Dec. 19, 1939. O. JABELMANN 2,183,913

LOCOMOTIVE

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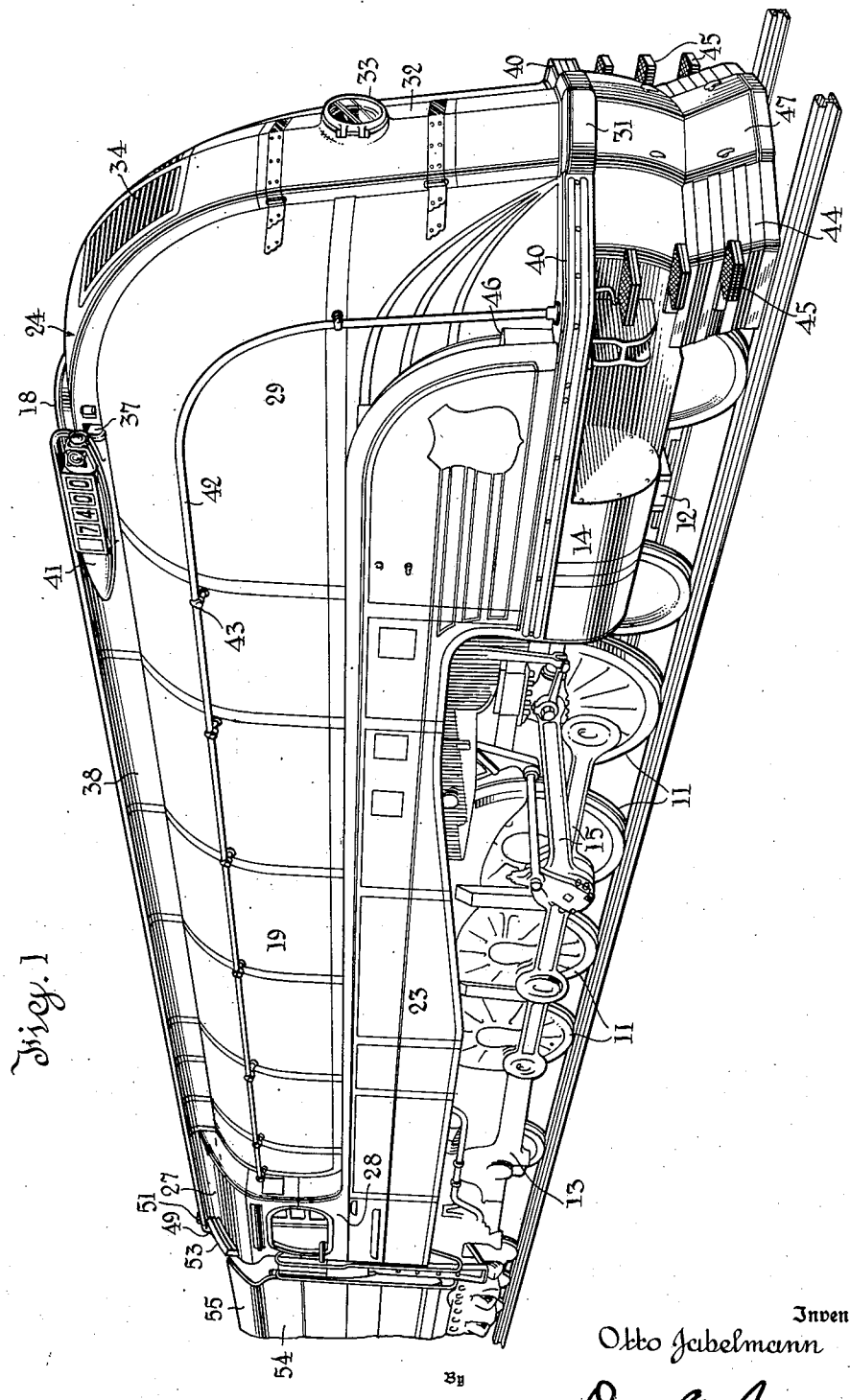

