July 13, 1965 J. C. TUTTLE 3,194,960

RAILROAD TRACK APPLIANCE

Filed Oct. 30, 1961 2 Sheets-Sheet 1

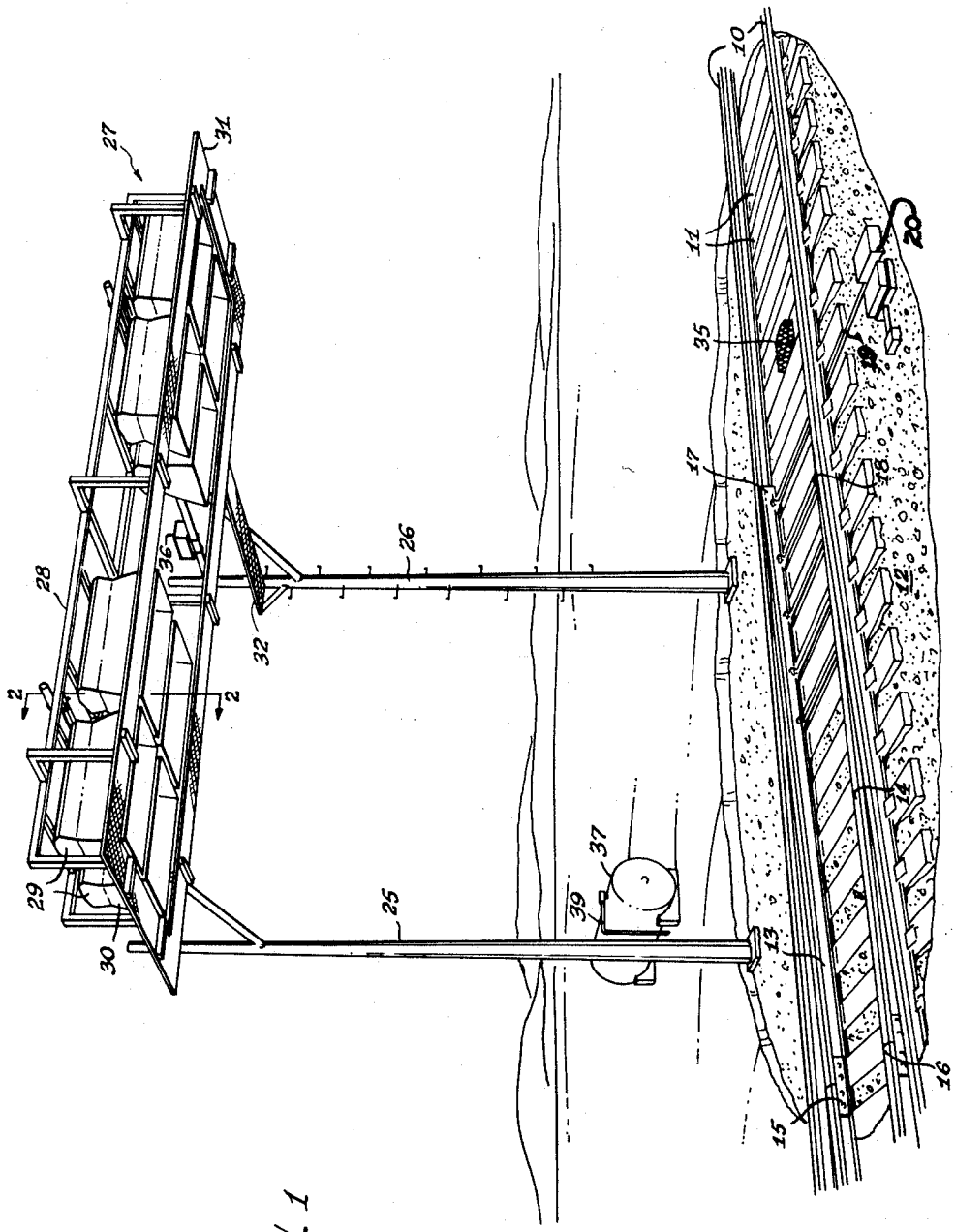


FIG. 1

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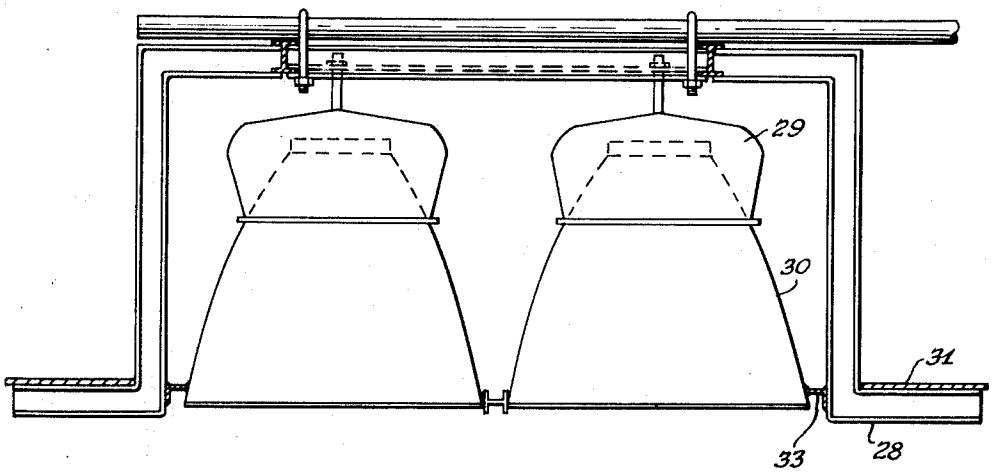


Fig. 2

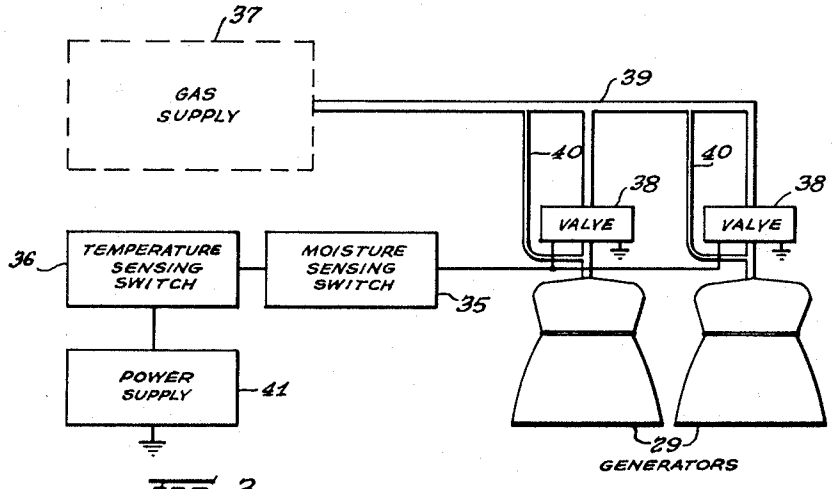


Fig. 3

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RAILROAD TRACK APPLIANCE

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5 Claims. (Cl. 246—428)

My invention relates to the prevention of the occurrence of frozen moisture on a railroad track.

Frozen moisture in the form of snow and ice long has been a problem in the winter operation of railroads. Snow plows are commonly used to keep the tracks free of snow so that trains may progress thereon without being derailed or losing their traction due to the slipperiness of the tracks. The main location of trouble, however, is at track switches, where the trains are optionally diverted from the main track to a siding or a branch track by means of a pair of rails having two positions at one end. In the switching operation the two rails are moved as a unit at the one end, so that one or the other of them is forced against a corresponding rail of the main line. For the switch to operate correctly the moving end of the rail, called the point, must be forced against the main line rail.

During the winter the occurrence of snow and ice hinders correct switch operation because the frozen moisture will accumulate between the point and the rail of the main line, thus preventing or hindering movement of the point against the rail. In the days of manually operated switches the switchman, with the aid of a broom or other implement, could clean the snow and ice out from between the point and the main line rail before operating the switch. However, in recent years the majority of switches have been converted to remote electrical control from a central control point often located as far as a hundred miles from the switch. Thus, manual labor is not automatically available at the switch, but must be sent to the switch especially for the purpose of keeping it clear in times of storms. If the railroad is to be operated efficiently, this means that the central control point operator must be able to forecast weather conditions which will require cleaning of the switch, and arrange for manual cleaning when necessary. Otherwise, train movement will be delayed while labor is being sent to the switch. Besides the delay entailed, it is quite costly to use manual labor for cleaning the switches.

