Dec. 23, 1958 W. W. PARKS ET AL 2,866,070

GRILL AND SUPPORT FOR ELECTRICAL HEATER

Filed July 24, 1956 2 Sheets-Sheet 1

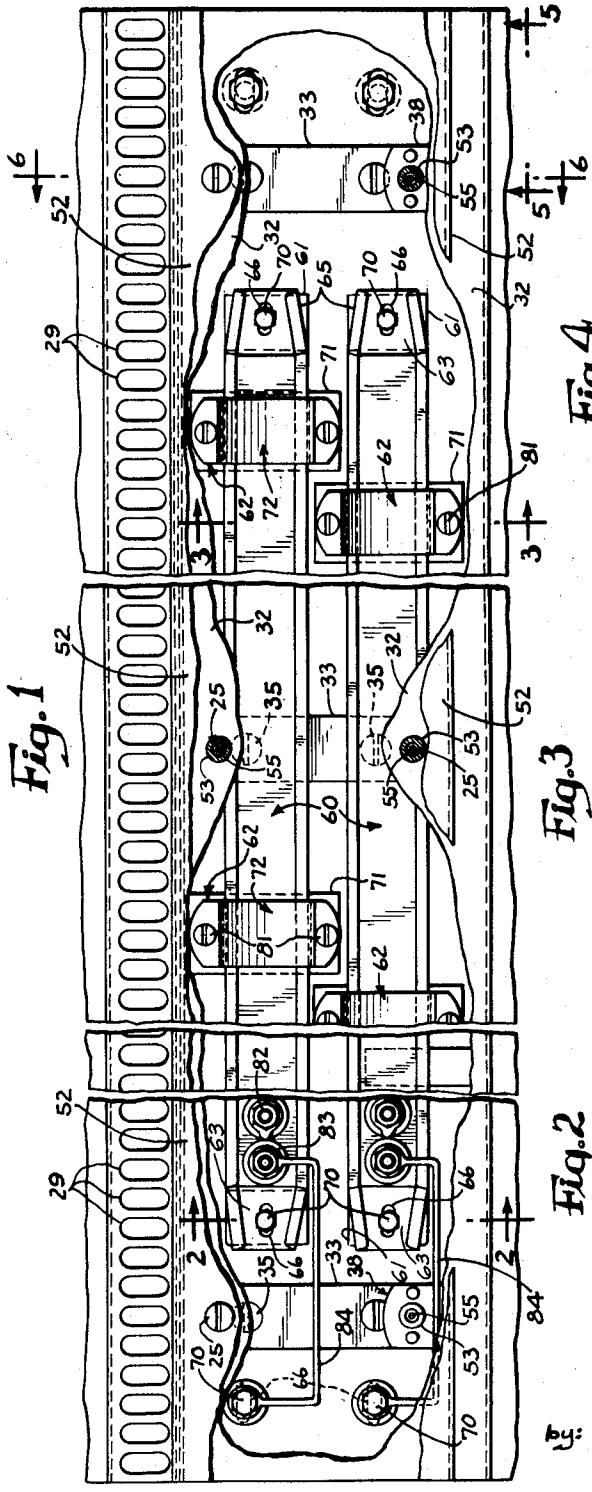


Fig. 1

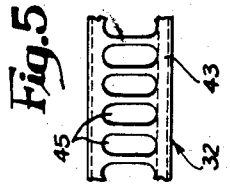


Fig. 5

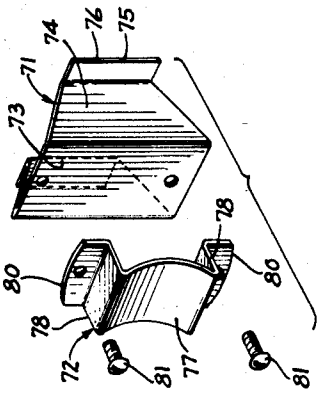


Fig. 4

