventional smoke box is eliminated and a structure is substituted in its stead which arrests the discharge of sparks up the stack which in itself is supported by said structure, the parts of said structure being so shaped and formed as to provide better streamlining for the front end of the locomotive so that wind resistance is materially reduced.

25 The above mentioned objects of the invention, as well as others, together with the many advantages thereof, will more fully appear as I proceed with my specification.

In the drawings:

30 Fig. 1 is a view in side elevation of the front end portion of a locomotive embodying one form of the invention, the associated streamline hood or cowling being shown in longitudinal section.

35 Fig. 2 is a horizontal sectional view through the same as taken on the line 2—2 of Fig. 3.

40 Fig. 3 is a view in front end elevation of the locomotive parts shown in Fig. 1, with parts of the streamline hood or casing shown in transverse section.

45 Referring now in detail to that embodiment of the invention, 5—5 indicates the sides of the locomotive frame and 6 indicates a cylinder saddle mounted on and operatively connecting said frame sides together. If desired, the frame sides and the cylinder saddle may be cast as an integral structure. As shown herein, the saddle is provided at each side with a steam cylinder 7 and valve cylinder 8 and associated with each valve

cylinder is a flanged steam pipe connection 9. The saddle is provided at its central portion with an upright extension 10 terminating in a flat horizontal seat or flange 11. Suitably secured centrally of the seat is an exhaust nozzle 12. In the saddle, and extending between both valve chambers and the nozzle, are suitable passageways (not shown herein) through which exhaust steam passes from the valve cylinders to the nozzle.

5 A suitable distance to the rear of the saddle is a transversely extending bracket 13 which connects the sides 5—5 of the locomotive frame together at this point. If desired, this bracket may be made integral with the sides 5—5 of the locomotive frame.

10 The top end of said bracket is made as an upwardly facing, arcuate flange 14 which forms a seat in which the front bottom end portion of the boiler shell 15 rests and is operatively secured. The bottom portion of more than 180° of the shell terminates shortly in advance of said bracket, while the top portion of said shell projects forwardly of the plane of said bottom portion to form an overhanging extension 16 as best shown in Fig. 1.

15 The front end of the bottom portion of the shell is provided with an internal, incomplete stiffening ring 17 and the front end of the extension 16 is provided with an internal complete stiffening ring 18. Said bottom portion and said top extension are each provided with a plate 19 and 20 respectively having a bolted-on, removable connection with respect to the associated rings 17 and 18. In the boiler shell and spaced a suitable distance to the rear of the ring 17 is a flue sheet 21, in which the front ends of the flues 22, that lead from the firebox are fixed. 23 indicates a horizontally disposed partition plate that extends from the ring 18 to the flue sheet and divides this end of the boiler shell into a bottom superheater bend compartment 24 and a superheater header compartment 25. In the compartment 24 are disposed the upturned ends or bends 26 of the superheater tubes and which ends or bends are connected to a superheater header 27 disposed in the header compartment mentioned.

20 28 indicates as a whole the casing of a spark arrester arranged above the saddle 10 and extending forwardly from the plate 19. This casing which is of the centrifugal or cyclone action type, is open at its rear end and includes flat horizontal top and bottom walls 29 and 30 respectively, upright side walls 31 and 32 respectively,

and a rounded upright front wall 33. In this instance, the wall 33 which is shown as a semi-circular wall, is provided with a removable inspection door 33a.

5 The open rear end of the casing is provided with an outwardly extending flange 34 which has a bolted on connection with the plate 19 about an opening therein that registers with the open rear end of the casing 28.

10 A portion of the flat bottom wall rests upon the flat seat as provided by the flange 11 of the saddle extension 10. The nozzle 12 is arranged upon the top surface of the bottom wall concentric with the front wall 33 and bolts 12a pass through the flange of said nozzle, the bottom wall 30 and into suitable receiving openings in the flange 11 to secure the parts together in operative relation. Thus it is apparent that the arrester casing is secured at one end to the boiler shell for the support of said end and is also supported from the saddle.