Fig. 1

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Fig. 2

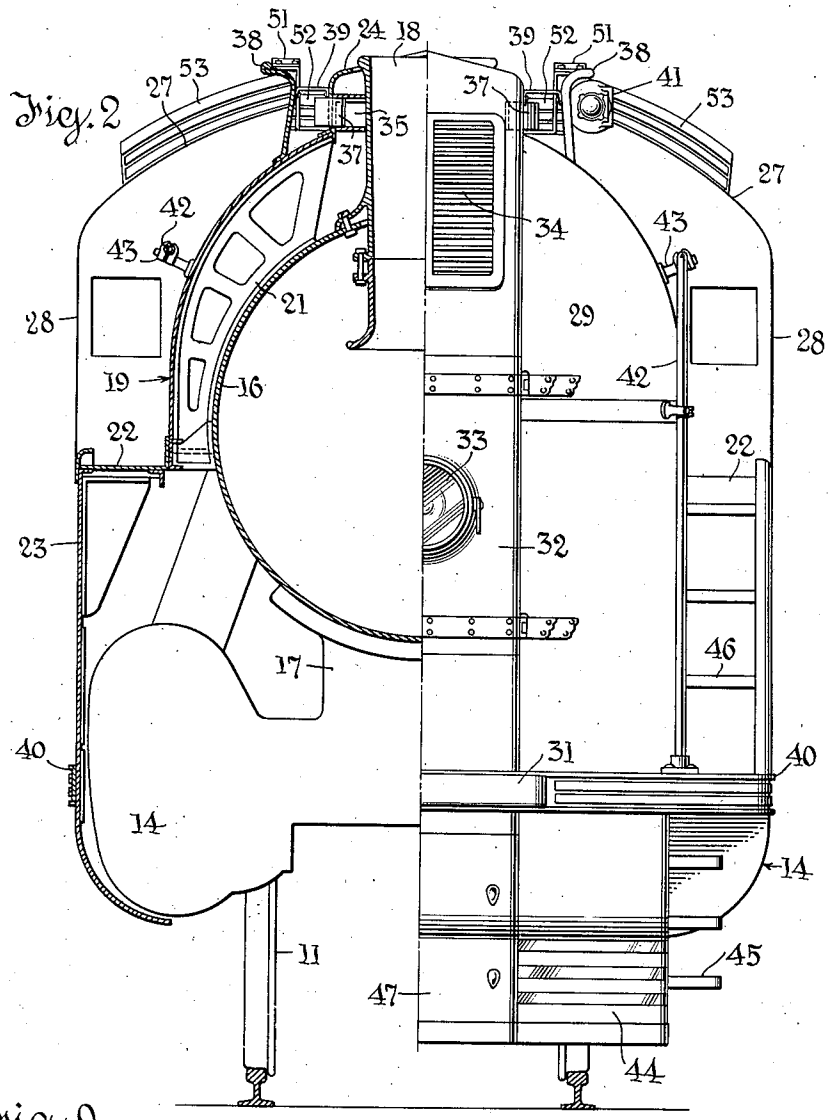

Fig. 9

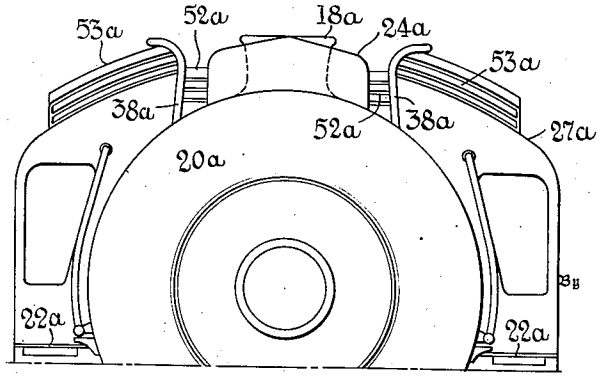

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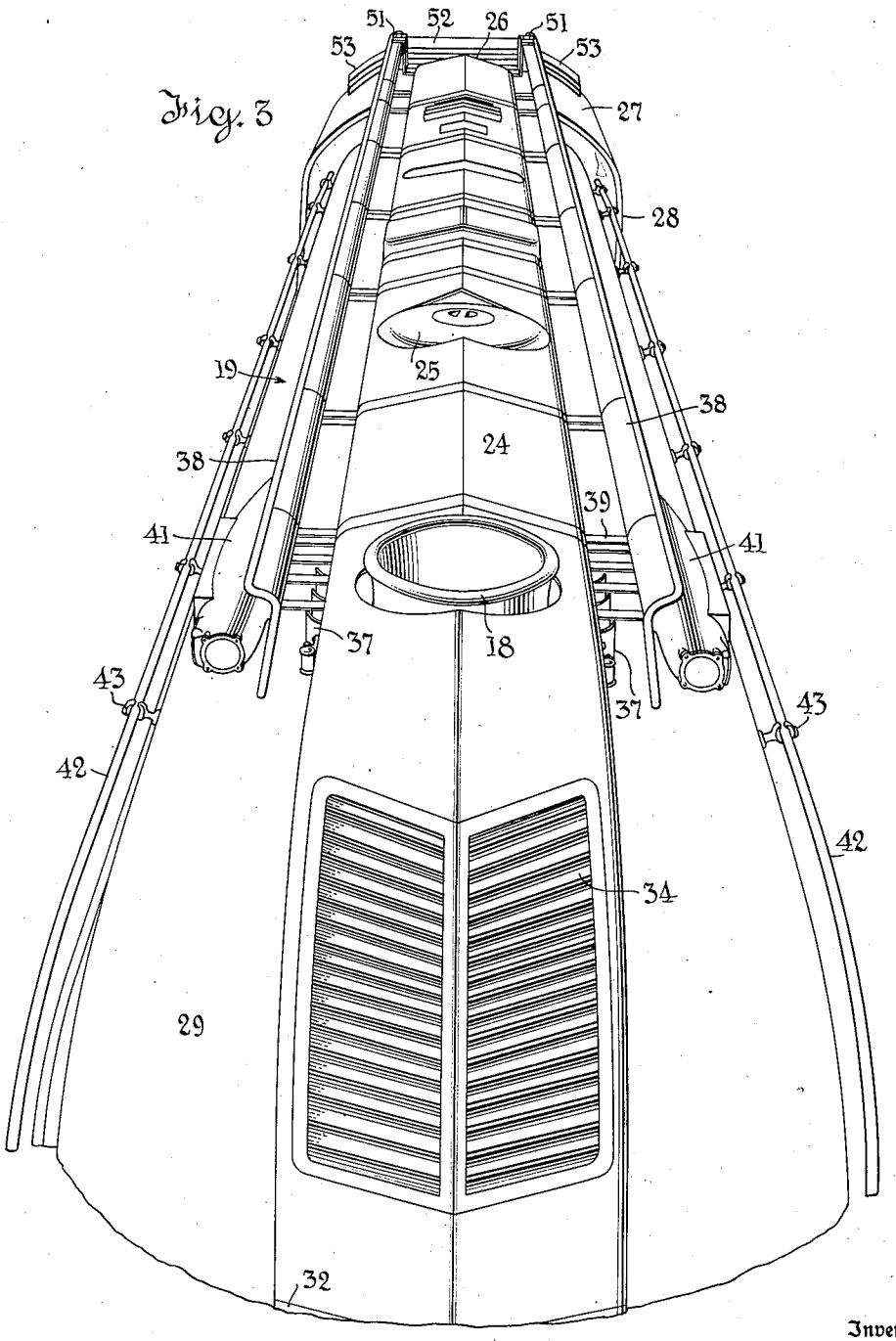
Fig. 3



