

Aug. 31, 1965

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3,204,094

RADIANT GAS-FUELED RAILWAY SWITCH HEATER

Filed April 3, 1964

3 Sheets-Sheet 1

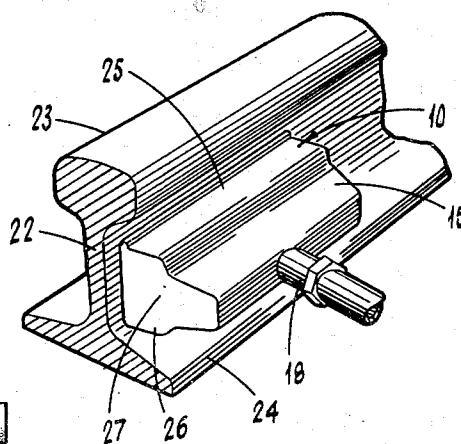
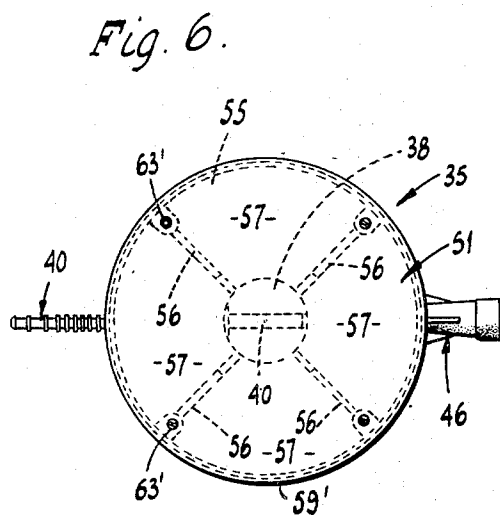
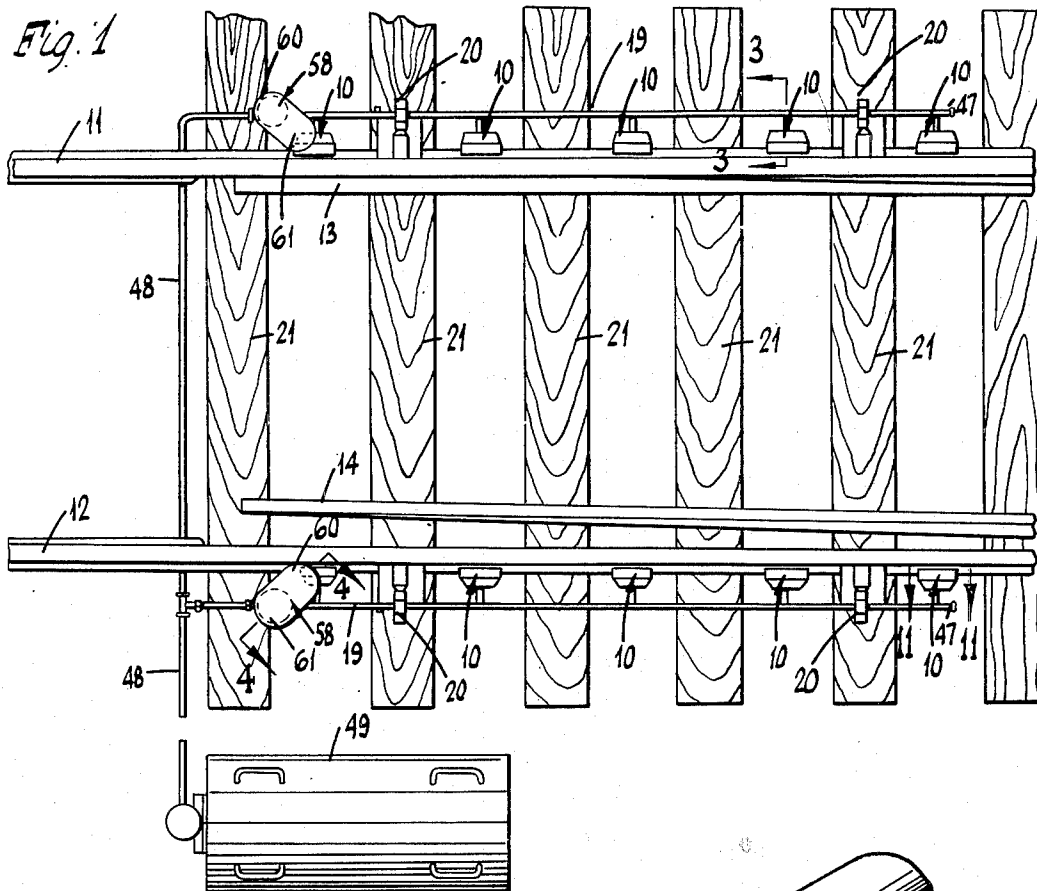


Fig. 2.