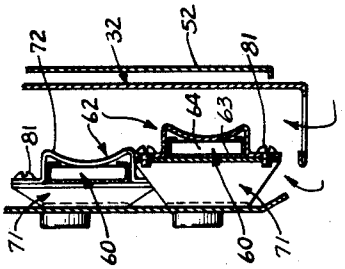


Fig. 3

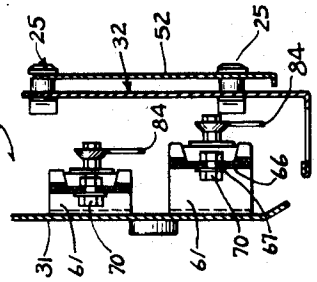


Fig. 2

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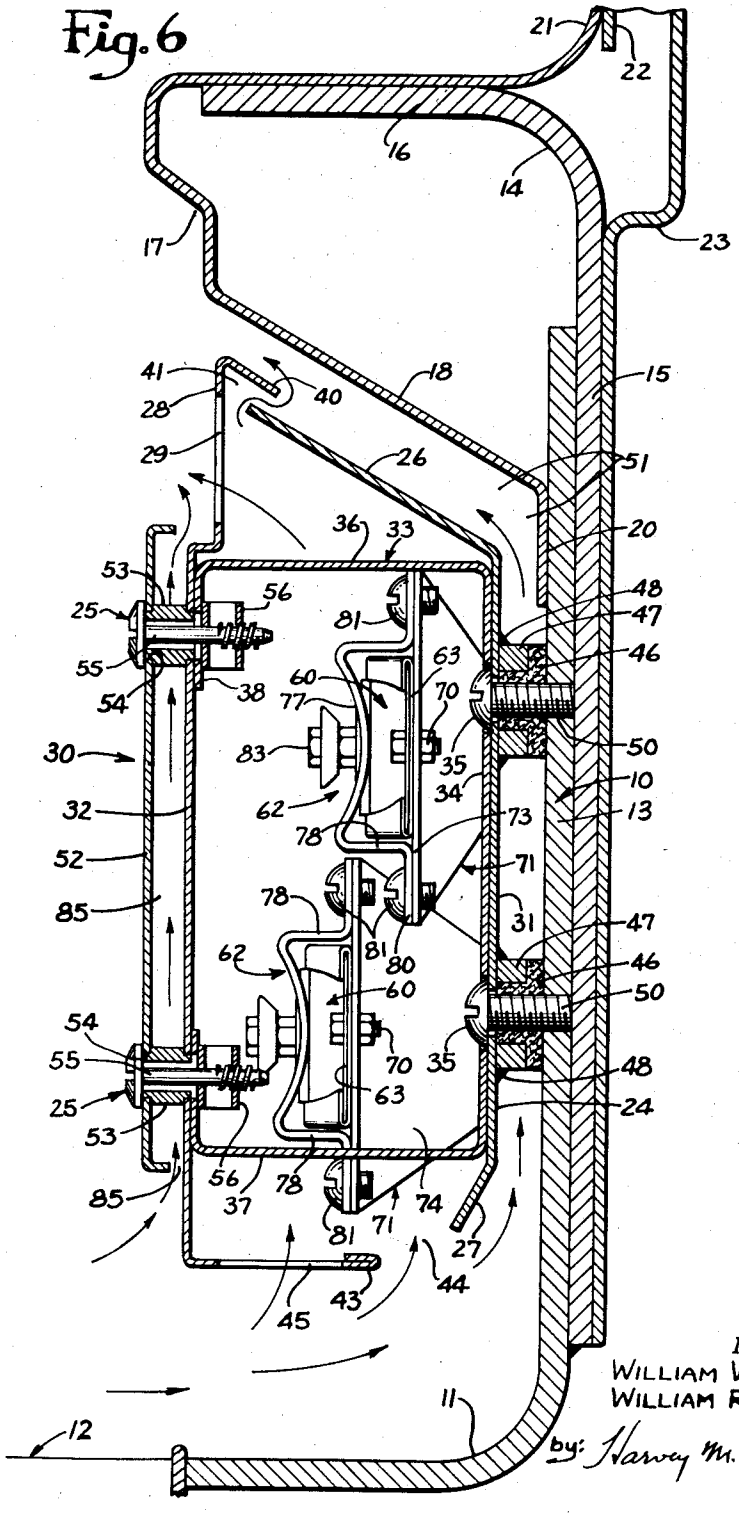
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GRILL AND SUPPORT FOR ELECTRICAL HEATER

