Sept. 13, 1938. W. LINTERN 2,130,306

VEHICLE BODY VENTILATION APPARATUS

Original Filed Jan. 9, 1936

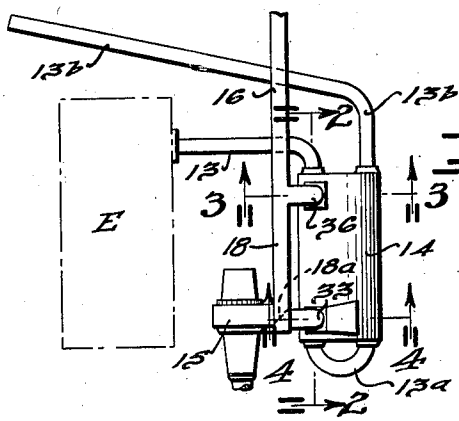


FIG. 1.

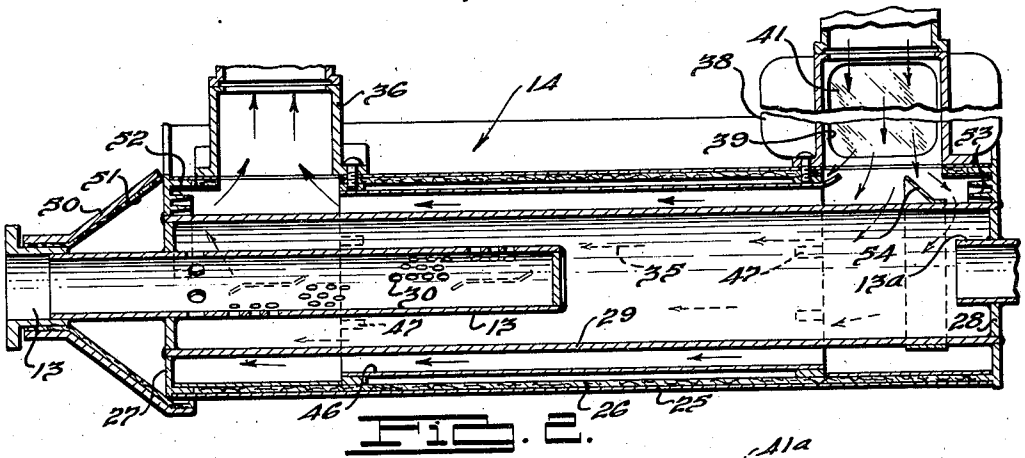


FIG. 2.

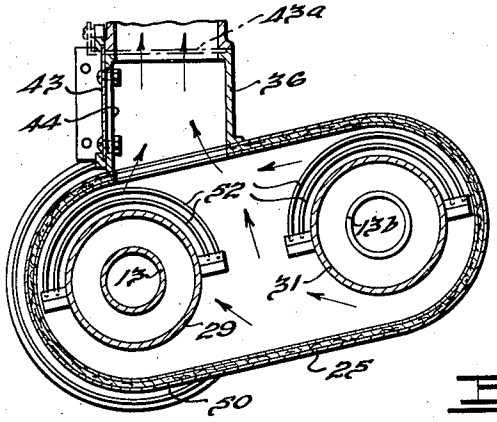


FIG. 3.

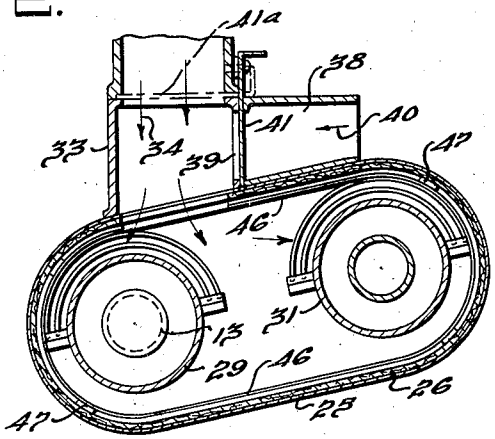


FIG. 4.