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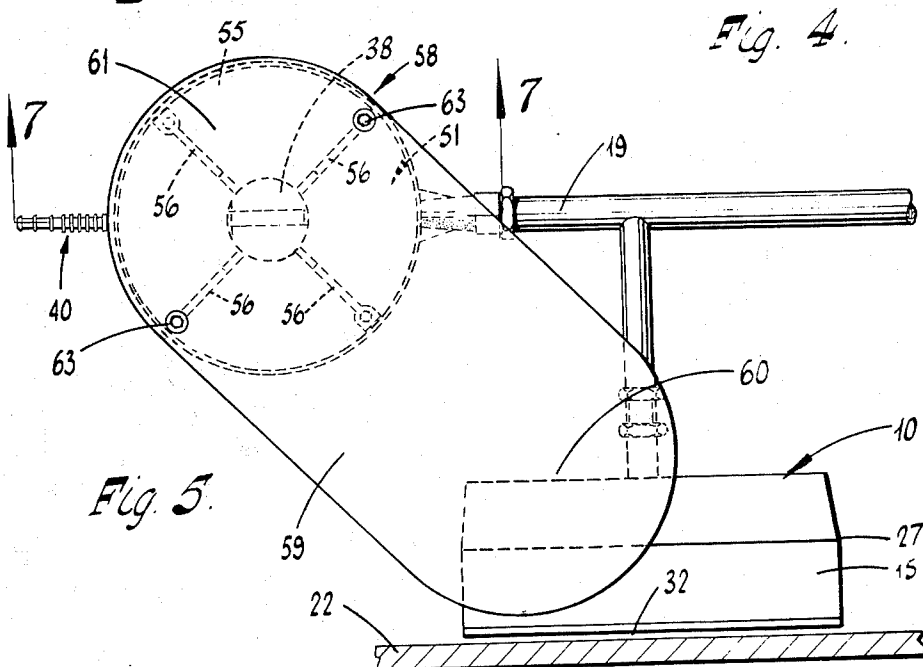
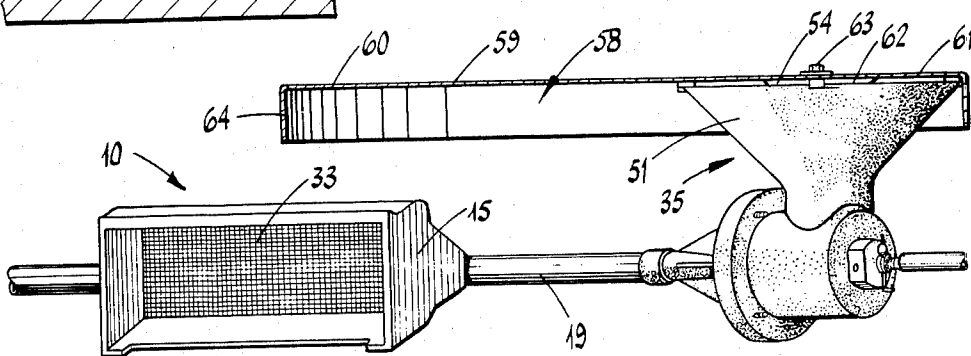
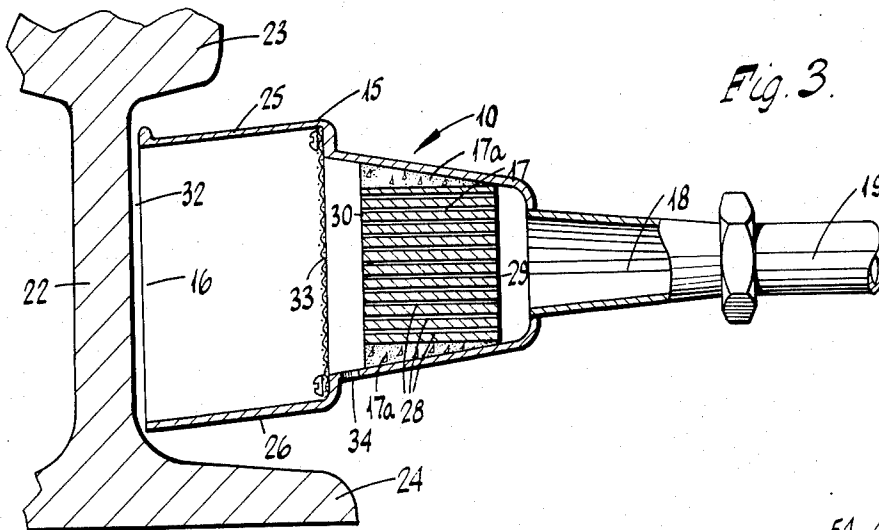
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RADIANT GAS-FUELED RAILWAY SWITCH HEATER

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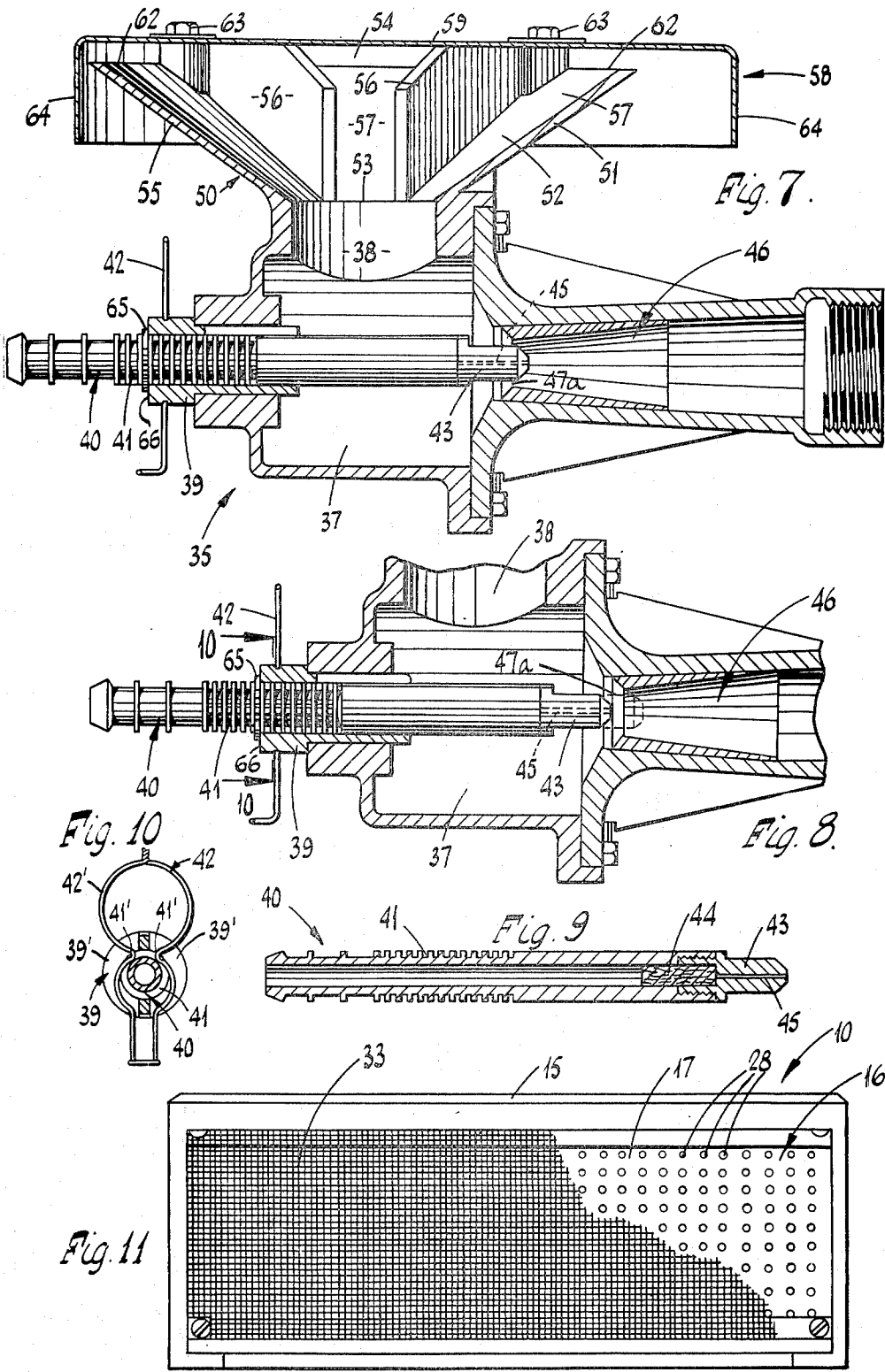
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RADIANT GAS-FUELED RAILWAY SWITCH HEATER

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3,204,094

RADIANT GAS-FUELED RAILWAY SWITCH HEATER

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215,415; Oct. 28, 1957, 221,930
17 Claims. (Cl. 246-428)

This application is a continuation-in-part of my earlier filed application Serial No. 721,496, filed March 14, 1958.

