March 31, 1953 D. G. KERWIN ET AL 2,633,190

GAS FUELED RAIL HEATER

Filed June 18, 1947

Fig. 1

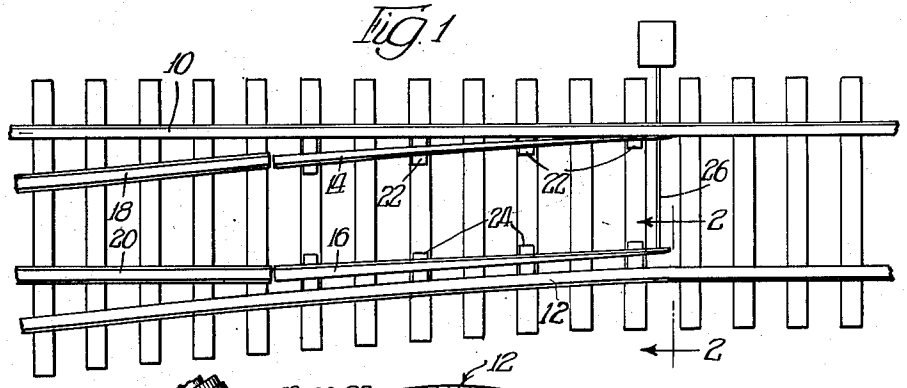


Fig. 2

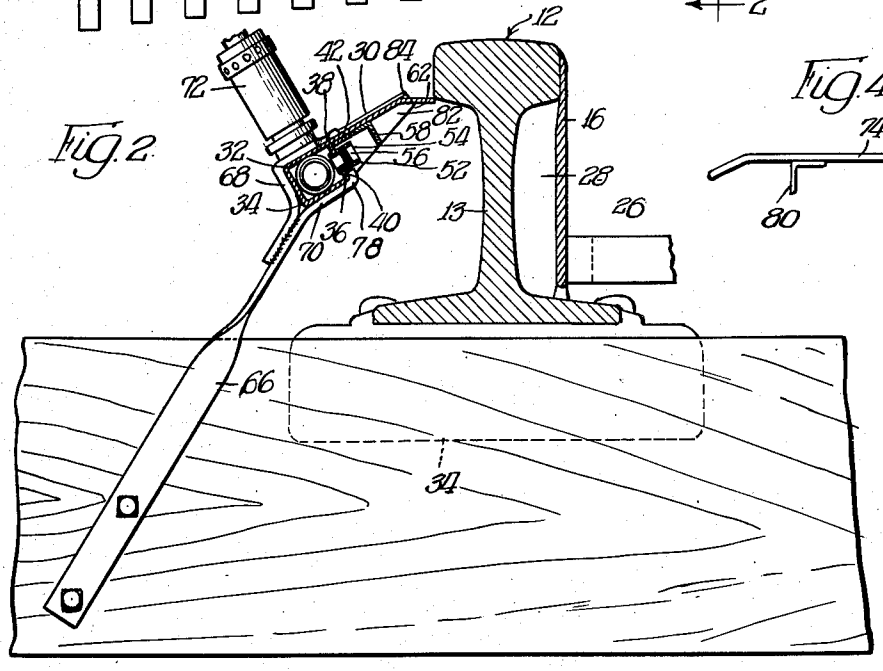
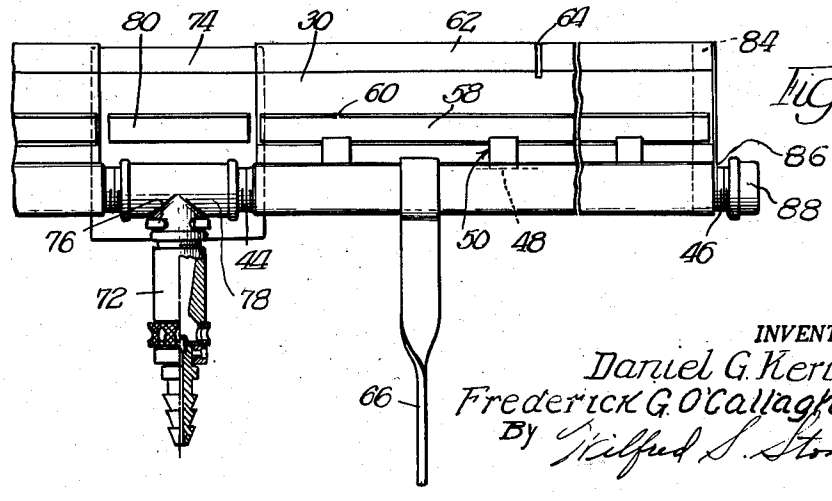