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Fig. 6



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GRILL AND SUPPORT FOR ELECTRICAL HEATER

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Application July 24, 1956, Serial No. 599,754

6 Claims. (Cl. 219—34)

The present invention relates to an electrical heater construction for railway cars and the like and more particularly to a novel form of grille and supporting structure for such heaters.

The present invention is directed particularly to a novel structural arrangement whereby a series of resistance units or heaters may be supported from the side wall structure of a railway car in such a manner as to attain certain advantages both as regards the distribution of heat within the interior of the car and the convenience of installation of the heater construction in an out-of-the-way location beneath the wall trim or seat sills associated with the car wall structure and in conformity with the wall space provided for it.

The objects of the invention are manifold and, principal among them is the provision of a grill and supporting structure for electrical resistance heater units which consists, in the main, of front and rear plates connected together by intervening strut members, the plates cooperating with each other to form an elongated generally tubular enclosure for a heating element or elements. The rear plate is maintained spaced from the side wall of the railway car so that a current of air may flow upwardly behind the rear plate, absorbing some heat from the latter but serving principally to thermally insulate the heater construction from the wall panel so that little or no heat will escape by conduction through the wall panel. A front shield is supported in spaced relation from the front plate and is substantially coextensive therewith, thus forming in combination with the front plate, a second patch for upward flow of air which may absorb some heat from contact with the front plate but which has the principal purpose of shielding the heat developed in the front plate so that the front plate will not radiate intense heat laterally to the discomfort of passengers or other occupants of the car and also so that accidental contact with the front plate is avoided. The front and rear plates are so designed and supported relative to each other that a current of air may pass upwardly between them, such current constituting the principal source of heat of convection issued to the car interior for the comfort of the occupants.

It is a further object of the invention to provide a heater construction of the type briefly outlined above in which the major components thereof may be formed of light sheet metal stampings, thus contributing toward economy of manufacture.

Another object of the invention is to provide such a heater construction in which the heater elements per se are entirely concealed from view yet in which none of their heating effect or efficiency is destroyed.

The provision of a heater construction in which the design thereof is not only attractive in its appearance but in which its design cooperates with the natural contour of the railway car wall to produce certain functional effects wherein heated convection currents of air are directed to the car interior is a further consideration that

has been borne in mind in the production and development of the present invention.

Other objects and advantages of the invention, not at this time enumerated, will become more readily apparent as the following description ensues.

In the accompanying two sheets of drawings forming a part of this specification, a preferred embodiment of the invention has been shown.

In these drawings:

Fig. 1 is a fragmentary front elevational view of a grille and supporting structure for a railway car heater constructed in accordance with the principles of the present invention. In this view certain portions have been broken away to more clearly reveal the nature of the invention.

Fig. 2 is a sectional view taken substantially along the line 2—2 of Fig. 1.

Fig. 3 is a sectional view taken substantially along the line 3—3 of Fig. 1.

Fig. 4 is a perspective exploded view of a mounting bracket and support for one of the electrical heater units of the present heater construction.

Fig. 5 is a fragmentary front elevational view of a portion of a grille construction employed in connection with the invention, and

Fig. 6 is a sectional view taken substantially along the line 6—6 of Fig. 1.

Referring now to the drawings in detail and in particular to Fig. 6, a form of heater construction embodying the principles of the present invention is shown as being applied to the inner sheathing or panel of a more or less conventional wall structure associated with a railway car which may be any one of numerous types as for example a railway coach, roomette, dining car or the like. Although a specific form of wall structure has been shown for illustrative purposes, it will be understood that the heater construction may, with or without suitable modification, be applied to other types of wall structures either in railway car construction or in other forms of habitable enclosures, whether mobile or stationary. Irrespective however of the particular use to which the present heater construction may be put, the essential features of the invention are at all time preserved.