In the open rear end of the casing, at that side associated with the wall 32 of the casing, are deflector plates 35—36 and 37 which are so disposed as to direct incoming products of combustion toward the other side wall 31 of the casing. The inner or front end of the deflector plate 37 is connected by a curved plate 38 to the wall 32 and this plate forms an inside extension for the rounded front wall of the casing.

30 39 indicates the smoke stack for the locomotive arranged axially with respect to the nozzle 12. Said stack includes a base flange 40 that rests upon the top surface of the top wall 29 of the casing 28. Associated with said stack and disposed within the casing is a stack extension 41 which includes a top flange 42, that engages with the bottom surface of the top wall of the casing. A suitable hole is formed in said top wall in line with the stack and extension and bolts 43 pass through both flanges and the interposed portion of the top wall to complete the assembly. Thus it is apparent that the stack and its extension are supported at least in part from the casing 28 which may be braced in any suitable manner to make it rigid enough to support said stack and extension.

Associated with each valve chamber 8 is a steam pipe 44, each secured at one end to an associated flange 9 and each passing at its other end through the wall 20 of the boiler shell extension into the chamber 25. In said chamber each last mentioned end of said steam pipe is secured to a superheater header 27. As best shown in Fig. 3, these pipes diverge upwardly and inwardly from the associated flange 9, to curve around and avoid the top corners of the casing. From this point, said pipes converge inwardly at a different angle and are then extended rearwardly to pass through said wall 20 for connection with the respective superheater headers.

It is apparent from the foregoing, that no conventional smoke box and appurtenances are employed in the structure mentioned. Therefore, the present structure has several advantages over the conventional structure, not only in its requirement for less material and weight but also in labor costs. Another advantage afforded by the present structure is that it is quite flexible in its adaptability to streamlining for reducing wind resistance.

75 In the drawings, I have illustrated in connection with the structure mentioned, a streamline hood or cowl 45. Such a hood or cowl may be made in the form of a sectional casing which

includes sides 46, the lower portions of which are disposed as perpendicular aprons 47 and the intermediate portions 48 of which follow the inclination of the steam pipes 44. The intermediate side portions merge into rounded top portions 49, which in turn terminate at an inverted channel 50. In the front end of said channel is formed a depression 51, up through which the top of the stack extends to terminate substantially flush with the top of the inverted channel. The rear end of said depression is made as an ogee curve to merge into the top wall of said inverted channel.

At the front of the casing the portions 47—48 of the casing are directed downwardly and forwardly as at 52 in Fig. 1. When viewed in plan as in Fig. 2, the front end of the casing is rounded. This formation is not absolutely necessary for efficient operation and the shape of this part of the casing is determined by the type of locomotive to which the casing is applied.

The casing as before mentioned is sectional in form for easy application and removal and said sections are of course, in turn supported from the structural parts of the locomotive. However, as the manner of supporting the casing from said parts of the locomotive forms no particular part of the present invention, it is not thought necessary to illustrate or describe the same in detail.

In the operation of the locomotive, the jet discharged by the nozzle 12 into the stack 39, produces a draft action which causes the products of combustion to pass through the tubes 22 into the compartment 24 and then into the casing 28 through its open rear end. In entering said casing, a part of the products of combustion are directed by the deflectors 35, 36 and 37 toward the side wall 31 of the casing to follow around the rounded front wall 33 and extension 38 so that said products of combustion are caused to take on a whirling motion in the casing. In this motion, the larger particles of said products of combustion are broken up by their engagement with the said wall parts and the smaller particles thereof are forced inwardly to be entrained for discharge by the stack.