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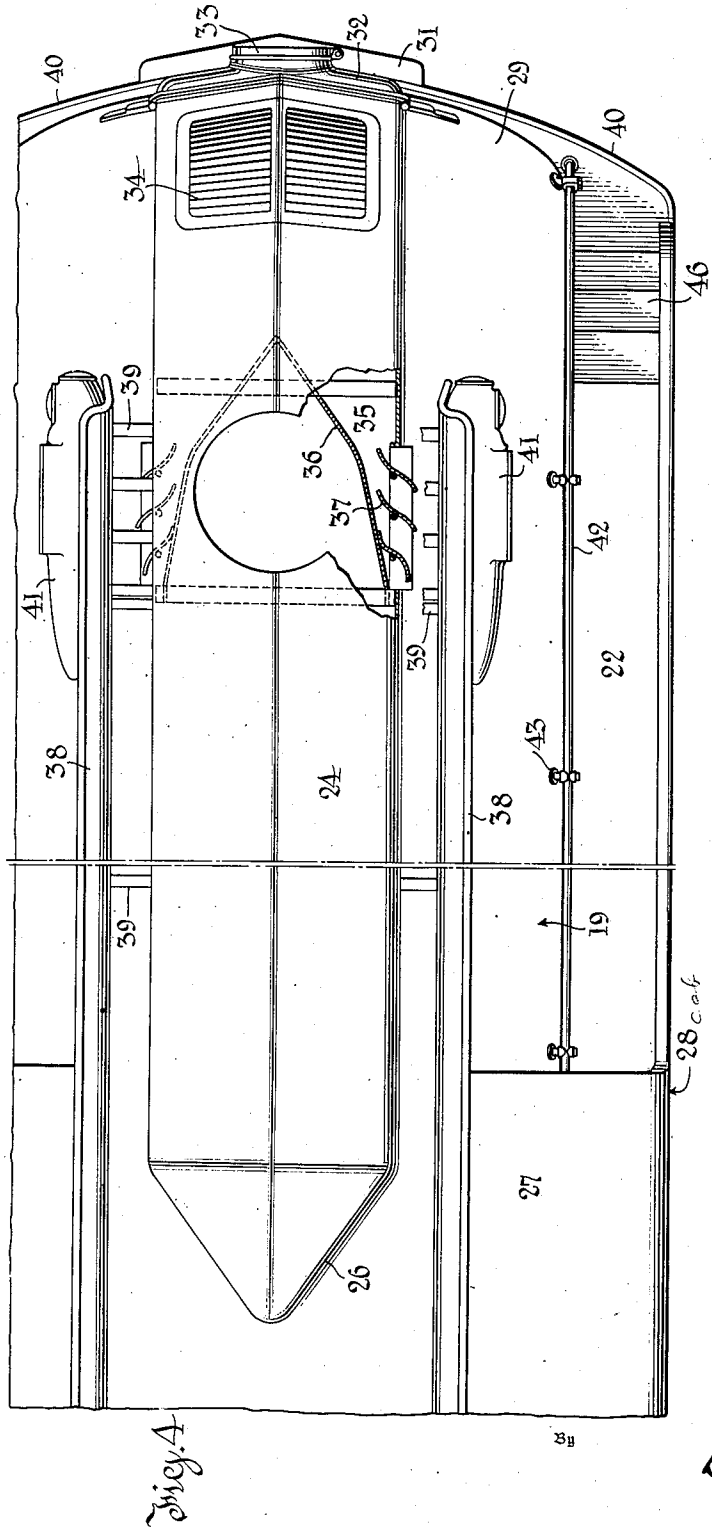