Fig. 4

Fig. 3



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Patented Mar. 31, 1953 2,633,190

UNITED STATES PATENT OFFICE

2,633,190

GAS FUELED RAIL HEATER

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Application June 18, 1947, Serial No. 755,304

9 Claims. (Cl. 158—113)

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This invention relates to a rail heater for melting snow and ice in track switches. Sometimes they are called switch heaters. The demand for a gas heater that remains lighted irrespective of weather conditions and without supervision is increasing because of the growing number of railroad centralized traffic control systems where switches at points remote from railroad personnel must be kept in operable condition. The requirements for this type of switch heater are much more exacting than are those for the switch heaters that have been in common use in approaches to yards and stations, where during inclement weather, personnel is constantly supervising the heaters and reigniting them when they are blown out.

The problem to be solved by a switch heater is frequently misunderstood. Many think that the switches become inoperable because of the freezing of water and snow amongst the operating parts. This is not correct. The switch is blocked because of the jamming of snow between a switch point and the rail against which the switch point operates. Figure 1 illustrates an ordinary switch. Numerals 10 and 12 identify 39 foot rail lengths; 14 and 16 are the switch points, and 18 and 20 are rails continuing the switch track and the main track respectively. The switch points 14 and 16 slide back and forth on plates such as 22 and 24 and the points may be joined at one end by one or more links such as 26. Referring to Figure 2, which is a view taken on the line 2—2 of Figure 1, the snow drops into the space 28. As the switch is thrown back and forth, the point 16 packs the snow into the space 28 adjacent the web of the rail and beneath the ball. Commonly, the temperature of the rails, the points, the plates, and the ties is below freezing, and there is no water formation. Each time the switch is thrown the point 16 packs more snow and very quickly the point is working against a snow pack, which from the standpoint of strain, is the equivalent of ice. At this point the switch cannot be thrown. Moreover, the points are likely to lock in a midpoint position so that a train cannot advance onto either the main track or the switch track. The switch cannot be easily cleared. It is not a question of breaking with a hammer small formations of ice between the bottom of the switch points and the plate on which it moves. What is required is a pick working in the space 28 and beneath the ball.

Rail heaters are of two general types. The first type employs burners positioned beneath the

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base of the rail and of the switch point, as suggested by the dotted line 34 in Figure 2. The second type seeks to heat, continuing to refer to Figure 2, the web 13 of the rail. Applicants term this the web and ball type heater. It must be of a length such that it can be used not only on rails at switches, but at crossovers and oilers, and hence is built in a standard, comparatively short length. The theory of this type of heater is that as fast as the snow is packed against the web, the snow is melted and the water runs down onto the ballast. This type of heater has been employed for some years on street railway switches, and is shown in the Greenfield Patent No. 1,681,231. The invention that is the subject of this application is of this second type.

Both types of rail heaters when employed at unsupervised switches, must be able to resist blowing out due to the passage of a train, or if blown out, must be capable of being reignited automatically.

The first object of this invention is to provide a new and improved web and ball type heater characterized by burners protected by open-ended tunnels which constitute combustion chambers and these are positioned to resist the snuffing effect of a gust of wind moving through the heater along a path substantially parallel to the rail. The burners employed are old in the propane gas art. A propane burner has a tunnel which is made of heat-radiating material and the burner is designed so that the flame will heat the tunnel. Until the tunnel is heated, the propane gas, which is slow burning, will not burn efficiently. However, applicants in the present invention are not concerned with the burning qualities of these propane tunnels. The important function of the tunnel so far as this invention is concerned is that it provides a combustion chamber which is shielded from a strong gust of wind. The feature of applicants' invention, therefore, is the positioning of these tunnels in the heater so that the plane of their delivery orifice is parallel to the length of the rail. A gust of wind caused by a moving train will move across the tunnel mouth and not into it. Inasmuch as most of the combustion occurs in the tunnel, in which the gas and air pressure is higher than atmospheric pressure, the effect of a gust of wind across the tunnel orifice which further lowers the pressure in the tunnel, will be little.

It is important that the pressures in the tunnel be such that combustion will take place there and applicants utilize a wide-range aspirator which will mix the proper amounts of air with

gas despite a wide range of gas pressures. Propane gas is usually under comparatively high pressure and natural gas from city mains is supplied in a rather wide range of comparatively low pressures.

The second object of this invention is to provide a flame transfer channel which will reignite snuffed-out burners. Applicants' burners are spaced four inches apart and are in a straight line. So long as one burner remains ignited, all burners will be promptly reignited by the movement of gas along the flame transfer channel.

Another object of this invention is to provide a multiple unit heater which may be assembled on the job and still provide a flame transfer channel between the units. A feature of this heater is a bridging flame plate which may be positioned between adjoining heaters and which in effect makes a single heater out of a plurality of units.