Thus, in recent years there have been introduced a number of schemes for keeping the switches clear of snow and ice more or less automatically. One such device involves the use of electric heaters located adjacent to the outer sides of the rails at the switch point, the power to which is controlled by a switch manually operated at the central control point. This provides heating at the switching point when the operator deems it necessary, but the desired result is delayed due to the necessity of heating the rail all the way through before frozen moisture on the other side of the rail is thawed enough to allow movement of the point. Since only the rails are heated, snow and ice a short distance from the rails, say a few inches, is left standing and may topple over into the space between the point and the main line rail after the heating has been discontinued, returning the switch to the same undesirable condition that existed before heating. Also, this scheme does not avoid mistakes in the judgment of the operator who may be as far as a hundred miles from the switch.

Another arrangement includes gas-fired burners located adjacent the rails, instead of electric heaters. One problem with this is that the gas flame is smothered easily when a passing train or snowplow drops quantities of snow and ice on the burner.

It is a general object of my invention to provide means for preventing the occurrence of frozen moisture at any desired location on a railroad track, including railroad switches. This is done automatically without intervention or the use of judgment by a remote operator.

It is a more specific object of my invention to prevent the occurrence of frozen moisture in the general area of a railroad track rather than only at the rails themselves.

It is another object of my invention to provide very fast heating of the area of interest under conditions favorable to the occurrence of frozen moisture.

A still further object of my invention is to provide infrared heating of a track area by means not subject to interruption from snow and ice dropped from a passing train.

Briefly, my invention accomplishes these and other objects which will become apparent later by means of infrared generating apparatus which beams infrared energy to the area of interest, being controlled by temperature and humidity responsive switches operating in series, so that the energy is supplied only under conditions favorable to the occurrence of frozen moisture. The infrared generators may be energized electrically, or gas-fired, and mounted near the track above the ground in a position to clear passing railroad trains. The moisture sensitive switch preferably is located in the roadbed near the switch point and is set to operate on sensing the presence of moisture. The temperature sensing switch may be located on the structure supporting the generators but in a location not affected by the infrared radiation. This switch preferably is set slightly above the freezing point of moisture and is connected electrically in series with the moisture responsive switch, both of them controlling a circuit which directly or indirectly controls the generation of infrared energy.

By means of a novel arrangement of infrared generators which will be later described more completely, an ellipsoidal pattern of radiation blanketing the critical area is provided. This completely prevents the occurrence of frozen moisture in the area, so that there is no danger of toppling snow or ice falling into the space between the switch point and the main line track and preventing operation of the switch. Also, the control rods which move the switch points are prevented from freezing up since they will be included in the area of radiation.

A better understanding of my invention may be had by reading the more detailed description to follow in conjunction with the appended claims and the attached drawing, in which:

FIG. 1 shows a typical installation of a preferred embodiment of my invention using gas-fired infrared generators;

FIG. 2 is a sectional view of the generator assembly taken along the lines 2—2 in FIG. 1; and

FIG. 3 is a block diagram of the control system used in the preferred embodiment.

Referring now to the drawing, main line tracks 10 are shown conventionally supported by ties 11 on roadbed 12. Moveable rails 13 and 14 pivot at heels 15 and 16 respectively, with points 17 and 18 moving in unison so that one or the other of the points is against its corresponding main line track. The points are moved by means of control rod 19, actuated by a mechanism not shown but contained in protective enclosures 20. This mechanism is remotely operated from a central control point.

