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WALL CONSTRUCTION

This invention relates to a wall construction, particularly a wall that is positioned between the interior of a vehicle cab and a source of heat such as an engine compartment.

In recent years, particular attention has been paid to the comfort of an individual that operates construction equipment. To that end, environmentally protected cabs have been developed to ensure the comfort of an operator through the provision of heating and air conditioning systems. However, even with the provision of air conditioning, on many vehicles the positioning of the cab is such that it is mounted next to a source of heat such as an engine compartment. The heat generated by the engine is often trapped within the confines of an enclosure and thus serves to increase the temperature of surrounding structures such as the cab thus counteracting the effect of the air conditioning unit. In many instances, a cab wall will be the only barrier between an engine compartment and the inside of the cab which will result in the direct transfer of heat into the cab.

A system that provides for the cooling of an engine compartment as well as an adjacent compartment is typically shown in our U.S. Patent Specification No. 3,866,580. Cooling air for the engine enclosure is drawn through air ducts in panels located at the rear and along the sides of the vehicle. Movement of the air occurs as a result of a pressure differential that is created by a venturi-type relationship between the engine exhaust pipe and a surrounding tubular encasement. Similarly, air is drawn through air ducts in panels surrounding the compartment that

houses the radiators which is positioned just forward of the engine compartment. The air is drawn through the compartment in conventional fashion by a fan and is directed through exhaust ducts in the front panels of the compartment. While this patent specification discloses an effective way of removing heat from within an enclosure housing a heat producing component, it does not address a method of preventing the transfer of that heat to adjacent enclosures.

Our U.S. Publication T986,006 discloses an air circulation system for a vehicle cab. In this system outside air is drawn through the cab by a venturi flow created between the exhaust pipe of the engine and the tubular structure that houses it. Alternatively, air may be drawn through the cab by an engine driven fan that is normally associated with the radiator and engine cooling system. Here again, this design provides only a system which circulates air within the cab and does not address the prevention of heat transfer between two compartments.

In accordance with the present invention, a wall construction, in which a wall is interposed between a first compartment containing a heat-source and also having means for providing a flow of air therethrough and an adjacent second compartment which, in use, is cooler than the first compartment, has a wall comprising a first panel exposed to the second compartment and having at least one opening therethrough; a second panel exposed to the first compartment adjacent to the flow of air and positioned in spaced relation to the first panel to form an air passage therebetween; means operatively associated with the second panel at a position remote from the opening for creating a pressure drop sufficient for drawing air from within the second compartment through the opening in the first panel and through the air passage for cooling the second

panel; and means for exhausting the air drawn through the air passage without that air passing back into the second compartment.

With air being drawn through the air passage, the wall may be positioned next to a source of heat such as an engine enclosure. The cooling of the air passage and thus the wall itself, prevents the transfer of heat from the engine compartment to the interior of an adjacent cab.

Examples of wall constructions in accordance with the present invention will now be described with reference to the accompanying drawings, in which:-

Figure 1 is a fragmentary top view of a first example shown partially in section;

Figure 2 is a fragmentary side view taken on the line II-II in Figure 1;

Figure 3 is a section taken on the line III-III in Figure 2;

Figure 4 is a fragmentary side view, similar to that of Figure 2, of a second example;

Figure 5 is an end view taken from the line V-V in Figure 4; and,

Figure 6 is a section taken on the line VI-VI in Figure 4.

Referring to the drawings, Figure 1 discloses a portion of a construction vehicle 10 that has a cab or operator's station 12 positioned thereon. Directly adjacent the cab lies an enclosure 14 which houses

various components such as an engine 16 and a radiator 18. A fan 20 which is driven by the engine, pulls air through a front portion 22 of the enclosure and then through the radiator for cooling purposes. The air is then directed toward a rear portion 24 of the enclosure under pressure from the fan. The air flows in a current through the enclosure and is indicated by arrows 26 in the drawings.

Interposed between the cab 12 and the enclosure 14 is a sidewall 28 of the cab. The sidewall has a first panel 34 that faces the interior 36 of the cab and extends longitudinally along a centerline X of the vehicle. A plurality of openings 37 are formed along a forward end 38 of the inner panel. A second longitudinally extending panel 39 of the sidewall extends parallel to the first panel and faces the interior 40 of the enclosure 14. The panel 39 is spaced from panel 34 to form a channel or air passage 41. The panels are connected to each other at their forward ends 38 by a third panel 42 that is transversely oriented to the air passage. A fourth panel 44 which is also transversely oriented to the air passage is connected to panel 34 at a rear portion 45 of sidewall 28. An extension or wing member 46 is connected to the second panel 39 and extends at a rearwardly directed angle therefrom into the interior 40 of enclosure 14. An opening 48 is formed between the wing member 46 and the fourth panel 44 which provides communication of conditioned air, illustrated by arrows 49 (Fig. 3), between air passage 41 and the interior 40 of enclosure 14.

Referring now to Figs. 4, 5 and 6, an alternate embodiment of the present invention is disclosed. Components in this embodiment that are identical to those previously described are indicated by the same reference numerals.