The inner sheathing above referred to includes a lower floor sill side member **10** including a horizontal portion **11**, aligned with the top surface of the car floor **12** and from which there extends upwardly a vertical extension **13**. The member **10** may extend substantially the entire length of the railway car. Suitably secured to the member **10**, as by welding, is a structural member **14** having a vertical portion **15** on the outside of the member **10** and having an inturned horizontal extension or sill portion **16**. The horizontal portion **16** serves in part to support an inner trim piece **17** having an upwardly and inwardly inclined wall portion **18** the lower edge of which is turned downwardly as at **20** and welded to the inner face of the member **10**. The trim piece **17** extends around the inner edge of the sill **16** and is then turned upwardly as at **21** where it may be secured to the inside lining panel **22** of the car. The outside wall panel extends upwardly along the outer face of the structural member **14** and is offset as at **23** and extends upwardly in spaced relation to the inside lining panel **22**.

The heater construction of the present invention is designated in its entirety at **30** and is adapted to fit and be nested within the "baseboard" space existing between the trim piece **17** and floor sill **11** so as to be substantially wholly contained within the vertical confines of these parts. This heater construction involves in its general organization a generally channel-shaped rear plate **31** and a similarly shaped front plate **32**, the two plates being connected together at intervals by intervening strut mem-

bers 33 (see also Fig. 1). The plates 31 and 32 are of appreciable longitudinal extent, as for example in the neighborhood of five feet each so that for a railway car of average length ten (?) or more of them may be arranged in end to end substantially abutting relation where an entire side of the car is to be heated. The heater construction is thus of a sectional nature, the number of sections employed depending upon the longitudinal extent of the car which it is desired to heat.

Each of the spaced apart strut members 33 is generally U-shape in design and includes a base portion 34 which is secured to the rear plate 31 by studs 35 in a manner that will be described presently. The upper and lower legs 36 and 37 respectively bridge the distance between the two plates 31 and 32 and have their ends turned inwardly as at 38 and secured to the front plate 32 by fastening assemblies 25 which likewise will be described subsequently.

The rear plate 31 is formed with a vertical wall panel 24 and upper and lower inclined diverging wing portions 26 and 27 respectively which extend forwardly toward the front plate 32. The upper wing 26 closely approaches the front plate 32 and this latter plate is formed with an offset portion 28 which is hooked over the end of the wing 26 as at 40 but remains spaced therefrom to provide an elongated circuitous passage 41 for the flow of heated air upwardly and outwardly from between the two plates 31 and 32. The offset portion 28 is formed with a series of spaced openings 29 therethrough (see also Fig. 1) thus providing an upper grille for the further escape of air from between the two plates 31 and 32. The lower edge of the plate 32 is turned laterally rearwardly as at 43 so as to extend toward the lower wing 38 of the plate 31 but leaving a space or slot 44 between the two plates for the entrance of air into the box-like space existing between the plates. The inturned edge 43 is formed with a series of spaced openings 45 (see also Figs. 1 and 5) for the further entrance of air into the tubular space existing between the two plates 31 and 32.

The fastening studs 35 extend through both the base portions 34 of the struts 33 and the vertical portion of the rear plate 31 and also through asbestos washers 46 which are centered and reinforced in and by centering rings or bosses 47 welded as at 48 to the rear face of the plate 31. The ends of the studs 35 are threadedly received in openings 50 provided in the structural member 10. The washer and centering ring assemblies 46, 47 thus constitute spacer assemblies by means of which the rear plate is supported in slightly spaced relation from the vertical portion 13 of the sill member 10. It is to be noted that the space existing between the rear plate 31 and the vertical wall structure of the railway car, and also the space existing between the upper inclined wing 37 and the inclined wall portion 18 of the trim member 17 constitutes an air passage 51 through which air may flow upwardly around the rear of the heater construction for heat insulating purposes as will be explained presently. While two of the spacer assemblies 46, 47, together with their respective fastening studs 35, have been illustrated and are deemed sufficient for the anchorage of each strut member 33, it will be understood that a greater number of these assemblies may be employed if desired.