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VEHICLE BODY VENTILATION APPARATUS

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Original application January 9, 1936, Serial No. 58,350. Divided and this application September 30, 1936, Serial No. 103,235

2 Claims. (Cl. 257—241)

This invention is a division of the invention described and claimed in the application of William Lintern, Serial No. 58,350, filed January 9, 1936, for Vehicle body ventilation system and apparatus. The invention described and claimed in the parent application referred to relates to vehicle body heating and ventilating in which an adequate supply of fresh outside air from a clean source uncontaminated by exhaust fumes and the like is injected into and ejected from the interior of a vehicle body both while the vehicle is in motion and while stopped.

The principal object of the present invention is to effect recuperation of the exhaust gas heat by means of an improved exhaust gas heater.

Another specific object of the invention is to provide a heater which renders useful for heating purposes a greater percentage of the heat of the engine exhaust gases.

A further object of the invention is to provide for adequate heating of the air to be injected into a vehicle body by means of equipment which may be readily incorporated into the vehicle body without utilizing space which would otherwise be useful within the body compartment.

Other objects of the invention will become apparent from the following specification, the drawing relating thereto, and from the claims hereinafter set forth.

In the drawing, Figure 1 is a fragmentary plan view of an exhaust heater and associated mechanism embodying features of the present invention;

Figs. 2, 3 and 4 are cross-sectional views of the exhaust heater and adjacent equipment illustrated in Fig. 1 and are taken on the planes indicated by the lines 2—2, 3—3 and 4—4 respectively.

The apparatus shown in Fig. 1 is more fully described, in the parent application referred to, in its association with the interior of a vehicle body and ventilating ducts within the body; but for the purpose of the present invention referring to Fig. 1 a rear end engine E is provided, the engine having an exhaust pipe 13 leading to an exhaust heater 14 which is preferably located at the rear end of the body closely adjacent the engine so as to reduce loss of heat from the exhaust pipe 13 before reception thereof in the heater 14.

In the form illustrated, the heater 14 is a double unit pipe, both units being identical and included in the same casing, as will be more fully described hereinafter. The exhaust gases enter the heater through the pipe 13, pass through the first unit, then into the second unit through the pipe 13a. From the second unit the gases are exhausted to the outside air through the pipe 13b, all as will be more fully described hereinafter.

The air to be heated and/or conducted into the interior of the vehicle body is conducted to the inlet of a blower 15 from which it is forced into the heating compartment of the heater 14. A distribution duct 16 is connected to the outlet of the heater 14 and extends into the body. There is connected with the discharge of the blower 15 a by-pass duct 18 which is controlled by suitable valve 18a as described in the copending application of William Lintern, Serial No. 1,915, filed January 15, 1935, so that all or part of the air from the blower 15 may be passed through the heater 14, or, if desired, as in the warmer seasons, may be by-passed around the heater and directly to the duct 16.

Referring to the particular heater used which is illustrated in detail in Figs. 2 to 4, the heater 14 comprises an outer casing 25 having an inner liner of asbestos or other heat insulating material 26. The ends of the casing 25 are closed by suitable metal headers 27 and 28 which may be of cast iron or other heat conducting material. Within the casing 25, in spaced relation to the walls thereof, is a sleeve or conduit 29 mounted at its ends to the headers 27 and 28 and sealed therein so as to prevent passage of gases from the interior of the sleeve 29 into the compartment defined between the sleeve, the casing 25 and the headers 27 and 28. The exhaust pipe 13 from the engine E discharges into the interior of the sleeve 29 at one end and terminates part way of the length of the sleeve, a number of groups of ports 30 being provided for distributing the exhaust gases from the pipe 13 along a portion of the sleeve 29.