Fig. 4

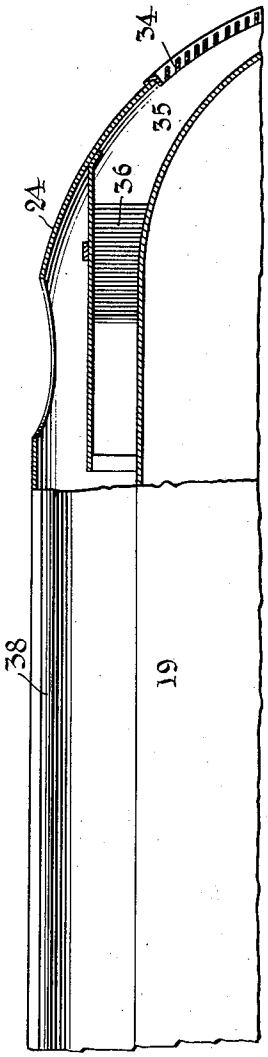

Fig. 5

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Fig. 6

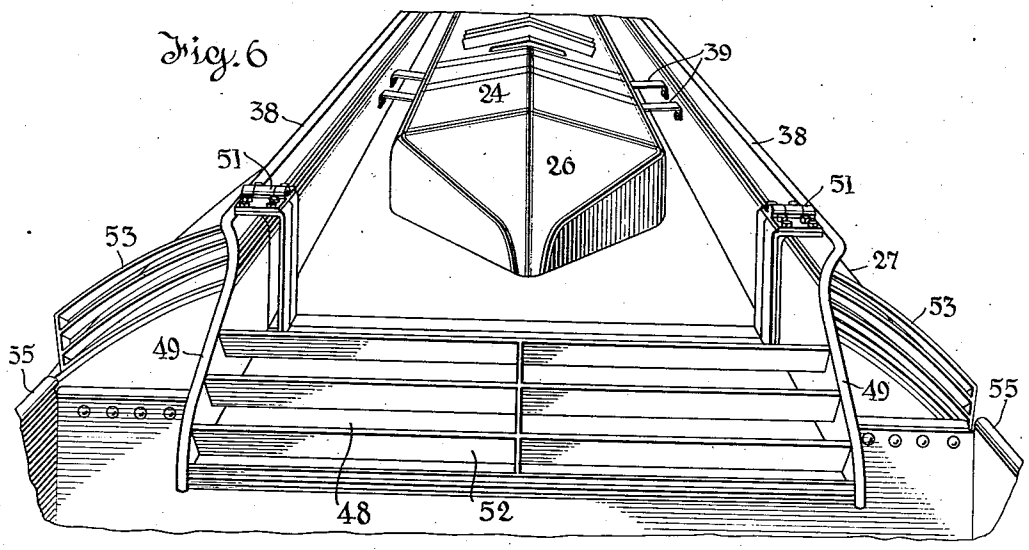


Fig. 7

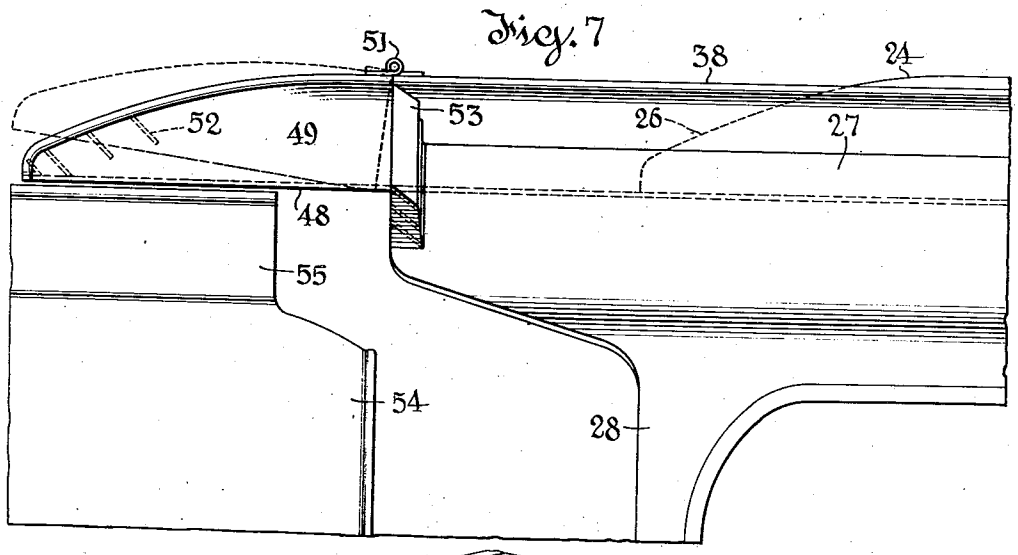
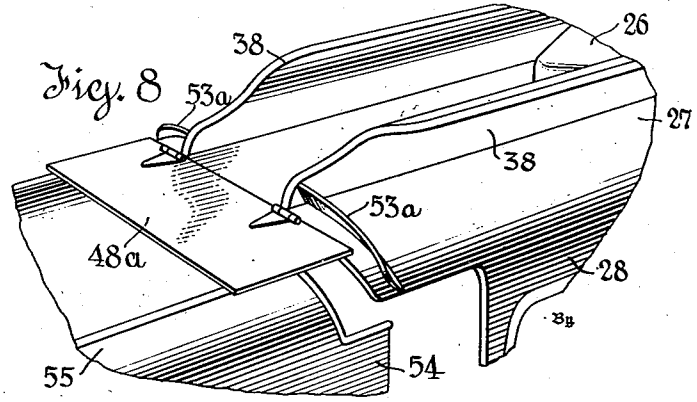


Fig. 8



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LOCOMOTIVE

Otto Jabelmann, Omaha, Nebr.