This invention relates to railway switch heaters of the type comprising a number of burners heated by the combustion of a gas-and-air mixture. Such heaters are used for the purpose of maintaining the railway switches operative under freezing conditions, for example, during conditions of heavy snowfall.

In railway switch heaters of the foregoing type as hitherto constructed, each burner has comprised a metal tube having a number of orifices providing a series of gas flames projected above the surface of the tube and which serve to heat the rail, in particular, the rail base. Such an arrangement is open to the objection that the gas flames are liable to be extinguished completely under strong wind conditions, particularly under gusty wind conditions, as frequently precede or accompany heavy snowfall, whereby the switch heater is rendered completely useless.

One of the objects of the present invention is to provide a railway switch heater embodying at least one ceramic burner plate within which the gas-and-air mixture burns, so as to heat the burner plate itself and in which a stabilizer is provided for preventing the gas-and-air flame back-firing within the burner plate under the effect of strong and, in particular, gusty winds.

Another object of the present invention is to provide a railway switch heater embodying a stabilizer for the foregoing purpose in which continued operation of the stabilizer is ensured under conditions of heavy snowfall.

A further object of the present invention is to provide a railway switch heater embodying a stabilizer for the foregoing purpose, in which provision is made for ensuring continued operation of the stabilizer under freezing rain conditions.

A further object of the invention is to provide a railway switch heater embodying a number of burners interconnected by a gas-and-air supply pipe which supplies the mixture from a gas-and-air mixing device in which provision is made for readily adjusting the volume of gas and for the volume of mixture supplied to the interconnected pipe in accordance with the number of burners supplied by such pipe.

Other objects of the invention will be understood from the following description and the appendant claims, as well as from the accompanying drawings which illustrate one preferred embodiment of the invention wherein:

FIGURE 1 is a plan view of one form of railway switch heater embodying the present invention,

FIGURE 2 is a perspective view on an enlarged scale illustrating one of the burners of the embodiment depicted in FIGURE 1,

FIGURE 3 is a part sectional view to an enlarged scale the section being taken on the line 3—3 of FIGURE 1,

FIGURE 4 is a part sectional view to an enlarged scale on the line 4—4 of FIGURE 1,

FIGURE 5 is a plan view to an enlarged scale of one of the stabilizing devices and adjacent burner of the embodiment depicted in FIGURE 1,

FIGURE 6 is a plan view of a modified form of stabilizing device similar to that in FIGURE 5, but with a circular wind deflecting cover thereon.

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FIGURE 7 is a cross sectional side elevation to an enlarged scale on the line 7—7 of FIGURE 5, depicting the injector for supplying the gas to the gas/air mixer shown in FIGURE 7,

FIGURE 8 is a view of part of the construction shown in FIGURE 7, depicting the gas supply injector of FIGURE 7 in an alternative adjusted position,

FIGURE 9 is a cross sectional view of the gas injector depicted in FIGURES 7 and 8,

FIGURE 10 is an end view of the gas injector looking in a direction of the arrow 10 of FIGURE 8 with some of the parts broken away,

FIGURE 11 is a part sectional view to an enlarged scale on the line 11—11 of FIGURE 1.

The railway switch heater illustrated in the accompanying drawings comprises two sets of burners 10, each set being arranged to heat a corresponding flange footed railway rail 11-12 on the outer side thereof adjacent a corresponding movable switch tongue 13-14.

Each burner 10 comprises a housing 15 which is open on one side 16 thereof, as shown in FIGURE 3. The housing 15 being otherwise closed and each containing a burner plate 17 of ceramic material cemented in position at 17a.

Each burner housing 15 on the side thereof opposite to its open side 16 is provided with a branch pipe 18 connected to a gas-and-air mixture supply pipe 19, which extends parallel to but spaced from the adjacent rail 11-12, which pipe 19 serves to inter-connect together the several burners 10 in each set of burners and to support the same in position for heating the adjacent railway rail, for which purpose each pipe 19 is secured by clips 20 at intervals along its length to some of the rail supporting sleepers 21.

As shown in FIGURE 3, each burner housing 15 has an overall vertical depth less than the overall vertical depth of the rail to be heated, such overall vertical depth of each burner housing being substantially equal to the overall vertical depth of the rail web 22, so that each housing 15 is adapted to extend between the adjacent underside of the rail head 23 and the upper side of the adjacent railway foot flange 24, whereby the open side 16 of each burner housing is in close proximity with the rail web.

Insofar as each burner housing 15 is open only on the side thereof which is directed towards the rail web, that is to say, it is closed on its upper and lower sides 25-26 (see FIGURE 3) in addition to being closed at its two ends 27, the open side 16 of the housing is well protected by the approximate overlying rail head 23 and underlying rail foot flange 24 from the ingress of snow or rain, particularly under stormy conditions. The lower side 26 of each burner housing slopes downwardly in a direction towards the open side 16 so as effectively to drain away any water which may enter the burner housing.

At the same time, by reason of the close proximity between the open side 16 of each burner receptacle 15 and the adjacent rail web 22, the heat generated by each burner is transmitted directly to the rail web as well as to the rail head 23, with the minimum of heat loss, so as to most effectively utilize the available heat for preventing freezing or accumulation of snow in the immediate vicinity of each movable switch tongue so as to preclude its operation.

Each burner plate 17 is formed as a substantially rectangular block of ceramic material and is formed with a large number of mutually parallel passages 28 of small bore which extend between opposite in situ vertical faces 29-30 of the plate, of which the face 29 is adjacent the pipe connection 18 and the face 30 directed towards the adjacent rail web 22.

Each plate has a vertical depth corresponding to the distance between the upper and lower sides 25-26 of

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each housing 15 and has a dimension in a direction longitudinally of the rail corresponding to the distance between the two ends 27 of each housing. The arrangement is accordingly such that the gas/air mixture supplied to the burners from each interconnecting pipe 19 and pipe 18 is caused to pass through the burner plate passages 28.