A baffle assembly 50 is positioned at the rear portion 45 of the sidewall 28 which includes a deflector plate 52. The deflector plate has a first portion 54 that extends transversely across the air passage 41 and is connected to first and second panels 34 and 39. A second portion 56 of the deflector extends from the first portion through an opening 58 (Fig. 6) in second panel and into the interior 40 of enclosure 14 at a forwardly extending angle. A support plate 60 extends between the second portion of the deflector and the second panel 39 and is positioned generally perpendicular to the angle of the second portion 56.

A plurality of horizontally oriented conduits 62 extend between the interior 40 of enclosure 14 and a chamber 63 formed on the rear portion 45 of sidewall 28. A first end 64 of each conduit is mounted within a plurality of vertically spaced openings 66 in support plate 60. Similarly, a second end 68 of each conduit is mounted within a plurality of mounting holes 70 (Fig. 6) that are formed in the first portion 54 of the deflector plate 52 and extend into chamber 63. As best illustrated in Figs. 4 and 5, it can be seen that a plurality of openings 72 are formed in the first portion of the deflector plate and are positioned between each of the conduits. The openings permit communication of conditioned air (arrows 49) between the air passage 41 and the interior 40 of enclosure 14 at the rear portion 45 of the sidewall 28 by way of chamber 63.

Industrial Applicability

In the operation of the vehicle 10, the fan 20, driven by the engine 16, pulls air through enclosure 14 and directs a current of air 26 to the rear of the enclosure for expulsion therefrom. The current flows by the second panel 39 of sidewall 28

under pressure where it encounters the wing member 46. The air flow is deflected by the angularly extending wing and, as it moves around the wing, it creates a drop in pressure at the opening 48 in wall member 44. As a result of the pressure drop, the conditioned air 49 is drawn from the cab interior 36 through openings 37 and into air passage 41. From the air passage 41, the air is syphoned through opening 48 and into the interior 40 of the enclosure 14.

Thus it can be seen that a current of conditioned air is established within the air passage. The air flow provides a medium for cooling between the second panel 39 which draws heat from the engine 16 and first panel 34 which may be under the cooling influence of an air conditioner.

Alternatively, the flow of air 26 may be opposed by a baffle assembly 50 as is shown. The deflector portion 56 is angled into the flow of air which forces a portion of the air flow 26 into the first ends 64 of conduits 62. The conduits, in turn, direct the air flow into the air passage 41 where it is exhausted at an accelerated velocity into the chamber 63 formed by the rear portion 45 of sidewall 28. The passage of air at an accelerated rate between the panels 34 and 39 establishes a venturi-type flow of air within the air passage. As a result, conditioned air 49 is drawn from the cab interior 36 into the air passage through openings 37 in the first panel. The conditioned air is then drawn out of the air passage through the openings 72 in the first portion 54 of the deflector plate 52 and exhausted back into the interior 40 of the enclosure 14.

While the invention has been described in connection with an enclosed cab, one skilled in the art will appreciate that the invention is not necessarily so limited. For example, this invention can be applied

to the inner wall of an operator's station that has no environmental enclosure. Whereas the novel wall construction hereinbefore described may be applied to prevent a heat source from counteracting the effects of an air conditioner, the same may be applied in the absence of air conditioning.

CLAIMS

1. A wall construction in which a wall is interposed between a first compartment containing a heat-source and also having means for providing a flow of air therethrough and an adjacent second compartment which, in use, is cooler than the first compartment, the wall comprising a first panel exposed to the second compartment and having at least one opening therethrough; a second panel exposed to the first compartment adjacent to the flow of air and positioned in spaced relation to the first panel to form an air passage therebetween; means operatively associated with the second panel at a position remote from the opening for creating a pressure drop sufficient for drawing air from within the second compartment through the opening in the first panel and through the air passage for cooling the second panel; and means for exhausting the air drawn through the air passage without that air passing back into the second compartment.

2. A wall construction according to claim 1, wherein the second panel means comprises a wing member connected to the second panel and extending at an angle therefrom away from the air passage and into the flow of air.

3. A wall construction according to claim 2, wherein an opening is formed in the second panel adjacent the wing member to allow movement of the air from the air passage into the first compartment.

4. A wall construction according to claim 1, wherein the second panel means comprises a baffle assembly comprising a first portion having at least one opening and being connected to the first and

second panels to extend across the air passage, and a second portion extending from the second panel at an angle therefromin opposition to the air flow; a chamber formed adjacent to the first baffle portion; at least one conduit having a first end extending through the first baffle portion and into the chamber, and a second end connected to the second baffle portion at a location remote from the air passage and in communication with the air flow, the or each conduit being positioned to direct a portion of the air flow into the chamber.

5. A wall construction according to claim 4, wherein the or each opening in the first baffle portion allows air from the passage to be drawn into the chamber in response to a drop in air pressure in the chamber resulting from a venturi effect created by the or each portion of the air flow flowing from its respective conduit second end through its respective conduit first end and into the chamber.

6. A wall construction according to claim 4 or claim 5, wherein a vertically aligned plurality of the conduits extend through the first baffle portion and the openings are positioned in the first baffle portion between each of the conduits.

7. A wall construction according to any one of the preceding claims, wherein the wall is positioned between an interior of a vehicle cab forming the second compartment and an engine enclosure forming the first compartment, and the arrangement being such that, in use, air from the cab is drawn through the air passage to prevent the transfer of heat from the engine enclosure to the vehicle cab.

8. A wall construction substantially as described with reference to the accompanying drawings.