Standards 25 and 26 are located beside the switch and support infrared generator assembly 27 directly above the switch. The assembly includes a supporting framework 28 and eight gas-fired infrared generators 29, each of which has a parabolic shield 30 located therebelow to direct the infrared radiation from the generator to the switch area. I have found the Perfection Schwank infra-

red generators, manufactured by Perfection Industries in Cleveland, Ohio, to be very satisfactory for the purpose, providing that the parabolic reflector is lengthened to confine the radiation to a smaller area than was intended by the original design. Since a long narrow pattern of radiation is desirable to cover the switch (which may be as long as forty feet) and not to be wastefully expended on the surrounding terrain, I have devised a novel arrangement of generators as shown in FIG. 1. The generators are mounted end-to-end in two parallel adjacent rows, with the center two generators of each row being spaced approximately three times as far apart as are the end two generators of each row. This provides two overlapping circular patterns of radiation, with the overlapping area at the switch point where maximum heating is desired, creating a generally ellipsoidal pattern of radiation in the area of the switch. Thus, as shown in FIG. 1, snow and ice are prevented from occurring anywhere near the switch, the cross bar 19, and enclosures 20. This assures reliable operation of the switch regardless of the type of weather encountered.

Encircling the generators is catwalk 31, which may be made of expanded metal or other open work, and which provides a means for access to the generators for maintenance. Extension 32 of the catwalk reaches to standard 26 for the convenience of maintennace workers. As shown in FIG. 2, angle iron 33 is conductively attached to both the adjacent shield 30 and framework 28 which is itself conductively attached to catwalk 31. Thus, while infrared radiation is being generated it will warm the shield, and through conduction warm the catwalk and prevent the occurrence of frozen moisture on the catwalk so that it will be a safer place on which to work. The catwalk is attached in this way to all adjacent shields. It will be noted that framework 28 extends below the bottom of the shields a short distance, to prevent damage to the shields during shipment of the units prior to installation.

For the most economical operation of my invention it is desirable that it be operated only when moisture is present at temperatures favorable to the freezing of the moisture. For this reason I have provided a moisture sensing switch 35 and a temperature sensing switch 36. Switch 35 preferably is mounted near switch points 17 and 18 near the level of roadbed 12 and may be any of several commercially available models which operate a set of electrical contacts when moisture is present at the switch. One such instrument is marketed as a "Moisture Sensitizer" by Blanco Manufacturing Co., Albuquerque, New Mexico, and has been found to be entirely satisfactory. Some models such as that described in U.S. Patent No. No. 2,717,957 include a heater to melt snow and ice to more readily operate the contacts. In the location shown, not only will the switch sense the presence of falling snow, but it will also sense the presence of rain or water which is in the roadbed due to the melting of snow or due to other flooding and which may prove detrimental to the operation of the railroad switch.

Temperature sensing switch 36 is mounted in assembly 27 in a location not influenced by the infrared radiation from generators 29 nor by conduction of heat from the shield 30. Switch 36 may be any of several commercially available models which operate a set of electrical contacts at a set temperature. A suggested temperature sensing switch which has been used with good results is Model L6021A refrigeration thermostat in the temperature range of 15° to 75° F. and a differential of 5° F., manufactured and sold by Minneapolis-Honeywell Regulator Company, Minneapolis 8, Minnesota. Through experimentation I have found that it is best to set temperature sensing switch 36 at approximately 37° F. This is because a wet surface located in ambient air at that temperature will itself be at a lower temperature, perhaps low enough to freeze the moisture. Thus it is desirable

that the temperature sensing switch operate to start the infrared generators working at that temperature.

The gas-fired generators are supplied with gas through line 39 from supply 37 which may be a tank or, if convenient, a nearby gas main. Located optionally near each generator is an electrically controlled valve 38 which controls flow of gas to the generator. Pilot line 40 bypasses each valve to furnish gas to pilot flames maintained at all times in the generators for ignition. If desired, electric ignition may be substituted.

Temperature sensing switch 36 and moisture sensing switch 35 are connected electrically in series with a power supply 41 and the electrical portion of each valve 38, as shown in FIG. 3, the valves being electrically in parallel with each other. The power supply may be located in the same enclosure as the temperature sensing switch, or elsewhere as desired. Since the switches are in series, power from the power supply will not be applied to the valves unless both of the switches are closed, indicating the presence of moisture at temperatures favorable to the freezing of the moisture, providing the temperature sensing switch is properly set. Thus, although the moisture sensing switch will close if it is rained upon at temperatures above the set point, the temperature sensing switch will remain open and thereby prevent the operation of valve 38. This in turn prevents ignition of the infrared generators. If no moisture is present at temperatures below the set point, the moisture sensing switch will remain open and prevent operation of valve 38 even though temperature sensing switch 36 is closed.