Application November 8, 1937, Serial No. 173,479

17 Claims. (Cl. 105—2)

This invention relates to locomotives and particularly to streamlined shrouding applied to conventional steam locomotives.

It has long been proposed to equip high speed locomotives with streamlined enclosures, and the present trend is in that direction.

There are practical difficulties which develop, and which are determining factors in any truly workable solution. The present invention involves features which have been worked out to meet the demands of the situation, and which have demonstrated utility in actual railway service.

The design of steam locomotives represents the results of a long evolutionary process, and certain conventions are so well established on the basis of proved performance that radical changes in basic form are unthinkable. This entails two consequences. The streamlined form must be secured by the application of a shell which encloses the machine. Provision must be made for servicing parts so concealed.

The second question is smoke. The streamlined form entails the elimination or at least the concealment of the conventional stack. Thus in the absence of special provisions to counteract the effect, smoke discharging from the very short stack tends to hug and flow along the surface of the locomotive, with very objectionable results. One of the troublesome effects which has been encountered in prior streamlined forms is the tendency of the smoke to flow along the shrouding and over the windows, thus impairing the view afforded the engine driver or the firearm or both.

One of the important features of the present invention is the provision of means to direct the flow of smoke, protect the smoke controlling means from the effects of cross winds, and deflect the smoke upward as it flows over the rear of the cab roof to prevent it from eddying into the cab. While this smoke-directing feature is particularly useful with streamlined locomotives, its utility is not limited thereto, because the wind wings, alone but preferably in combination with a monitor, can be used to improve smoke conditions on any locomotive.

Most locomotives have on the top of the boiler, between the stack and the cab, a number of protruding parts, such as bell, sand box, steam dome and safety valve. To house these and the stack a monitor is formed from the front of the locomotive to a point near the rear of the cab roof. This monitor is not visible from the side of the locomotive, being housed in the interval between two parallel outwardly concave wind wings, so arranged as to deflect cross winds, and to define with the monitor two deep air conducting channels extending the entire length of the locomotive.

To induce a rapid air flow rearward along these channels, a louvered air inlet is formed in the forward end of the locomotive housing. This inlet acts as an air scoop and delivers air to a duct which enters the monitor and discharges the air through louvers in the sides of the monitor into the air channels adjacent the stack. The effect is to accelerate air flow through the channels.

This rapidly flowing air stream causes the smoke to flow to the rear of the locomotive where deflectors on the cab roof give it a sharp upward impulse. Consequently the engineer is afforded a clear view forward and smoke does not eddy into the cab.

The tender, regardless of its actual form, is shrouded to conform to the form and dimensions of the locomotive cab. When tenders of the Vanderbilt type are used this involves quite a radical change of external contour.

The wind wings are formed at their forward ends to house a classification lamp and train indicator.

Other features will become apparent as the description proceeds.

Preferred embodiments will now be described by reference to the accompanying drawings, in which—

Fig. 1 is a perspective view of a steam locomotive and of a part of the associated tender, showing the stream-lined shrouding.

Fig. 2 is a view of the locomotive, half in section and half in front elevation, and indicating the relationship of the shrouding to the actual locomotive structure, particularly the boiler shell, the cab roof, the stack and the cylinders.

Fig. 3 is a perspective view of the upper portion of the locomotive shown in Fig. 1, looking from front to rear and showing the monitor and wind wings.

Figs. 4 is a plan view of the locomotive, the middle portion and rear end being broken away, and a part of the monitor being sectioned.

Fig. 5 is a fragmentary elevation, partly in section, showing the forward end of the shrouding and indicating the louvers and the duct which feeds air to the high velocity air channels.

Fig. 6 is a view similar to Fig. 3 but looking forward from the rear of the locomotive.

Fig. 7 is a fragmentary side elevation of the

cab roof, with its extension and deflectors overlying the forward portion of the tender.

Fig. 8 is a perspective showing a modified form for the parts visible in Fig. 7.

Fig. 9 shows how the monitor and wind wings may be applied to a locomotive, having no streamlined shrouding.

Referring first to Figs. 1 and 2, parts of a conventional steam locomotive are identified as follows: driving wheels 11, forward truck 12, trailing truck 13, cylinders 14, side and connecting rods 15, smoke box shell 16, saddle 17, stack 18.