At the opposite end of the sleeve is a pipe 13a which forms in effect the continuation of the exhaust pipe of the engine and leads into the opposite unit of the heater which includes the sleeve 31, corresponding in form and effect to the sleeve 29. From the opposite end of the sleeve 31, the continuation 13b of the exhaust pipe extends and discharges into the outside atmosphere.

At the end of the casing 25, remote from the pipe 13, is an inlet header 33 from which air from the blower 15 is discharged into the heating compartment of the heater 14, as indicated by the arrows 34. This air flows lengthwise of the heater, as indicated by the arrows 35, and is discharged therefrom through a header 36 which leads to the distribution duct 16.

In general practice, the heaters are installed on the vehicle body permanently. Consequently in the warmer seasons when the air is not to be

heated, it may be by-passed through the duct 18. When the air is by-passed in this manner for long periods, as during the summer season, no means have heretofore been provided for removing heat from the heating compartment of the heater with the result that extremely high temperatures are created therein, which when long continued have caused scaling and other deterioration of the component parts. In order to remove the heat and maintain a safe temperature during these periods, the inlet header 33 is provided with wings 38 which flare apart forwardly of the vehicle and direct on-rushing air through a suitable opening 39 in the header into the heating compartment so that outside air from any source desired may be passed into the heater, as indicated by the arrow 40. In those instances in which an excess capacity is provided by the blower 15 part of this air may be utilized for this purpose.

For controlling this operation a suitable slide damper 41 is provided, and is positioned, as indicated in Fig. 5, to block the opening 39 when it is desired to utilize the heater. The damper 41 may be removed therefrom and positioned, as indicated at 41*a*, to block the outlet of the blower 15 relative to the heater when the heater is not in use for an interval. A corresponding damper 43 is provided in the discharge header 36 which header is provided with an opening 44. The opening 44 faces rearwardly of the body so that a low pressure air zone is created about the opening 44 for insuring an adequate flow of air to the heater and into the outside atmosphere when the heat is not being used for heating the body. The damper 43 may likewise be utilized to close the discharge passage of the heater, as indicated, at 43*a*, which leads to the interior of the body when the damper is not positioned for closing the opening 44.

When it is desired to use part of the air injected into the inlet duct through the blower 15 for removing heat from the heater when the heater is not in use, the damper 43 may be positioned in the dot and dash position 43*a*, illustrated in Fig. 3, in which case the opening 44 is opened and air from the blower 15 passes through the heater to the outside air. Under these latter circumstances, the damper 41 is positioned to block or partially block the opening 39, depending on the amount of air to be passed through the heater. When the damper 41 is positioned to block the opening 39 entirely, the proportion of the air from the blower which is passed through the heater is controlled by the control valve 18*a* or the by-pass duct 18 above referred to.

As the air flows through the heater from the header 33 to the header 36, it is desirable to utilize part of this air for preventing the intense heat from the sleeve 29 from radiating to the outer casing 25. Consequently a sleeve 46 is provided and extends from the adjacent edge of the header 33 to the adjacent edge of the header 36, being supported in place on suitable spaced pads 47 so that air may flow between the sleeve 46 and the casing 25 or insulating packing 26. Thus the larger portion of the air passing through the heater passes between the sleeve 29 and the sleeve 46 and is exposed close to and confined closely about the intensely heated sleeve 29. A part of the air however passes between the sleeve 46 and the outer casing and thus forms an insulating and recuperating air stream for reducing radiation losses which would be occasioned were no such sleeve interposed between the sleeve 46 and the sleeve 29. Thus heat received in this air stream is not lost but is passed on into the air being discharged from the heater.