In the travel of the locomotive, the hood or cowl deflects the air stream laterally in both directions and also upwardly so that wind resistance is materially reduced. Such moving air as enters the recess 51 about the top end of the stack, is caused to be directed upwardly by the rear end thereof and this carries the smoke upwardly so that it seeks an elevation well above the locomotive cab and the cars in the train. Thus the smoke cannot swirl downwardly to cloud the vision of the locomotive crew or passengers on the train.

In the conventional front end structure employing a smoke box, the steam pipes leading to the cylinders, extend through openings in the smoke box shell. Expensive joint structures are employed at these openings to prevent leakage there-through, as such leaks whether steam or air, seriously interfere with draft action. In this case, as no smoke box shell is employed, no openings with such expensive joint structures are necessary. Therefore, the cost of such a structure, together with the draft loss by leakage is eliminated.

If desired the saddle 6 and bracket 13 may be made as integral parts of the frame. With such an arrangement, a rigidity between the parts is assured which will preclude any relative movement between the pipes 44 and the parts to which they are attached so that there can be no steam loss due to leaks resulting from such movement.

The construction described eliminates many conventional parts so that the locomotive is not only less costly to make, but its weight is materially reduced without a reduction in power.

5 The parts are so disposed that servicing operations are easy to carry out because after the streamline hood has been removed, all parts are readily accessible. Should any servicing be required on the flue sheet, the same is readily accessible after removal of the casing 28.

10 Again, the parts are so formed and arranged that any one of a number of different types of streamlining may be employed in connection therewith.

15 In describing my invention, I have referred in detail to the form, arrangement and construction of the various parts thereof, the same is to be considered only in the illustrative sense so that I do not wish to be limited thereto, except as may be specifically set forth in the appended claims.

20 I claim as my invention:
 1. In a device of the class described, an under-framing comprising side frames having cylinder saddles on either side thereof and at the forward end, a boiler shell support carried by the side frames and disposed rearwardly of the saddles, an upright extension carried by the saddles and provided with an enlarged horizontally disposed flange forming a flat seat, a centrifugal spark arrester casing supported by said flange and secured at its rear end to the boiler shell, said casing being of less height than the boiler shell, a steam nozzle also supported on said flange at the bottom of the spark arrester, and a smoke stack above the nozzle and concentric therewith.

35 2. In a locomotive, a frame, a cylinder saddle supported thereby and at the forward end thereof, a boiler shell, means for supporting the front end of the shell from the frame, said supporting means being located rearwardly of the saddle, a flat seat carried by the saddle, a flat bottom centrifugal spark arrester casing having

a rounded front end and an inlet end, with the flat bottom engaged upon said seat, and with the inlet end connected to the front end of the shell, said casing being of considerably less height than the boiler shell, a nozzle opening in the said casing, a smoke stack fixed to the top of the casing concentric with the nozzle for communication with the interior of the casing, and a streamline shell surrounding the locomotive and having a downwardly and forwardly inclined front portion arranged in a plane substantially coincident with a line extending from the top front corner portion of said stack to the top front corner portion of said casing and engaged adjacent its bottom end with a part fixed with respect to the frame forward of the saddle.

3. In a locomotive, a frame, a cylinder saddle supported thereby and at the forward end thereof, a boiler shell, means for supporting the front end of the shell from the frame, said supporting means being located rearwardly of the saddle, an upright extension carried by the saddle and provided with a flat seat, a flat bottom centrifugal separator casing having a rounded front end and an inlet end, with the flat bottom resting upon said seat, and with the inlet end connected to the front end of the shell, the flat bottom being provided with an opening, a nozzle supported by the flat seat and projecting into the casing through the opening in the flat bottom, means for securing the nozzle and the flat bottom to the flat seat, a smoke stack outlet for the casing arranged above and concentric with the nozzle, and a streamline shell enclosing the locomotive and having a downwardly and forwardly inclined front portion arranged in a plane substantially coincident with a line extending from the top front corner portion of said stack to the top front corner portion of said casing and engaged adjacent its bottom end with a part fixed with respect to the frame forward of the saddle.

ROBERT A. CARR.