The bore of these passages 28 and the length thereof, i.e., the distance between the two faces 29-30 of each burner plate is so selected that when the gas/air mixture is ignited the combustion does not occur on the surface 30 of the plate which is directed towards the rail web, but occurs within the passages 28 at a position spaced inwardly from the burner plate face 30 by a distance which may vary from between 2 to 3 mm. to about 15 mm. depending on the bore of the passages and their length. Desirably each passage has a bore of approximately the order of 0.8 mm. and a length of 20 mm.

Thus, when the combustion of the gas-and-air mixture occurs, not only is there an absence of flame at the surface 30 of each burner plate, but insofar as the combustion takes place within the passages 28 inwardly from the surface 30 the combustion heats the adjacent part of the burner plate surrounding the passages in which the combustion occurs, so that each burner plate over an appreciable depth, which may be half the overall depth between the faces 29-30, is heated to the temperature of combustion, i.e. to incandescence and provides a heat reservoir for maintaining continued combustion within the passages 28 under stormy or gusty conditions which would be calculated to extinguish the open flames of the gas/air heated railway switch heaters as hitherto customarily employed.

Further, if by reason of abnormally high wind conditions of such violence as momentarily to extinguish the flame, despite the provision of the stabilizer device later to be herein described, the gas-air mixture is at once re-ignited by the residual heat in the mass of the burner plate at a position spaced inwardly of the face 30 thereof, which is directed to the rail.

This face is necessarily exposed to a certain amount of wind since some space must be left between the surrounding edge of the side 16 of the burner housing and the adjacent rail web, as shown at 32 in FIGURE 3, to permit of the free escape of the combustion products, as well as to enable the operator to make sure that each burner is properly ignited when the heater is initially brought into operation.

Each burner plate 17 is, however, of sufficient depth as measured between its two faces 29-30, e.g. of the depth 20 mm. aforementioned, as to provide passages 28 of sufficient length as to preclude backfiring of the flame, i.e. backward travel of the flame into the interior of the burner housing beyond the inner face 29 of the burner plate, as would occur if a relatively thin plate having a thickness of e.g. 5 mm. were employed. Thus, each burner plate has a thickness of at least about 10 mm., i.e. is of thick configuration.

Although the combustion occurs within the passages 28, the hot products of combustion are flowing to the burner face 30. Thus, although flameless combustion occurs, each burner plate will be found to present to the rail to be heated, an incandescent or glowing surface along its face 30.

The aforementioned combustion of the gas-air mixture within the interior of the burner plate is further assisted by providing between the outer face 30 of the burner plate and the rail web a strip of gauze 33 having a mesh width not exceeding about 3 mm. Such gauze serves to check inflow of air towards the burner plate through the open side 16 of the housing 15 resulting from severe wind gusts. The gauze is secured at its periphery to the interior of the burner housing with the outer face 30 of the burner plate spaced away from the gauze.

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Each burner plate is further of elongated configuration in a direction along the length of the rail, as shown in FIGURE 2, so as to heat a substantial length of rail without requiring an abnormally large burner and increased gas consumption.

The ignition of each burner will normally be effected through igniting holes 34 one of which is depicted in FIGURE 3, which holes 34 may also serve as water drainage holes for the downwardly sloping lower side 26 of the burner housing.

The air which is supplied along each pipe 19 is obtained from the immediately surrounding atmosphere and mixed with the gas in the mixing device depicted at 35 in FIGURES 4 and 6.

Such mixing device comprises a chamber 37 of generally cylindrical configuration and provided in its upper side with an air supply opening 38. One end wall of the chamber 37 is provided with a central bush 39 in which is mounted for adjustable sliding movement a gas injector nozzle 40, the construction of which is best shown in FIGURES 7 to 10. This nozzle which is conveniently formed of brass is a tight sliding fit in the bush 39 and one end of the gas injector nozzle 40 is provided with a series of axially spaced grooves 41.

The bush 39 is provided with a pair of opposed slots 39' opening into the bore of the bush and the slots 39' serve to slidably receive a spring locking member 42 formed as shown in FIGURE 10 and having opposed inwardly directed portions 41' which in one position as shown in FIGURE 10 are disposed in the slots 39' and project into one of the grooves 41 to retain the nozzle 40 in adjusted position. The locking member 42 also includes an enlarged circular portion 42' and upon movement of the member 42 downwardly from the position shown in FIGURE 10, the portions 41' are disengaged from the groove 41 and from the slots 39' to permit removal or adjustment of the nozzle 40.

The nozzle 40 is provided with a removable jet member 43 and may, as shown, house a filter 44 which serves to prevent the orifice 45 of the jet member 43 becoming clogged in the case where the orifice is of small size as is found necessary in some cases using propane as the gas.

The jet member 43 is adapted to project beyond the air supply opening 38 into a venturi element 46 which forms an extension of the mixing chamber and in which the actual mixing of the air and gas occurs, this venturi element having a bore, as shown in FIGURE 7, of venturi configuration and being connected at its free end to one end of the inter-connecting pipe 19, the opposite end of pipe 19 being provided with a removable closure cap 47 as shown in FIGURE 1.

Thus, if desired, by removing the closure cap 47, the pipe 19 may be connected to a further pipe, precisely similar to the pipe 19 illustrated, whereby the number of burners in each set of burners may be readily increased, e.g. from five burners as illustrated, to e.g. seven burners.

Any such adjustment in the number of burners supplied by the gas-air mixture from the mixing device 36 necessitates an increase or decrease in the total amount of gas-and-air supplied to each pipe 19 according to whether the number of burners is increased or decreased.

Such adjustment in the amount of gas supplied is effected by substituting for the existing jet member 43 one having an orifice 45 of lesser or greater size as shown respectively in FIGURES 7 and 8. Adjustment in the amount of air supplied is readily effected by sliding the injector member 40 within the bush so that the injector member projects by a lesser or greater distance respectively towards the venturi member 46.

The effect of projecting each nozzle member towards the venturi element 46 is to reduce, as shown in dotted outline in FIGURE 8, the cross section of the annular air space 47a surrounding the nozzle member at the en-

trance to the venturi element thereby reducing the effective cross section of the air passage into the venturi element, whereby the amount of air injected is reduced, the reverse effect being obtained by displacing the nozzle member 40 in a direction away from the venturi element 46, as shown in full lines in FIGURE 8.