Still referring to Fig. 6, a shallow channel-shape shield 42 extends along the front plate 32 substantially coextensively therewith and is maintained slightly spaced therefrom by means of the previously mentioned fastening assemblies 25. The shield 52 is maintained in its spaced relation to the plate 32 by means of spacing rings 53 constituting a part of the fastening assemblies 25. The spacing rings 53 have their ends anchored in openings 54 provided in the shield and plate 32 respectively and an anchoring bolt 55 extends through each ring 53 and through the openings 54 and the threaded shank portions thereof receive thereon conventional stamped metal box-shaped fastening nuts 56. The fastening assemblies 25 thus serve the dual function of holding the shield 52 in its spaced relation on the plate 32 as well as maintaining the various strut members 33 anchored to the front plate 32.

Interposed between the front and rear plates 32 and 31 respectively and fastened to the latter plate are a plurality of preformed and preassembled heating units per se, each of which has been designated in its entirety at 60. These heating units 60 are in the form of elongated narrow assemblies which, according to the illustrated form of the invention, are arranged in end-to-end relationship in two rows offset slightly laterally from each other as clearly shown in Figs. 1, 3 and 6. Depending upon the length of these units in relation to the length of each sectional unit 30 of the heater construction, one or more of the heating units 60 may be contained in each of the two offset rows of each unit or assembly 30. The heating units 60 are fastened at their ends in position against the back plate 31 by means of bracket assemblies 61 (Fig. 2) and are supported in their medial regions from the plate 31 by means of strap assemblies 62 (Figs. 3 and 6), which assemblies 61 and 62 will shortly be described in detail. The heating units 60 are not necessarily confined wholly within the space existing between any two pair of front and back plates 31 and 32 and, as shown at the left hand side of Fig. 1, the ends of one pair of laterally offset units 60 extend into the space existing between the two illustrated plates 31 and 32 from an adjacent heating unit 30.

Each heating unit 60 comprises an elongated backing strip or sheath 63 which is best illustrated in Figs. 1 and 3 and the longitudinal edges of which are crimped, flanged or rolled over the heating element proper 64 so as to firmly hold the same in position within the sheath. The opposite ends of the element 64 terminate short of the ends of the sheath 63 and the latter are tapered inwardly as at 65. The ends 65 of the sheath 63 are formed with elongated slots 66 designed for registry with holes 67 formed in respective U-shaped brackets 61 (Fig. 2) the legs of which are welded to the rear plate 31. Nut and bolt assemblies 70 cooperate with the registering slots and holes to clamp the ends of the heater units 60 in fixed position. The elongated slots 66 allow for tolerance in the manufacture of the heating units 60 and insure registry with the holes 67.

The strap assemblies 62 are best illustrated in Figs. 1, 3, 4 and 6 wherein each assembly is shown as comprising two principal parts, namely a U-shaped base support or bracket 71 and a clamping strap 72 (Fig. 4). Each bracket 71 is of U-shape design and includes a base portion 73, tapered side legs 74 and attachment ears 75, the latter being welded as at 76 to the front face of the rear plate 31. The various heater elements 60 are clamped against the outer faces of the supporting brackets 71 which they traverse by means of the cooperating clamping straps 72, each of which is generally of U-shape configuration and is provided with an inwardly bowed base portion 77, side legs 78 and attachment ears 80. Clamping screws 81 pass through the ears 80 and have their ends threadedly received in the base portion of a cooperating supporting bracket 71. The side legs 78 of each clamping strap 72 straddles the heating unit 60 and, when the strap is firmly secured in position on the bracket 71 by means of the screws 81, the curved base portion 71 of the strap yieldingly bears against the outer face of the heating unit 60 with which it is associated and clamps the same against the bracket 71. Inasmuch as the various strap assemblies 62 yieldingly hold the medial regions of the heater units 60 against lateral displacement while allowing limited longitudinal shifting of the heating elements 64 so that they may adjust themselves to the effects of thermal expansion under varying heat conditions.