In operation, it has been found that considerable loss of heat is occasioned at the ends of the heater due to the large volume of cold outside air which is constantly blown over the exhaust pipe portion 13 and 13*a*. This cold air is constantly displaced, the maximum differential in temperature between the exhaust pipe, the headers 27 and 28, and the outside air is present at all times during the operation of the vehicle. Furthermore, since the headers 27 and 28 are of heat conducting material, and must be usually of metal, a large amount of heat is transferred from the pipes 13 and 13*a* by direct metal to metal conduction, resulting in a much larger surface exposed to the rapidly passing outside air current. This heat likewise is passed by metal to metal conduction to the outer casing 25, thus creating undesirable heating thereof and additional heat losses into the outside air. In order to utilize this heat to advantage and prevent these undesirable effects, a heat insulating metal shield 50 having a heat insulating lining 51 is mounted on the pipe 13 and flared outwardly from the pipe to the end of the heater 14 so as to form a substantially dead air pocket at the end of the heater. Such shields may be provided at both ends of the heater. This prevents the rapid passage of outside air over and in contact with the pipes 13 and 13*a* so that the heat is not dissipated therefrom. However, as a result of this, the headers 27 and 28 of the casing are heated to an additionally high temperature and differentials in expansion and contraction may adversely affect the heater. For eliminating these undesirable effects and at the same time utilizing the heat which would otherwise be lost in creating them the headers 27 and 28 are provided with sets of radiating fins 52 and 53 respectively. The fins are preferably thin metal integral with the end walls and extend inwardly into the heating compartment of the heater. The fins 52 and 53 are formed to provide as much surface area as possible commensurate with an adequate flow of air thereacross.

Referring first to the fins 52, the same extend longitudinally of the sleeve 29 and only about half way down from the top of the heater, as better illustrated in Fig. 3, so that air may readily pass into them and conduct away the heat. Thus the heat in the header 27 is conducted rapidly into the fins and discharged thereby into the air which passes into the body. The fins 53 are correspondingly arranged. In those instances in which the air entering the header 33 passes the fins without coming in contact therewith, a semi-annular baffle 54 is provided for deflecting part of the air entering the header 33 longitudinally of the heater and directed onto the fins. Thus, the heat conducted into the header 28, instead of being conducted outwardly through the casing or dissipated into the outside air, is conducted into the interior and discharged into the air stream utilized for heating the interior of the vehicle body. The baffle 54 is preferably fastened in firm contact with the sleeve 29 so that heat may be conducted from the sleeve and thereby additional surface for radiating this heat into the air within the heater is provided.

Formal changes may be made in the specific embodiments of the invention described without departing from the spirit and substance of the

broad invention, the scope of which is commensurate with the appended claims.

What is claimed is:

1. A vehicle body exhaust gas heater comprising a heat radiating conduit arranged for connection to an engine exhaust gas line for passage of exhaust gases therethrough, a casing surrounding the conduit in spaced relation thereto, heat conducting metal end walls extending from the conduit to the casing and defining therewith and with the conduit an air heating compartment, said conduit being sealed between the end walls for excluding exhaust gases from the compartment, whereby heat is radiated into said compartment from the conduit, and conducted from the conduit by the end walls, means to pass air to be heated through the compartment, and heat radiating fins on said end walls and disposed within the compartment and extending into the path of the air, whereby heat conducted by said end walls from the conduit is removed from the end walls and is recuperated.

2. A vehicle body exhaust gas heater comprising a heat radiating conduit arranged for connection in an engine exhaust gas line for passage of exhaust gases therethrough, a casing surrounding the conduit in spaced relation thereto and having an end wall, said casing and conduit defining an air heating compartment, an air inlet opening into the compartmet, an air outlet opening into the compartment in spaced relation to the opening of the air inlet, whereby air may be passed from the inlet to the outlet through the compartment, a shield mounted within the compartment between the openings, said shield being in slightly spaced relation to the casing walls for defining with the interior wall surface of the casing a restricted air passage, said passage being open at both ends whereby part of the air passing through said compartment may pass in direct contact with said conduit and part of the air may pass through said restricted air passage to provide an air shield between the shield and casing for reducing heating of and radiation losses from the casing.

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