Such adjustment in the amount of gas-and-air supplied to each pipe 19 in accordance with the number of burners 10 fed from such pipe, is most necessary because if the supply of gas-air mixture is too great the combustion at each burner will take place at least partly on the surface 30 of the burner plate and the same undesirable effect will occur if the proportion of gas within the mixture is too great, by reason of there being insufficient air to support complete combustion within the burner passages 28. Since, such flame combustion is susceptible to being extinguished under high wind conditions, it is most necessary to so adjust each nozzle member as above described, and thereby to so adjust the gas-air mixture as to ensure that combustion takes place wholly within each burner block 17.

At the same time, the supply of gas-air mixture or the proportion of gas within the same must not be reduced to such a degree that the mixture is so weak that back-firing occurs within the passages 28 in a direction towards the inner face 29 of the burner block.

Each nozzle member 40 is connected through gas supply pipe 48 to gas storage tank 49 adapted to supply the gas under pressure to member 40.

In order to maintain continued combustion under high wind or stormy conditions it is necessary that any sudden increase in air pressure adjacent the outer face 30 of each burner plate which would have the effect of blowing the flame inwardly of the burner plate so as to tend to extinguish it, should be counter-balanced by a corresponding pressure increase within the mixing chamber 37 by which the air is supplied to the burners. It is also necessary to maintain the air supply to the mixing chamber under high wind or gusty conditions, so as to ensure that each burner still continues to function quite steadily.

For this purpose each mixing chamber is provided with a stabilizing device 50. This stabilizing device comprises the provision on the upper side of the mixing chamber 37 of an air intake element 51 of hollow inverted frusto-conical configuration, which provides an air supply passage 52 of downwardly convergent form in cross section, which leads into the interior of the mixing chamber through opening 53. The upwardly directed mouth of this air intake element 51 provides an upwardly directed air intake opening 54.

The walls 55 of the air intake element 51 are provided with a number, as shown four, symmetrically circumferentially spaced ribs 56 which extend radially inwardly from the walls 55 toward the central vertical axis of the air intake passage 52. Since the walls 55 are convergent downwardly, the circumferentially adjacent ribs 56 which provide in co-action with the adjacent part of wall 55 a downwardly convergent channel 57 in the air supply passage 52. Thus, according to whichever direction an air current in the vicinity of opening 54 is deflected thereto, it will enter one of these channels 57, so by reason of the downward convergence thereof to provide in the mixing chamber 37 an increase in air pressure as compared with that obtaining in the surrounding atmosphere, so as to thereby maintain air flow to each burner 10 and to resist the aforementioned inward blowing of the combustion flame within the burner plate passages 28 as the result of sudden wind gusts in the vicinity of the burners themselves.

The stabilizing device 50 further comprises the provision above the upwardly directed air intake opening 54 of a hood 58.

This hood comprises a substantially horizontally extending body portion 59, which as viewed in plan, is of

generally elongated configuration so as to have straight parallel sides and substantially semi-circular ends 60-61 of a radius slightly greater than the radius of the periphery of the upper end of air intake member 51.

The body portion 59 of hood 58 is supported with its underside spaced a short distance above the lip 62 of the air intake opening 54 by arranging for the ribs 56 to project a short distance above the level of the lip 62, the upper edges of which ribs abut against the underside of the hood body portion 59. The hood is secured in this position with its semi-circular end 60 concentric with the central vertical axis of intake passage 52 by securing screws 63. The arrangement is such that a space is provided between the underside of the hood 58 and the lip 62 for the ingress of air to the air intake passage 52.

The mixing chamber 37 is disposed adjacent one of the several burners 10 supplied by such mixing chamber and as shown in FIGURES 4 and 5, elongated hood 58 adjacent the end 61 thereof extends above such burner, so as to be adapted to receive heat therefrom.

The hood 58 is provided along the periphery of its body portion 59 with a vertically dependant flange 64, which extends around the entire periphery of the hood including the two end portions 60-61 thereof, so as to depend below the level of the lip 62 and opening 54 to the air intake passage 52. This dependant flange 64 of the hood 58 performs two separate but interrelated functions. Insofar as the flange where it is adjacent to the air intake element 51 depends below the lip 62 thereof, it acts as a deflector for deflecting upwardly and over the lip air currents, particularly air currents occasioned by very strong or gusty winds, so as to ensure under conditions of very strong and gusty winds the continued flow of air into the mixing chamber as opposed to air being sucked out of the mixing chamber as would occur under certain conditions if the hood 58 were not present and violent currents of air, as happens under stormy conditions, were blowing across the uncovered air intake opening 54.

The dependant flange 64 where the hood extends over the adjacent burner 10, as shown in FIGURE 4 serves to deflect and retain beneath the underside of the body portion 59 of the hood, currents of warm air rising by reason of convection from the adjacent burner, which currents of warm air will be drawn into the interior of the mixing chamber through the air intake passage 52 as a result of the injector action of the gas discharged under pressure from the gas injector nozzle 40. Thus, there is at all times a continued flow of warm air from the adjacent burner into the air intake opening 52 of the mixing device so that blockage of the air intake opening as a result of freezing rain or snow is prevented.

In addition to the foregoing two interrelated functions of dependant flange 64 of hood 58, this also assists in preventing the driving of snow beneath the hood 58 toward the mouth of the air intake opening 52.

Thus, the presence of the hood 58 arranged to receive heat from the adjacent burner serves to ensure the continued operation of the mixing device 35 despite conditions of driving snow or freezing rain. At the same time, the hood 58 and in particular the dependant flange 64 thereof, co-acts with the inwardly converging air intake passage channels 57 in maintaining an air flow to the mixing chamber and thus to the burner plates 17 at a volume and pressure sufficient to counterbalance any local pressure increase resulting from strong or gusty winds in the vicinity of the outer face 30 of each burner plate, so as to maintain steady combustion of the gas-air mixture within the burner plate passages, as already described, even under the most stormy and gusty conditions.

Furthermore, the splitting by the ribs 56 of the air intake passage 52 into a number of inwardly converging channels 57 spaced around the centre of passage 52, together with the hood 58 ensures that from whatever di-

rection the stormy or gusty winds may be blowing the air will be deflected by the hood into the channel 57 which is nearest to the windward side of the air intake element 51, such deflection being assisted by the fact that the upper edges of the ribs 56 project above the lip 62 and are flush with the underside of the hood body portion 59 for a substantial portion of their length.