Electrical current may be supplied to the various heating elements 63 according to acceptable engineering practice, it being understood, of course, that each unit will

be supplied with current commensurate with its current rating. The units may be connected in electrical parallel, in series or in series-parallel as desired. In Fig. 1, the two adjacent pairs of aligned units are shown as being connected in series, the lead-in and lead-out terminals for each unit being designated at **82** and **83** respectively. The connecting bus-bar connections **84** connect the lead-in terminal **82** of one unit with the lead-out terminal of an adjacent unit.

When the heater construction of the present invention is in operation with the electrical elements **63** energized, heat is radiated forwardly from these elements and much of it is radiated against the front plate **32**. Some of this radiated heat is reflected back into the space existing between the front and rear plates **32** and **31** respectively, while some of it passes through the front plate and is radiated into the space or passage **85** existing between the front shield **52** and the front plate **32**. A considerably lesser amount of heat is radiated rearwardly from the heating units and there is, of course some conduction of heat through the metal structural members of the heater assembly. Such heat of conduction is, however, largely dissipated due to the upward flow of air through the passage **44** and behind the heater element **60**, thus cooling the various supporting brackets **61**, **71** and other structural members such as the struts **36**. Such heat of radiation and of conduction as does reach the rear plate **31** is further thermally insulated from the wall construction of the railway car by the flow of air upwardly through the passage **51** between the plate **31** and wall construction. This stream of air cools the plate **31** so that there is less heat radiated therefrom to the wall construction and, since the stream of air rises rapidly as it gathers heat from the adjacent metal surfaces of the heater construction only a small amount of heat of convection reaches the wall surface. This wall, including the members **10**, **15** and **22**, is thus maintained relatively cool and much of the heat of radiation, conduction and convection that otherwise would reach the wall and be expended to the outside atmosphere through the wall is retained for useful heating purposes.

Air which enters the passage **44**, in the main flows behind the heating units **60** while air entering the grille openings **45** passes upwardly in front of these units. The two streams receive heat from their respective areas or regions of the space existing within the heater structure between the plates **31** and **32** and a portion of the front stream combines with the rear stream near the top of the structure and the combined streams flow outwardly through the passage **41** and become commingled with the stream of air leaving the passage **51**. The remainder of the front stream passes outwardly through the grille openings **29** and enters the car enclosure.

Air entering the passage **85** at the bottom of the heater structure flows upwardly between the shield **52** and front plate and assimilates heat from the front plate **32**. This latter stream of air prevents the shield **52** from assimilating excessive heat and thus this shield at all times remains comfortable to the touch so that accidental contact therewith will not produce burns or discomfort. This stream of air is ultimately discharged into the car compartment at the top of the heater structure.

It is to be noted that in the form of the invention illustrated herein the heater structure is nested in an out-of-the-way place directly beneath the slanting wall **18** of the trim piece **17** so that it occupies space that otherwise would remain unused. The entire structure occupies a space that is wholly within the vertical confines of the trim piece **17** so that it remains inconspicuous and the portions thereof which are visible present an attractive and pleasing appearance.

It is worth mentioning that the structural make-up of the heater construction is such that there are no entrapping pockets or other recesses in which small objects such as coins or the like may become lodged. Such objects if dropped or otherwise caused to enter the upper open end of the passage **51** will slide along the wing portion **26** of the rear plate **31** and fall to the floor through the vertical portion of the passage where it may be retrieved. Similarly, the passage **85** presents no obstruction to the passage of objects inadvertently entering the top of this passage.

The invention is not to be limited to the exact arrangement of parts shown in the accompanying drawing or described in this specification as various changes in the details of construction may be resorted to without departing from the spirit of the invention. Only insofar as the invention has particularly been pointed out in the accompanying claims is the same to be limited.

