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INTERNALLY FIRED GAS BURNER

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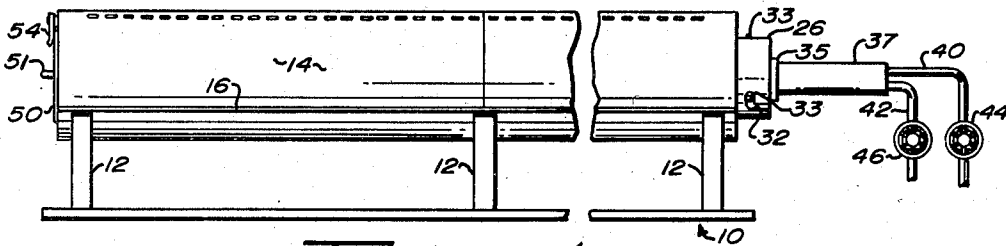


Fig. 1

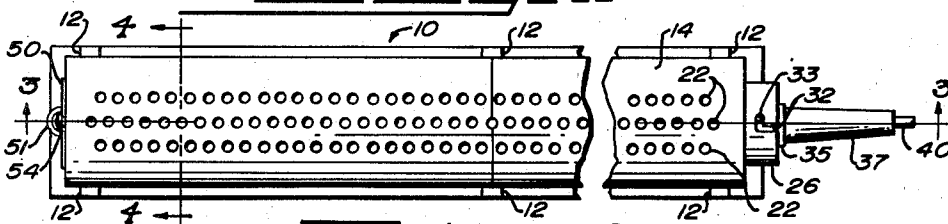


Fig. 2

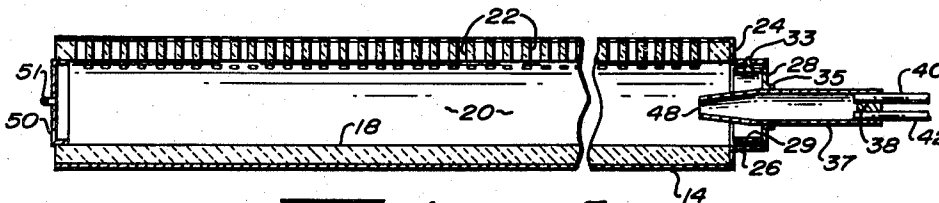


Fig. 3

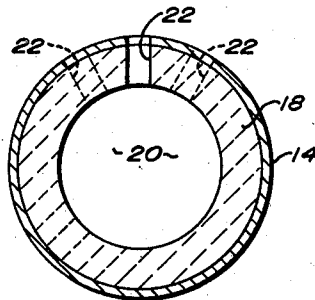


Fig. 4

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INTERNALLY FIRED GAS BURNER

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1 Claim. (Cl. 158—99)

This invention relates to burners or heating devices and more especially to heating devices for use in thawing frozen freight materials in railway cars or rolling stock.

One of the difficulties encountered in railway transportation of materials such as coal, iron ore and the like, stone or similar materials when in or moving through low-temperature areas is that the materials become frozen due to precipitation from rain or melting snow on the materials becoming solidified. As a typical example, open cars of material may receive precipitation in the form of rain, snow or sleet which gravitates to the lower zone of the material in the transporting cars and becomes frozen, rendering difficult the operation of removing the materials from the cars. In instances where the loaded car is inverted to transfer the coal or ore into the hold of a ship, a thawing operation is necessary to free the material from the car.

Various arrangements have been used for applying heat to such frozen materials, but no satisfactory, effective method or apparatus has heretofore been devised for this purpose.

One of the objects of the present invention is the provision of simple yet effective means for applying heat in a zone adjacent or beneath a railway car so as to direct the heat in a manner to quickly elevate the temperature of the floor and walls of the car and the contents sufficiently to thaw or melt any ice formations existing in and through the materials.

Another object of the invention is the provision of a burner construction which is especially adapted for car-thawing operations in open places and which is constructed and arranged for satisfactory operation under all weather conditions.

Another object of the invention is the provision of a burner construction which is specially adapted for elevating the temperature of materials in railway cars to alleviate freezing of the materials so that the same may be readily removed from the cars especially when the cars are inverted.

Still another object of the invention is the provision of a burner construction especially adapted for heating or thawing railway rolling stock wherein the burner chamber is surrounded by high temperature resistant refractory material to assure long life of the burner construction.

Still another object of the invention is the provision of a burner construction of a cylindrical shape wherein the combustion chamber is lined with high temperature resistant refractory material, the material and surrounding casing or housing being provided with outlets for obtaining substantially uniform distribution of heat over a comparatively large area.

A further object is the provision of a burner construction of this character which is adapted to burn volatile fuels or liquid fuels and wherein fuel and oxidant or air are delivered into the burner chamber in proper proportions to attain substantially complete combustion within the chamber of the burner.

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Further objects and advantages are within the scope of this invention such as relate to the arrangement, operation and function of the related elements of the structure, to various details of construction and to combinations of parts, elements per se, and to economies of manufacture and numerous other features as will be apparent from a consideration of the specification and drawing of a form of the invention, which may be preferred, in which:

10 Figure 1 is a side elevational view illustrating a form of the burner of the invention;

Figure 2 is a top plan view of the construction shown in Figure 1;

15 Figure 3 is a vertical sectional view taken substantially on the line 3—3 of Figure 2, and

Figure 4 is an enlarged vertical transverse sectional view taken substantially on the line 4—4 of Figure 3.

While the embodiment of the invention is illustrated as especially adapted for use in heating railway cars of materials in order to thaw the materials or render the same in a condition to be removed from the car, it is to be understood that use of the invention is contemplated in any place where it may be found to be applicable.