A slightly modified form of the invention is shown in FIGURE 6 in which the elongated hood 59 shown in FIGURE 5, is replaced by a circular hood 59' having a peripheral depending flange similar to the flange 64 shown in FIGURE 7, and the hood is received over the air intake element 51 and secured in place by screw threaded fastening means 63'.

The function of the hood of FIGURE 6 is the same as that shown in FIGURE 5, except that the hood of FIGURE 6 does not project over an adjacent burner to receive hot air and direct the same into the air intake.

However, when utilizing the form of the invention shown in FIGURE 6, the mixing device 35 is positioned in close proximity to an adjacent burner to receive heat therefrom for melting snow or ice in order to permit free air flow into the air intake, regardless of weather conditions.

The present invention provides a railway switch heater which, under exposed conditions of operation peculiar to railway switch heaters and which do not obtain with gas-air heaters as customarily employed indoors, is particularly well adapted to continue to operate unattended under the type of weather condition which the heater is required especially to combat, i.e. not merely freezing or snowy conditions but blizzard conditions, i.e. conditions of driving snow accompanied by very strong and gusty winds.

The nozzle member 40 in addition to being adjustable within bush 39 can be removed completely therefrom by sliding it outwardly of chamber 37 to permit of jet member orifice 45 being cleared and to ensure that the nozzle member is returned to the same axially adjusted position it is provided with a spring clip 65 which when positioned in the groove 41 nearest the outer end face 66 of bush 39 abuts the same to act as a locating stop when nozzle member 40 is repositioned.

By the above described invention there has been provided a rail heater including certain specific components but in order to provide for proper all-weather operation, such components must be assembled in a specific manner to provide the necessary cooperation therebetween and this does not merely involve connecting the mixing device to the burners but necessarily involves positioning the mixing device in a definite relationship to an adjacent burner in order to provide for proper operation of the mixing device under all-weather conditions.

It is recognized that heretofore mixing devices have been combined with burners as a unitary structure but this materially increases the problems of construction and cost and does not permit locating a mixing device in a selected position as in the instant invention.

It will be obvious to those skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof and therefore the invention is not limited by that which is shown in the drawings and described in the specification, but only as indicated in the appended claims.

It is further to be pointed out that the subject matter of this invention is directed to a system providing adequate heat to a railroad rail adjacent a switch location that is fully operable regardless of inclemency in weather. In order to obtain this result, the various components of the system must cooperate one with the other to insure continuity of such combustion as will provide the proper heat. This means that the components that are subjected to falling rain or snow and wind currents have to be correlated with one another so that what might be termed excess air conditions cannot exist, that possibility

of freezing is eliminated, the combustion cannot be extinguished and blocking of the air intake is prevented.

It is recognized that the heating of railroad rails adjacent switch locations is well known. However, proper heating to assure operation of the switch under any condition of weather requires the maintenance of proper heat conditions at all times that a heater is in operation. Where combustion takes place with a mixture of gas and air, the problem of preventing excess air and extinguishing of combustion and blocking of the air intake is acute.

Therefore, the present invention provides a system for heating railroad rails at a switch location which includes a combination of components to furnish adequate and continuous heat to the rail comprising a ceramic material burner means, a casing surrounding said burner means including a weather shielded outlet end to be positioned adjacent the rail section to be heated, said burner means being spaced inwardly of said outlet end and having a plurality of longitudinal bores therethrough, the length of each bore being substantially in excess of the cross-sectional area thereof, a casing further including an inlet portion through which a combustion mixture of gas and air can enter the bores at the ends thereof remote from said outlet end of the casing, conduit means communicating with the inlet opening of the casing and through which said mixture flows to the burner, means providing a pressurized source of combustible gas, a combined air intake and gas-air mixing device interposed between said source and said conduit means at a location at least closely adjacent said casing and including means defining a chamber having an upper, outwardly-flared air inlet portion, a gas supply nozzle within the chamber and directed axially of at least a portion of said conduit means, said nozzle cross-sectional area being less than that of the conduit means and being located relative to said conduit so as to provide an annular passage between the interior of the conduit means and the nozzle whereby combustion supporting air flow mixes with the gas from said nozzle and a hood means operably associated with said outwardly-flared inlet including an imperforate top having a cross-sectional area greater than that of the major dimension of said outwardly-flared inlet, said top being spaced above the terminal end of said inlet to provide a passageway through which air after impingement against the underside of said top can flow downwardly into said inlet and a rim depending from said top, said rim being spaced from said inlet so as to define with the underside of said top a tortuous passageway for air whereby an adequate and shielded air flow to said nozzle and proper mixing of air with gas is insured regardless of change in direction of air flow or in the velocity of such flow.

What I claim then is:

1. A railway switch heater comprising a plurality of burner housings open only along one vertical side thereof which is adapted to be placed against the web of a rail to be heated, a pipe connected to each of said burner housings through which a gas-and-air mixture is fed to the interior thereof, a thick ceramic burner plate disposed within each of said housings and formed with a plurality of passages extending therethrough between two opposite faces of the plate one of which faces is directed towards the open side of the associated housing and in which passages the combustion of the gas-and-air mixture occurs to heat to incandescence the surrounding mass of the burner plate including the face thereof directed to the open side of the associated housing, a single gas-and-air mixing device disposed adjacent to one of said burner housings and operatively connected to each of said burner housings by said pipe, said mixing device having an upwardly directed air intake opening, a hood extending over said air intake opening, said hood being adapted to deflect into said opening air currents flowing in the vicinity of said mixing device and said hood extending over the burner housing which is adjacent to said

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mixing device to receive heat from said adjacent burner housing and direct said heat to the vicinity of said air intake opening.

2. A railway switch heater comprising a plurality of burner housings open only along one vertical side thereof which is adapted to be placed against the web of a rail to be heated, a pipe connected to each of said burner housings through which a gas-and-air mixture is fed to the interior thereof, a thick ceramic burner plate disposed within each of said housings and formed with a plurality of passages extending therethrough between two opposite faces of the plate one of which faces is directed toward the open side of the associated housing and in which passages the combustion of the gas-and-air mixture occurs to heat to incandescence the surrounding mass of the burner plate including the face thereof directed to the open side of the associated housing, a single gas-and-air mixing device disposed adjacent one of said burner housings and operatively connected to each of said burner housings by said pipe, said mixing device having an upwardly directed air intake opening, a hood having a main body portion extending in a substantially horizontal direction above said air intake opening and said burner housing which is adjacent to said mixing device, and said hood having a peripheral dependant flange adapted in co-action with said body portion of the hood to deflect to said air intake opening both air currents flowing in the vicinity of said mixing device and also heat from said adjacent burner housing.