Another object of the invention is to produce a heater of simple construction. Most heaters today have gas manifolds consisting of a pipe and a shield of some sort is attached to the pipe. Applicants' heater including the manifold and the shield is formed out of a single sheet or plate of steel which can be bent on brakes and spot or line welded to hold the desired configuration. The gas manifold itself is square in cross section, but an ordinary pipe coupling is mounted at each end. The aspirator is designed to handle a selected number of burners. In applicants' design, the aspirator will handle two lengths of five feet each where the aspirator feeds the gas through a T into one end of each length. The aspirator's capacity is not suitable for attachment to one end of a ten-foot length.

Some difficulty has been experienced with the shields of heaters which warp due to changes in temperature. Inasmuch as the shield is really a baffle for directing heat against the under side of the rail ball and the web, when the shield warps, it permits the heat to escape upwardly between the ball and the shield, whereas the operation is more efficient if the heat is forced downwardly and out around the bottom of the heater itself. Applicants provide slots in the shield which permit some expansion and contraction, thereby avoiding warping, although a slight amount of heat is lost as it passes through the slots. A slot is also provided in the flame transfer channel immediately above each burner. An advantage is derived from the manifold's being formed integrally with the shield, particularly where the heater is using propane gas. The gas is quite cold and it tends to keep the manifold cold, and this in turn tends to keep the shield cold.

These and such other objects as may hereinafter appear are attained in the embodiment of the invention hereinafter described in conjunction with drawings on one sheet, wherein:

Fig. 1 is a schematic, plan view of a railroad switch;

Fig. 2 is a sectional view of applicants' heater positioned at a point on the rail indicated by line 2—2 of Fig. 1;

Fig. 3 is an inside elevation of applicants' heater; and

Fig. 4 is a side view of a bridging flame plate.

Continuing to refer to the drawings, the main body of the heater consists of an elongated plate **30** having a rectangular configuration, see Fig. 3. The lower portion of the plate, referring to Fig. 2, carries right angle bends, **32**, **34**, **36**, and **38**, which form between themselves lands, the significant land being the burner land **40**. The land **42** is welded to the under side of the plate. By this construction there is formed a manifold having a rectangular cross section. The ends of the manifold are closed by couplings **44** and **46** which are brazed to the ends of the manifold, see Fig. 3.

The burner land **40** carries a row of circular holes such as **48** in which is mounted a tunnel-type burner **50**. This tunnel-type burner is similar to those used for burning propane gas and consists of a burner screen **52** mounted over the opening of the circular hole **48** and inside a tubular tunnel member or duct **54**. The tunnel member or duct is made of metal adapted to radiate heat into the combustion space **56**. These burners are spaced at selected intervals along the manifold.

Mounted above the burners is a continuous flame angle, **58**, which, when the burner is mounted as illustrated in Fig. 2, constitutes a downwardly directed channel. This flame angle carries a transverse slot **60** above each burner to permit expansion and contraction of the metal without warping the flame angle. The upper edge of the plate **30** is canted at **62** and this canted portion carries slots **64** to permit expansion and contraction of the plate **30** without warping. In this type of burner the plate **30** is commonly described as a shield. In applicants' burner, however, the plate **30** constitutes the body of the device. This is important not only because it provides a simple construction but because the manifold cools the plate **30** when the heater is operated on propane gas. When propane gas is introduced to the manifold, it is extremely cold and while the flame heats the upper part of the plate, the cold gas in the manifold tends to counteract this undesirable heat.

Applicants' rectangular manifold makes it possible to utilize a holder **66** which is readily adjustable laterally. Referring to Fig. 2, the lower portion of applicants' holder **66** is conventional, but the upper part consists of two arms **68** and **70**. The arm **70** has a lug **78** on its end. The inside dimensions between the arms, or one arm and the lug **78**, is slightly greater than the outside diameter of the manifold, so that referring to Fig. 3, the holder **66** can be slipped over the end of the manifold and then pushed down to any desirable point, the lug **78** not engaging the burner **50**. Ties do not bear any fixed relationship to the end of a switch point, and hence, the holder **66** must be movable laterally of the heater.