The shrouding proper 19 is carried on tapering arcuate spacers 21 mounted on the boiler shell or the smoke box shell, as the case may be (depending on the location of the particular spacer). The running board 22 is mounted at the lower ends of the spacers 21 and carries the skirting 23 which is cut away at its lower edge to afford clearance for moving parts, particularly the connecting rod and valve gear.

Above the shrouding 19 and carried thereby is the monitor 24, which embraces the stack 18, sand box 25, and other projections on the top of the boiler. The monitor is essentially an inverted metal channel (see Fig. 2) serving to enclose these parts and supported at its edges on the upper ends of spacers 21 and shrouding 19. At its rear end the monitor terminates in a boat-tail 26 on the roof 27 of the cab 28. As best shown in Figs. 6 and 7 (see also Figs. 2 and 3), a groove or channel is formed longitudinally in the center of the cab roof 27, and the monitor 24 occupies the middle portion of this.

At its forward end the monitor curves downward as a rib on the rounded front shrouding 29. Above the bumper 31, which is mounted in the pilot beam, there is a door 32 which can be opened to reach the smoke box. The door 32 carries the head lamp 33. Above the door is a grill or louvered wind scoop 34, leading to a duct 35, (see Figs. 4 and 5). A V-shaped deflector 36 splits the duct 35 in advance of stack 18 and directs the air between the S-shaped louvers 37 mounted in openings in opposite sides of monitor 24, abreast stack 18.

Rising from shrouding 19 and spaced from the side walls of monitor 24 are two upstanding, parallel wind wings 38. These wings are above and in the interval between the front windows of the cab, flare outward at their tops (Fig. 2) and are braced to the monitor by strap braces 39 as indicated. They define deep narrow high velocity air channels along each side of the monitor 24, and extend to the rear of cab roof 27 where they define the sides of the groove in which the monitor is located. As best shown in Figs. 6 and 7 the wings 38 extend above the cab roof, i. e. they are higher than the sides of the groove, so as to have their function of deflecting cross winds. The louvers 37 discharge rapidly flowing air into the channels and this flow has the effect of controlling the flow of smoke discharged by stack 18, so that the smoke flows to the rear end of the locomotive and does not stream down across the cab windows even when there is a cross wind. The groove in the cab roof is necessary because the top of the cab projects substantially above the boiler shell. In some locomotives the center of the cab roof is virtually a continuation of the boiler shell. In such case the groove disappears and the wings merely extend over the roof as in the modified structure Fig. 8.

The flaring form of the wind wings 38 adapts them to house at their forward ends elongated streamlined classification and train indicator lamps 41. A hand rail 42 may be provided, the brackets 43 which support the rail being connected with the spacers 21.

Instead of the conventional cow-catcher, an enclosed shield 44, whose form is shown in Fig. 1, is mounted below the pilot beam. Wing steps 45 lead to the pilot beam and from that steps 46 lead to the running boards.

The pilot beam on each side of bumper 31 is reinforced with channels 40, which extend rearward along the lower margin of the skirting 23 to the rear ends of cylinders 14. This channel offers protection in case of collision.

The shield 44 has a door 47 at its center and this may be opened to expose a hinged coupler (not shown) which when not in use is swung out of the way. Couplers of this type are well known.

As explained, the boat-tail 26 on monitor 24 is nearly at the rear end of cab roof 27. The wind wings 38 extend clear to the end of the cab roof 27.

An extension roof 48 with extensions 49 of wings 38 is hinged at 51 to wings 38 and covers the gang-way between cab and tender. (See Figs. 6 and 7.) Extension 48 carries a plurality of deflector louvers 52, inclined upward and to the rear, and similar groups of deflector louvers 53 are mounted on each side of cab roof 27 outside wings 38, and approximately at the rear ends thereof.

Fig. 8 shows a simplified construction in which the roof extension 48*a* carries no wing extensions and no deflectors. Single deflectors 53*a* are used in lieu of the multiple deflectors 53 of Fig. 7. In this case, as above explained the cab roof at its center is so nearly a continuation of the boiler shell that no groove in the cab roof is needed. This feature is independent of the feature of using single or multiple deflectors.

Portions of the tender are shown in Figs. 1, 7 and 8. It is sheathed as indicated at 54, the upper margin 55 of the sheathing being turned in to conform to the cab roof 27. The shrouding 19 and skirting 23 each include removable panels where nedeed for access to concealed parts.

In Fig. 9 is shown one mode of applying monitor and wind wings to a locomotive otherwise of conventional form. The locomotive is viewed in front elevation. The smoke box is shown at 20*a*, the stack at 18*a* and the running boards at 22*a*.

A monitor 24*a* similar to the monitor 24 embraces the stack 18*a* and also the protruding parts on the top of the boiler, such as sand box, steam dome, etc., just as in the structures already described. There are wings 38*a*, similar to the wings 38 spaced from the monitor. These, and the monitor extend from a point forward of the stack, to or near the rear end of the cab roof 27*a*, which is shown channeled as in the case of the embodiment shown in Figs. 1 to 7.

Deflectors are used on the cab roof and multiple deflectors 52*a*, 53*a* are shown, though these are subject to variation as will be readily understood.