3. A railway switch heater comprising a plurality of burner housings open only along one vertical side thereof which is adapted to be placed against the web of a rail to be heated, a pipe connected to each of said burner housings through which a gas-and-air mixture is fed to the interior thereof, a thick ceramic burner plate disposed within each of said housings and formed with a plurality of passages extending therethrough between two opposite faces of the plate one of which faces is directed toward the open side of the associated housing and in which passages the combustion of the gas-and-air mixture occurs to heat to incandescence the surrounding mass of the burner plate including the face thereof directed to the open side of the associated housing, a single gas-and-air mixing device disposed adjacent one of said burner housings and operatively connected to each of said burner housings by said pipe, said mixing device having an air supply passage the walls of which converge in a direction inwardly of said passage toward said mixing device, said air supply passage walls providing an upwardly directed air intake opening, a hood extending above said air intake opening and said burner housing which is adjacent to said mixing device, said hood being adapted to deflect to said air intake opening both air currents flowing in the vicinity of said mixing device and also heat from said adjacent burner housing, a plurality of ribs within said air supply passage and spaced circumferentially around the central axis thereof, said ribs in co-action with the adjacent wall of said passage presenting a plurality of inwardly converging channels to said passage one or another one of which channels, according to the direction of flow of the air current in the vicinity of the switch heater, is adapted to receive air from said air current to maintain the air supply to said mixing device.

4. A railway switch heater comprising a plurality of burner housings open only along one vertical side thereof which is adapted to be placed against the web of a rail to be heated, a pipe connected to each of said burner housings through which a gas-and-air mixture is fed to the interior thereof, a thick ceramic burner plate disposed within each of said housings and formed with a plurality of passages extending therethrough between two opposite faces of the plate one of which faces is directed toward the open side of the associated housing and in which passages the combustion of the gas-and-air mixture occurs to heat to incandescence the surrounding mass of the burner

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plate including the face thereof directed to the open side of the associated housing, a single gas-and-air mixing device disposed adjacent to one of said burner housings and operatively connected to each of said burner housings by said pipe, said mixing device having an air supply passage the walls of which converge in a direction inwardly of said passage toward said mixing device, said air supply passage walls providing an upwardly directed air intake opening, a hood having a main body portion extending in a substantially horizontal direction above said air intake opening and said burner housing which is adjacent to said mixing device, said hood having a peripheral dependant flange adapted in co-action with said body portion of the hood to deflect to said air intake opening both air currents flowing in the vicinity of said mixing device and also heat from said adjacent burner housing, a plurality of ribs on said inwardly converging walls of said air supply passage spaced circumferentially there around and extending radially in relation to central axis of said passage and said ribs in co-action with the adjacent wall of said passage presenting a plurality of inwardly converging channels to said passage one or another one of which channels according to the direction of flow of the air current in the vicinity of the switch heater, is adapted to receive air from said air current to maintain the air supply to said mixing device.

5. A railway switch heater comprising a plurality of burner housings open only along one vertical side thereof which is adapted to be placed against the web of a rail to be heated, a pipe inter-connecting each of said burner housings through which pipe a gas-and-air mixture is fed to the interior of said housings, a thick ceramic burner plate disposed within each of said housings and formed with a plurality of passages extending therethrough between two opposite faces of the plate one of which faces is directed toward the open side of the associated housing and in which passages the combustion of the gas-and-air mixture occurs to heat to incandescence the surrounding mass of the burner plate including the face thereof directed to the open side of the associated housing, a single gas-and-air mixing device comprising a hollow body portion having an outlet passage and operatively connected to each of said burner housings by said pipe, said mixing device incorporating a gas injector member having a removable gas discharge nozzle at one end thereof and extending within said hollow body portion and means on said body portion mounting said injector member for movement relative to said body portion so that said nozzle can project to a greater or lesser degree into said outlet passage according to the number of burner housings to which said outlet passage is connected by said pipe.

6. A railway switch heater comprising a plurality of burner housings open only along one vertical side thereof which is adapted to be placed against the web of a rail to be heated, a pipe inter-connecting each of said burner housings through which pipe a gas-and-air mixture is fed to the interior of said housings, a thick ceramic burner plate disposed within each of said housings and formed with a plurality of passages extending therethrough between two opposite faces of the plate one of which faces is directed toward the open side of the associated housing and in which passages combustion of the gas-and-air mixture occurs to heat to incandescence the surrounding mass of the burner plate including the face thereof directed to the open side of the associated housing, a single gas-and-air mixing device comprising a hollow body portion having an outlet passage and operatively connected to each of said burner housings by said pipe, said hollow body portion of said mixing device having at its upper side an air supply passage the walls of which converge in a direction inwardly of said passage towards said mixing device, said air supply passage walls providing an upwardly directed air intake opening, a hood extending above said air intake opening as to deflect to

said air intake opening air currents in the vicinity of said mixing device, said mixing device incorporating a gas injector member having a removable gas discharge nozzle at one end thereof and extending within said hollow body portion and means on said body portion mounting said injector member for movement relative to said body portion so that said nozzle can project to a greater or lesser degree into said outlet passage according to the number of burner housings to which said outlet passage is connected by said pipe.

7. A railway switch heater comprising a plurality of burner housings open only along one vertical side thereof which is adapted to be placed against the web of a rail to be heated, a pipe inter-connecting each of said burner housings through which pipe a gas-and-air mixture is fed to the interior of said housings, a single gas-and-air mixing device disposed adjacent to one of said burner housings comprising a hollow body portion having an outlet passage and operatively connected to each of said burner housings by said pipe, said hollow body portion of said mixing device having at its upper side air supply passage walls providing an upwardly directed air intake opening, a hood having a main body portion extending in a substantially horizontal direction above said air intake opening and said burner housing which is adjacent to said mixing device, said hood having a peripheral dependent flange adapted in co-action with said body portion of the hood to deflect to said air intake opening both air currents flowing in the vicinity of said mixing device and also heat from said adjacent burner housing, said mixing device incorporating a gas injector member having a removable gas discharge nozzle at one end thereof and extending within said hollow body portion, and means on said body portion mounting said injector member for movement relative to said body portion so that said nozzle can project to a greater or lesser degree into said outlet passage according to the number of burner housings to which said outlet passage is connected by said pipe.