Gas may be introduced to the manifold by mounting an aspirator such as **72** in Fig. 2 directly on the end of the coupling **44** in Fig. 3. However, the aspirator utilized by applicants has a capacity of handling two manifolds with burners, each having a length of five feet. In Figs. 3 and 4, there are illustrated portions of two of applicants' burners in which the shield portion of the plates **30** are joined by a bridging flame plate **74**, which has a spring clamp **76** for holding a T-coupling **78**. More importantly, it has a flame transfer channel link **80**. As illustrated in Fig. 3, if all of the burners on the right-hand heater are extinguished, gas from the left-hand heater will flow along the flame transfer channel across the bridging plate and reignite the burners

in the right-hand heater. The bridging flame plate is an important practical asset in applicants' device because it makes it possible to string a row of heaters where fifteen or twenty feet of rail web should be heated while providing a maximum guarantee of reignition of snuffed-out burners. These heaters must be installed by regular railroad employees and for that reason, installation instructions must be simple and the equipment must be simple to install. Moreover, the heaters as made must be comparatively short. In many track layouts, heaters should be installed where the maximum available space is only four or five feet. Unless the manufacturer is going to manufacture heaters of various lengths, the maximum length of a heater is limited to four or five feet. As a practical matter, designing heaters for each switch installation is uneconomical and designing heaters of varying lengths undesirable because neither railroads nor rail equipment jobbers like to tie up money in various length heaters. Applicants' single length heater, therefore, conforms with standard practice but the bridging flame plate makes it possible to join a plurality of these heaters in the field so as to get a single heater of any desired length.

The end of a heater is closed by an end shield **82** which has a flange **84** that engages the outside surface of the plate and a hole **86** which seats over the coupling such as **46**, see Fig. 3. This end shield may or may not be fastened to the plate as it leaves the factory. Ordinarily, it is fastened in the factory at that end of the heater which is to be closed by a cap such as **88**.

Having thus described our invention, what we claim is:

1. A rail web and ball heater comprising a plate having an upper and a lower side and having two substantially parallel edges, one edge of said plate being folded around to the lower side of the plate so as to form an elongated manifold, a plurality of burners mounted along the manifold adjacent the lower side of the plate, and each said burner including a duct connecting each burner to the manifold.

2. A rail web and ball heater comprising a plate having an upper and a lower side and having two substantially parallel edges, one edge of said plate being folded around to the lower side of the plate so as to form an elongated manifold, a plurality of burners mounted along the manifold adjacent the lower side of the plate, each of said burners including a duct connecting each burner to the manifold, and a longitudinally extending, continuous, flame transfer channel member mounted on the lower side of the plate.

3. A rail web and ball heater comprising a plate folded to provide an elongated manifold, a plurality of gas burners spaced along one face of said manifold, a tubular tunnel member surrounding each burner communicating at one end with the interior of said manifold and at the other end forming a flame orifice, said orifices lying in a plane substantially parallel to the length of the manifold, a shield integral with and extending from the manifold over but spaced from said orifices and a longitudinally extending angle member, forming with the side of the manifold a continuous flame transfer channel, mounted immediately below the shield and overlapping the flame orifices and into which channel said orifices are directed.

4. A rail web and ball heater comprising a longitudinally extending manifold of rectangular cross-section formed from a portion of a sheet metal plate, the remainder of said plate projecting beyond the manifold and adapted to extend towards the rail to be heated, a plurality of burners operatively positioned along one side of said manifold below said extended plate portion, and an angle member mounted on the lower side of said extended plate portion overlapping the burners and forming with the manifold a continuous flame transfer channel into which said burners are directed.

5. The rail web and ball heater of claim 4 wherein heat expansion slots are cut into the extended edge of the plate.

6. The rail web and ball heater of claim 4 wherein a heat expansion slot is cut into the angle member forming the flame transfer channel above each burner.

7. The rail web and ball heater of claim 1 in combination with a holder having fixed arms shaped to engage slidingly the greater portion of the outside, cross-sectional periphery of the manifold.

8. A multiple unit rail web and ball heater comprising two identical, elongated heaters each having an elongated manifold provided with longitudinally spaced gas burners and a continuous flame channel adjacent to said burners and extending lengthwise of the heater and into which said burners are directed, said heaters being positioned in end-to-end relationship, a gas coupling positioned between the manifolds of the heaters when they are positioned in end-to-end relationship, a bridging flame plate mounted between the heaters, and a laterally extending flame transfer channel mounted on the bridging flame plate in horizontal alignment with the flame channels on the heaters.

9. In combination with two rail heaters, each comprising an elongated manifold provided with a plurality of gas burners spaced along the outer face of said manifold and protected by a continuous shield extending from said manifold over said burners and a flame transfer channel formed with the manifold by an angle member positioned below said shield and extending lengthwise thereof, into which channel said burners are directed, of a bridging flame plate connecting said two heaters, said plate having a cross-section to match that of the burner shields and an angle member integral therewith alignable with those of the two heaters to make said flame transfer channel continuous, and couplings for holding adjacent ends of the heaters and the bridging flame plate in assembled relationship.

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