The constructions described above have proven satisfactory in practical use and are preferred, but modifications are possible within the scope of the invention and consequently the detailed description is intended to be exemplary and not limiting.

What is claimed is—

1. The combination of a locomotive having a boiler, a smoke stack at the forward portion thereof, and a roofed cab located in a position

to the rear of said stack; a monitor housing the sides of the stack and extending rearward therefrom over the cab roof; and a pair of upstanding wind deflectors, one deflector opposite each side of the monitor, spaced therefrom and substantially coextensive in length therewith, said deflectors defining a channel along the top of the locomotive, protected from crosswinds and adapted to conduct smoke from said stack to the rear of the locomotive and to inhibit its flow past the front and sides of the cab.

2. The combination of a steam locomotive having a boiler, a stack adjacent the forward end of the boiler, and a roofed cab, the cab being located rearward of said stack and the cab roof having a central longitudinal channel whose bottom is substantially alined with the adjacent portion of the boiler shell; a monitor housing the sides of the stack and housing other parts protruding from the top of the boiler, said monitor being narrower than the channel in the cab roof and extending through at least a portion of said channel; and a pair of upstanding parallel wind deflectors, one located opposite each side of the monitor, spaced from the sides of said monitor and alined with the sides of the channel in the cab roof, whereby the channel between the deflectors forms a continuation of the channel in said roof, and a continuous smoke directing channel is provided along the top of the locomotive.

3. The combination of a steam locomotive having a boiler, a stack adjacent the forward end of the boiler, and a roofed cab, the cab being located rearward of the stack and the cab roof having a central longitudinal channel whose bottom is substantially alined with the adjacent portion of the boiler shell; a monitor housing the sides of the stack and housing other parts protruding from the top of the boiler, said monitor being narrower than the channel in the cab roof and extending through at least a portion of said channel; and a pair of upstanding parallel wind deflectors, one opposite and spaced from each side of the monitor, extending beyond the rear end of the monitor and extending above the upper limit of the channel in the cab roof, said wind deflectors coinciding with the sides of such channel and serving to form a continuous smoke-restraining duct which extends along the top of the locomotive from the stack to the rear of the cab.

4. The combination of a locomotive having a boiler, a stack adjacent the forward end thereof, and a roofed cab located to the rear of said stack; a monitor housing the sides of the stack and extending rearward therefrom over the cab roof; a pair of upstanding wind deflectors carried by the boiler, one opposite and spaced from each side of the monitor and substantially coextensive in length therewith, said deflectors defining a channel protected from cross winds and extending along the top of the locomotive from the stack rearward over the cab; and duct means including a wind scoop arranged to admit a stream of air induced by forward travel of the locomotive through the front portion of the locomotive and thence in a generally rearward direction into said channel adjacent said stack.

5. The combination of a locomotive having a boiler, a smoke stack at the forward portion thereof, and a roofed cab located in a position to the rear of said stack; a monitor housing the sides of the stack and extending rearward therefrom over the cab roof; a pair of upstanding wind deflectors, one deflector opposite each side of the monitor, spaced therefrom and substantially coextensive in length therewith, said deflectors defining a channel along the top of the locomotive protected from cross winds and adapted to conduct smoke from said stack to the rear of the cab roof; a tender connected to the rear of said locomotive; an auxiliary roof structure extending rearwardly from the cab roof at least partially over the tender; and secondary deflector means associated with said roof structure in the path of smoke discharging from the rear end of said channel and arranged to deflect discharging smoke upward.

6. The combination of a locomotive having a boiler; a stack adjacent the forward end thereof; and a roofed cab located to the rear of said stack; a monitor housing the sides of the stack and extending rearward therefrom; a pair of upstanding wind deflectors, one opposite and spaced from each side of the monitor, said deflectors defining a channel protected from cross winds and extending from the stack rearward over the cab; duct means including a wind scoop arranged to admit a stream of air induced by forward travel of the locomotive through the front portion of the locomotive and thence in a generally rearward direction into said channel adjacent said stack; a tender at the rear of said locomotive; an auxiliary roof structure extending rearwardly from the cab roof at least partially over the tender; and secondary deflector means associated with said auxiliary roof structure and in the path of smoke discharging from the rear end of said channel, said deflector means being arranged to deflect upward smoke discharging from the rear end of said channel.

7. The combination with a locomotive having a smoke discharge outlet at the upper portion of its forward end and a roofed cab at its rearward portion; a pair of spaced substantially parallel wind deflectors projecting upward from the upper portion of the locomotive and extending rearward from points adjacent the sides of said discharge outlet to and over the roof of said cab; said deflectors defining a continuous laterally closed channel extending to the rear of the cab over the top thereof, the forward end of said channel embracing said smoke discharge outlet.

8. The combination defined in claim 7, in which the cab roof is higher than portions of the locomotive forward of the cab, and the cab roof is formed with a longitudinal groove whose bottom is alined with such forward portions and whose sides are alined with said deflectors so that the groove in the cab roof forms a portion of said laterally closed channel.