25 Referring to the drawings in detail, the illustrated embodiment of the invention is inclusive of a base or plate 10 provided with spaced pairs of upwardly extending members or struts 12 which with the base 10 provide a frame supporting the burner construction. The burner construction includes a cylindrically shaped shell, housing or casing 14, preferably provided at each side with a longitudinally extending bar or ledge 16 welded or otherwise secured to the casing 14 and adapted for engagement with the upper extremities of members 12 of the supporting frame. If desired, the extremities of members 12 may be welded or otherwise permanently secured direct to the casing 14. The shell, housing or casing 14 is preferably formed of metal.

30 The interior wall of the casing 14 is lined with high temperature resistant refractory 18 which defines a combustion chamber 20 interiorly of the casing. Arranged at the upper zone of the casing is a plurality of rows of openings or orifices 22. In the illustrated embodiment, three rows of openings are provided, and the openings of the intermediate row are preferably arranged in staggered relation with respect to the openings in the adjacent rows. The openings 22 extend through the casing wall and through the refractory line 18 as shown in Figures 3 and 4. The openings provide means or vents through which the flame or heat resulting from the burning of the combustible mixture in the chamber 20 is projected from the burner to a zone beneath a railway car to be thawed by the heat.

35 The burner of the invention may be of any desired size, but it has been found that a burner having a shell of from 10 inches to 12 inches in diameter and from six feet to 12 feet in length has proven very satisfactory. The refractory 18 is preferably of a thickness of from one inch to three inches in order to minimize the heat transferred to the metal shell or casing 14 and to prevent deterioration or oxidizing of the metal shell.

40 Means is provided for introducing a combustible mixture of fuel gas and an oxidant such as air into the combustion chamber 20. One end of the burner casing 14 is provided with a plate 24 having an annularly shaped extension 26. Fitted into the zone defined by the extension 26 is a closure member 28 having a cylindrical portion or sleeve 29 telescoped into the extension. The extension 26 is formed with one or more bayonet-type slots 32 and the sleeve 29 is provided with a corresponding number of pins or projections 33 adapted for cooperation with the bayonet slots 32 to hold the

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member 28 in position closing the end of the burner.

The member 28 is formed with a central opening bounded by a flange 35 and extending into the opening is a nozzle structure or fuel-and-air mixing device 37. The end wall 38 of the nozzle construction 37 is formed with a pair of openings through which pipes 40 and 42 respectively extend. The pipe 40 may be connected with a source of compressed air and is adapted to convey air for establishing the combustible mixture into the nozzle 37. The pipe 40 is provided with a valve 44 for regulating the air or oxidant delivered into the nozzle. The pipe 42 is connected with a fuel gas supply (not shown) for conveying the fuel gas or combustible into the nozzle 37 where the same is mixed with the air delivered through the pipe 40. The pipe 42 is provided with a valve 46 for regulating the admission of fuel gas into the nozzle or mixer 37. The nozzle 37 is provided with an orifice 48 through which the combustible mixture of fuel and air is delivered into and burned within the combustion chamber 20.

The opposite end of the casing 14 of the burner is provided with a removable closure 50 provided with a handle 51. The closure 50 is made removable in order to provide access to the chamber 20 for cleaning or inspection purposes. The closure 50 is preferably retained in the end of the burner structure by means of lugs or clips 54 pivotally supported upon the end of the burner structure, one of the clips being illustrated in Figures 1 and 2. When it is desired to remove the closure 50, the clips 54 may be swung out of contact with the exterior wall of the closure.

Burner constructions of the invention are preferably utilized in pairs, the burners of each pair being in spaced, parallel relation, the pairs being spaced longitudinally of the rails or track and beneath the car whose contents are to be thawed. Three or four pairs of the burners disposed beneath a single car have been found very effective in thawing the car in a minimum amount of time.

It has been found desirable to obtain substantially complete combustion or burning of the mixture within the chamber 20 in order to minimize the flame projected through the openings 22, the heat of the burned gases moving through the openings 22 under the pressure of expansion of the burning gases within the chamber 20 being effectively directed against the floor or bottom wall of the car to be thawed. The volumetric ratio of the air to the fuel gas admitted into the burner chamber may be regulated by adjustment of the control valves 44 and 46.

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From the foregoing description it will be apparent that the burner construction of the invention provides a simple yet effective means having exceptionally long life for directing comparatively large amounts of heat into the zone beneath a railway car for accomplishing the purposes hereinbefore mentioned.

It is apparent that, within the scope of the invention as set out in the appended claim, modifications and different arrangements may be made other than is herein disclosed, and the present disclosure is merely illustrative.

I claim:

A burner for applying heat to thaw frozen railway cars, including, in combination, a substantially cylindrical casing formed of metal, a comparatively thick lining of refractory material disposed in said casing, the inner wall of the refractory defining a substantially cylindrical combustion chamber, a removable closure at one end of the casing, a plate on the opposite end of the casing, an annular collar extension coaxial with said casing and extending outward from said plate on the side opposite from the combustion chamber, said extension provided with bayonet type slots, a cylindrical sleeve of an outside diameter less than the inside diameter of said collar open at one end and having pins on the outer surface of the sleeve for cooperation with the bayonet slots, a central opening in the other end of said sleeve, a fuel and air mixing nozzle mounted in said central opening and having a restricted end of said nozzle extending through said cylindrical sleeve, said nozzle extending into said combustion chamber when said cylinder is telescoped into said collar and secured by cooperation of said bayonet slots and said pins, means for supplying fuel and air connected to the outer end of said nozzle, the upper region of said casing and refractory being formed with a plurality of openings through which heat and burned gases are discharged from the chamber.

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