8. In a railway switch incorporating a rail embodying a flanged foot connected to the rail head through a web and mounted on sleepers, a switch heater comprising a plurality of burner housings open only along one vertical side thereof, a pipe inter-connecting each of said burner housings through which pipe a gas-and-air mixture is fed to the interior of said housings, each of said burner housings at their open sides having a vertical depth less than the height of the rail web and being each elongated in a direction along the length of the railway rail to be heated, means supporting said pipe from the sleepers, said pipe mounting each of said burner housings between longitudinally adjacent sleepers with their open sides directed toward the rail web and with their upper and lower sides respectively extending beneath the rail head and above the rail foot with their lower sides sloping downwardly toward the rail web, a thick ceramic burner plate disposed within each of said housings and formed with a plurality of passages extending therethrough between two opposite faces of the plate one of which faces is directed toward the open side of the associated housing and in which passages the combustion of the gas-and-air mixture occurs to heat to incandescence the surrounding mass of the burner plate including the face thereof directed to the open side of the associated housing, each of said burner plates being elongated in a direction along the length of the adjacent rail, a single gas-and-air mixing device disposed adjacent to one of said burner housings and operatively connected to each of said burner housings by said pipe, said mixing device having an upwardly directed air intake opening, a hood extending over said air intake opening, said hood being adapted to deflect into said opening air currents flowing in the vicinity of said mixing device and said hood extending over the burner housing which is adjacent to said mixing device to receive heat from said adjacent burner housing and direct said heat to the vicinity of said air intake opening.

9. A railway switch heater according to claim 8 wherein said hood has a peripheral dependent flange adapted in co-action with said body portion of the hood to deflect to said air intake opening both air currents flowing in the vicinity of said mixing device and also heat from said adjacent burner housing.

10. A railway switch heater according to claim 1 wherein metal gauze of not over 3 mm. mesh is positioned between the ceramic burner plate and the open side of the burner housing to facilitate the maintenance of the combustion of the gas and air mixture within the interior of the burner plate.

11. A railway switch heater according to claim 5 wherein the hollow body portion of the mixing device is provided with a bush in which the injector member is mounted on said bush and adapted to extend in any one along the axis of the bush, said injector member being provided with a plurality of longitudinally spaced peripheral grooves, a spring abutment selectively received in one of said grooves and adapted to abut the outer end face of the bush to locate the injector member in adjusted slidable position in relation to the outlet passage of the mixing device, and retaining means movably mounted on said bush and adapted to extend in any one of said grooves to secure the injector member in its adjusted position.

12. A railway switch heater comprising a plurality of burners disposed in spaced relationship adjacent the web of a rail to be heated, a fuel mixture supply pipe inter-connecting said burners, a fuel mixing device connected to said pipe, said mixing device having a mixing chamber, a fuel mixture outlet communicating with said chamber and said pipe, a fuel inlet to said chamber, said fuel inlet being in alignment with said fuel mixture outlet, a fuel injector nozzle slidably mounted for adjustment toward and away from said mixture outlet to vary the effective cross sectional area of said mixture outlet and adjust the volume of fuel mixture in accordance with the number of burners connected to the mixing device, an upwardly opening air inlet to said chamber and an elongated hood covering said air inlet to prevent entry of rain or snow, a portion of said hood being disposed immediately above an adjacent burner to receive heat therefrom to melt any collection of ice or snow, said hood also serving to direct warm air from said burner into said air inlet.

13. A heater as defined in claim 12, in which a venturi nozzle is disposed in said fuel mixture outlet, said fuel injector nozzle being movable into and out of said venturi nozzle.

14. A railway switch heater comprising a plurality of burners disposed in spaced relationship adjacent the web of a rail to be heated, a fuel mixture supply pipe inter-connecting said burners, a fuel mixing device connected to said pipe, said mixing device having a mixing chamber, a fuel mixture outlet communicating with said chamber, a fuel mixture outlet communicating with said chamber and said pipe, a fuel inlet to said chamber, said fuel inlet being in alignment with said fuel mixture outlet, a fuel injector nozzle slidably mounted for adjustment toward and away from said mixture outlet to vary the effective cross sectional area of said mixture outlet and to adjust the volume of fuel mixture in accordance with the number of burners connected to the mixing device, an upwardly flared air inlet connected to said chamber and a horizontally disposed hood covering said air inlet to prevent entry of rain or snow, said mixing device being disposed in such close proximity to one of said burners to receive heat therefrom to melt any collection of ice or snow.

15. A heater as defined in claim 14 in which a venturi nozzle is disposed in said fuel mixture outlet, said fuel injector nozzle being movable into and out of said venturi nozzle.

16. A railway switch heater comprising a plurality of

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spaced burner housings each open only along one vertical side thereof and adapted to be placed against the web of a rail to be heated, a pipe connected to said burner housings through which a gas-and-air mixture is fed to the interior thereof, a thick ceramic burner plate disposed within each of said housings and each formed with a plurality of passages extending therethrough between two opposite faces of the plate one of which faces is directed towards the open side of the associated housing and within the passages of which the gas-and-air mixture burns to heat the mass of the burner plate including the face thereof directed to the open side of the associated housing to incandescence, a gas-and-air mixing device operatively connected to each said burner housing by said pipe, said mixing device comprising a body having an upwardly directed air intake passage, said device further comprising a generally horizontal hood extending over but spaced from said air intake passage to form an opening, said hood being adapted to deflect air currents in the vicinity of said mixing device from flowing directly into said opening, and said gas-and-air mixing device, including the hood thereof, being disposed so closely adjacent to one of said burner housings that heat received by said housing from the incandescently heated ceramic burner plate therein is transmitted to said gas-and-air mixing device to maintain the air intake opening thereof free from accumulated ice and snow.

17. A railway switch heater comprising a plurality of burner housings each open along only one vertical side and adapted to be placed against the web of a rail to be heated, a common-pipe connected to said burner housings through which a gas-and-air mixture is fed to the interior thereof, a thick ceramic burner plate disposed within each of said housings and each said burner plate being formed with a plurality of passages extending therethrough between two opposite faces of the plate one of which faces is directed towards the open side of the associated housing and in the passages of which the gas-and-air mixture burns to heat the surrounding mass of the

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burner plate, including the face thereof directed to the open side of the associated housing to incandescence, a gas-and-air mixing device comprising a body having an upwardly directed widely flared air intake passage, a hood extending over said air intake passage to provide an annular air intake opening, a peripheral dependent flange to said hood, said flange co-acting with said mixing device body adjacent said air intake opening therein to lead air flowing in the vicinity of said mixing device into said opening, and said hood flange being disposed so closely adjacent one said burner housing as to receive heat therefrom transmitted to said housing from said incandescently heated ceramic burner plate.

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