9. The combination of a locomotive externally formed to minimize the formation of eddies in the travel of the locomotive through the air, said locomotive having a smoke discharge outlet at its top adjacent its forward end; spaced wind deflectors one at each side of said outlet; said deflectors projecting upward from the top of said locomotive and extending longitudinally rearward from said outlet for substantially the entire length of the top of the locomotive to form a channel; and a duct extending from the front end of said locomotive to a point of discharge within said channel adjacent said smoke discharge outlet, said duct when the engine is in forward motion collecting air and discharging it in a flow inducing stream in a generally rearward direction into said channel.

10. The combination of a locomotive externally

formed to minimize the formation of eddies in the travel of the locomotive through the air, said locomotive having a smoke discharge outlet at its top adjacent its forward end, and a cab located forward of the rear end of the locomotive but wholly to the rear of said smoke discharge outlet; spaced wind deflectors projecting upward from the top of said locomotive, one deflector at each side of said outlet, and each deflector extending rearwardly from a point adjacent said outlet substantially the entire length of the top of the locomotive, the two deflectors defining an intervening channel; and secondary deflectors mounted at the rear end of the locomotive in the rear end of said channel to the rear of the forward end of said cab and in the path of smoke about to discharge from the channel, said secondary deflectors being arranged to deflect such smoke in a generally upward direction.

11. The combination of a locomotive externally formed to minimize the formation of eddies in the travel of the locomotive through the air, said locomotive having a smoke discharge outlet at its top adjacent its forward end; spaced wind deflectors one at each side of said outlet, said deflectors projecting upward from said locomotive and each extending rearwardly from points opposite the sides of said outlet for substantially the entire length of the top of the locomotive, said deflectors defining an intervening smoke channel; a duct extending from the front of said locomotive to a point of discharge within said channel adjacent said smoke discharging outlet, said duct when the engine is in forward motion serving to collect air and discharge it in a flow-inducing stream in a generally rearward direction into said channel; and secondary deflectors located adjacent the rear end of said channel in the path of smoke discharging therefrom, and arranged to deflect the discharging smoke in a generally upward direction.

12. The combination of a locomotive having a boiler, a smoke stack adjacent the forward end thereof, and a roofed cab located to the rear of said stack; a monitor housing the sides of the stack and housing other parts protruding from the top of the boiler, said monitor extending rearwardly at least to the cab roof; a pair of upstanding wind deflectors one opposed to each side of the monitor, spaced from the sides of the monitor and extending from a point approximately at the forward end of the monitor rearward to a point beyond the rear end of the monitor and to the rear of the forward end of the cab roof, said deflectors defining a channel protected from cross winds; and secondary deflectors above the cab roof, some within the channel between and some outside of said upstanding deflectors, said secondary deflectors being arranged to deflect smoke flowing in said channel and stray smoke which may escape said channel in a generally upward direction.

13. The combination of a steam locomotive having a boiler, a stack located near the forward end of said boiler and a roofed cab located to the rear of said stack, the cab roof having a central longitudinal channel whose bottom is substantially alined with the adjacent portions of the boiler shell; a monitor housing the sides of the stack, and housing other parts protruding from the boiler, said monitor being narrower than the channel in the cab roof and extending through at least a portion of said channel; a pair of upstanding parallel wind deflectors, one located opposite each side of the monitor, spaced from the sides thereof, and extending from a point adjacent said stack to approximately the rear end of said cab roof, said wings coinciding with the sides of said channel and extending above the cab roof, and secondary deflectors associated with said cab roof, certain of said secondary deflectors being outside of said upstanding deflectors and others being located at the discharge end of said channel adjacent the rear end of the cab roof, said secondary deflectors being arranged to deflect in a generally upward direction smoke approaching the rear margin of the cab roof.

14. The combination with a locomotive having a boiler, a stack located near the forward end of the boiler and a roofed cab located to the rear of said stack, of a monitor housing the sides of the stack and extending rearward therefrom over the cab roof; and a pair of upstanding wind deflectors one at each side of said monitor opposite thereto and spaced therefrom to produce a channel extending along each side of the monitor and protected from cross winds, each such deflector being substantially coextensive in length with the monitor, and having its upper margin at approximately the height of the highest portions of the locomotive and flared outward.

15. The combination with a locomotive having a smoke discharge outlet near its forward end, and a roofed cab rearward thereof, of a pair of spaced substantially parallel wind deflectors between which said smoke discharge outlet is located, said deflectors being flared outward at their upper margins and serving to define a laterally closed longitudinal channel terminating approximately at the rear limit of the cab roof.

16. The combination defined in claim 15 in which the cab roof is formed with a groove forming a portion of the channel defined by the deflectors, the deflectors forming extensions of the side walls of said groove and at least the upper outward-flaring portion of the deflectors projecting above the cab roof.

17. The combination with a locomotive having a smoke discharge outlet near its forward end, and a roofed cab rearward thereof, of a pair of spaced substantially parallel wind deflectors between which said smoke discharge outlet is located, said deflectors being flared outward at their upper margins and serving to define a laterally closed longitudinal channel terminating approximately at the rear limit of the cab roof; and means adjacent the rear limit of the cab roof and at least partially in the path of smoke discharging from the rear end of said channel for deflecting smoke upward.

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