What we claim is:

1. The combination with the wall structure of a railway car including a forwardly and upwardly inclined trim panel above the level of the car floor, of a housing for a horizontally disposed electrical heating element comprising a rear plate having a vertical panel portion and an inclined wing portion extending forwardly and upwardly from the upper edge of said panel portion, a front plate spaced from said rear plate and having a vertical panel portion, the lower edge of said front plate being turned laterally rearwardly and extending toward the lower edge of the vertical panel portion of the rear plate and terminating short thereof to define therewith an opening for the entrance of air into the space existing between said panel portions, the forward region of said laterally turned edge being formed with a longitudinal row of closely spaced grill openings for the entrance of air into said space, an electrical heating unit disposed within said space and disposed in a horizontal plane intermediate the vertical planes of said first mentioned opening and said grill openings, a plurality of struts extending between the vertical panel portions of said front and rear plates and supporting the former from the latter, spacer elements disposed between said vertical panel portion of the rear plate and said wall base structure, attachment studs passing through each of said struts and vertical panel portion of the rear plate and also through each of said spacer means for supporting the rear plate from the wall base structure, at an elevation wherein said inclined wing portion is spaced from said inclined trim panel, there being a series of grill openings in the vertical panel portion of said front plate along the upper edge region thereof for the discharge of air from said space, the space existing between the vertical panel portion of said rear plate and the surface of said wall base structure, and the space existing between the inclined wing portion and the inclined trim panel constituting a continuous path for the flow of air upwardly and rearwardly behind said heater construction for ultimate discharge into the railway car enclosure.

2. The combination set forth in claim 1 including, additionally, a shield panel spaced forwardly from said front plate and substantially coextensive therewith longitudinally, the upper edge of said shield terminating below the level of said grill openings in the vertical panel portion of the front plate.

3. The combination set forth in claim 2 characterized in that the upper and forward edge of said wing portion terminates short of the upper edge of the vertical panel portion of said front plate and in that the upper edge of the vertical panel portion of said front plate is turned laterally rearwardly and overlies the forward edge of said wing portion.

4. A combination grill and supporting structure for a horizontally disposed electrical heater comprising, in combination, a generally rectangular elongated tubular housing structure including a back plate having a vertical panel portion provided along its upper and lower edges with forwardly bent flanges and defining a channel construction for attachment to a side wall of an enclosure, a plurality of brackets secured to the back plate

for yieldably supporting a horizontally disposed elongated electrical heating element, an elongated front plate of open end channel configuration positioned in front of said heating element and cooperating with the back plate to provide a horizontal tubular enclosure for said heating element with the upper and lower edges of the front plate being spaced from the upper and lower edges of the back plate to provide a vertical passage for the flow of air between said plates, means for removably securing the front plate in its operative position comprising a plurality of outwardly extending strut members secured to the back plate and securing clamp devices for detachably securing the front plate to said struts, and a shield plate secured in spaced relation to the outer surface of the front plate to provide a relatively cool outer plate of the structure and to also provide a vertical passage for the flow of a stream of air therethrough to absorb heat from said front plate; the said front plate being formed with a series of closely and longitudinally spaced grill openings therein above the level of said shield plate for the further egress of air from said enclosure.

5. In a combination grill and supporting structure for an electrical heating element, the combination set forth in claim 4 wherein the lower side of the channel shaped front plate is formed with a series of closely and longitudinally spaced grill openings for the passage of air from the enclosure into and through the structure enclosing the electrical heater.

6. A combination grill and supporting structure for an electrical heater as defined in claim 4 characterized in that the supporting brackets for the electrical heating element include a pair of brackets to which the opposite ends of said heating element are secured with capacity for lengthwise adjustment, and a plurality of brackets for supporting the medial regions of said heating element.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,866,070 December 23, 1958

William W. Parks et al.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 1, line 45, for "patch" read -- path --; column 3, line 4, after "ten" strike out "(?)"; column 4, line 67, for "Inasmuch as the" read -- The --.

Signed and sealed this 17th day of March 1959.

(SEAL)
Attest:
KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents

UNITED STATES PATENT OFFICE

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