It is seen that the invention will provide immediate infrared radiation upon the occurrence of snow, since snow will be detected as moisture by switch 35 and will always occur below the suggested set point of 37° F. The infrared radiation will be directed to the switch area and, when it strikes the rails, ties, roadbed and other objects in its path, be converted into heat which will warm these objects and they will in turn radiate heat, melting the snow as it strikes them. Thus the snow will be prevented from piling up and becoming an operational problem. As long as moisture remains on switch 35 at a temperature below that at which switch 36 is set, the generators will remain on and will heat the area. However, as soon as the area is dry, regardless of the temperature, the generators will be turned off automatically.

Should a train pass by soon after the area has been heated and dried, dropping snow and ice on the area, not only will the moisture sensing switch start the generators, but the already warmed area will start melting the frozen moisture from below. Since the gas-fired generators are not located adjacent the rails there is no danger of the flame being smothered. The automatic removal of the frozen moisture will occur regardless of whether a remote operator is aware of the new situation or not, thus preventing expensive delays which would be encountered without my invention.

Although the preferred embodiment described is shown mounted over a switch point, it will be apparent that it could be used equally well anywhere on a railroad track where it is desired to prevent the occurrence of frozen moisture. Also, although the preferred embodiment is shown as mounted directly over the track with sufficient clearance for a railroad train, it is conceivable that the generators could be mounted at the side of the track and aimed at the track at an angle to direct the radiation to the proper area. In some locations it may be more feasible to use infrared generators powered by electricity or other means without departing from my invention.

I have described a preferred embodiment which automatically prevents the occurrence of frozen moisture at a desired location on a railroad track without the intervention of human judgment and without the expenditure of human labor. It is not my intention to limit the protection of this patent to the preferred embodiment shown as

an example, the sphere and scope of my invention being defined in the claims below.

I claim as my invention:

1. A device for automatically preventing the occurrence of frozen moisture on a railroad track, comprising:
an infrared generator;
means for supporting the generator above the track so as to clear railroad trains;
means for directing infrared radiation from the generator to the track;
means for sensing temperatures favorable to the freezing of moisture, and for signaling the occurrence thereof;
means for sensing the presence of moisture at the track and signaling such presence;
and means responsive only to simultaneous signals from both sensing means for starting the generator.

2. The device of claim 1 wherein the moisture sensing means is mounted near the point of the switch near roadbed level.

3. A device for automatically preventing the occurrence of frozen moisture on a railroad switch, comprising:
a gas-fired infrared generator;
standard means located beside the switch and supporting the generator above the switch so as to clear railroad trains;
a shield mounted in conjunction with the generator for directing infrared radiation to the switch;
a temperature sensing switch set to operate at a temperature favorable to the freezing of moisture;
a moisture sensing switch mounted near the point of the railroad switch;
and an electrically controlled valve, opened by simultaneous signals from the temperature and humidity switches when moisture is present at a temperature favorable to the freezing thereof, and thence permitting the flow of gas from a supply to the generator, whereby infrared radiation will prevent the occurrence of frozen moisture on the railroad switch.

4. A device for automatically preventing the occurrence of frozen moisture on a railroad switch, comprising:
eight infrared generators mounted end-to-end in two parallel adjacent rows of four each, the center two generators of each row being spaced approximately three times as far apart as are the end two generators of each row;
standard means located beside the track and supporting the generators above the switch so as to clear railroad trains;
a shield mounted in conjunction with each generator for directing infrared radiation to the switch;
a temperature sensing switch set to operate at a temperature favorable to the freezing of moisture;
a moisture sensing switch, maintained at a temperature above freezing and mounted near the point of the railroad switch;
an electrically controlled valve, opened by simultaneous signals from the temperature and humidity switches when moisture is present at a temperature favorable to the freezing thereof, and thence permitting the flow of gas from a supply to the generator, whereby infrared radiation will prevent the occurrence of frozen moisture on the railroad switch.

5. The device of claim 4 wherein the generators are encircled by a catwalk of heat-conductive material, the catwalk being in heat-conductive contact with the shields whereby frozen moisture is prevented from occuring on the catwalk while the generators are operating.

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LEO QUACKENBUSH, *Primary Examiner.*