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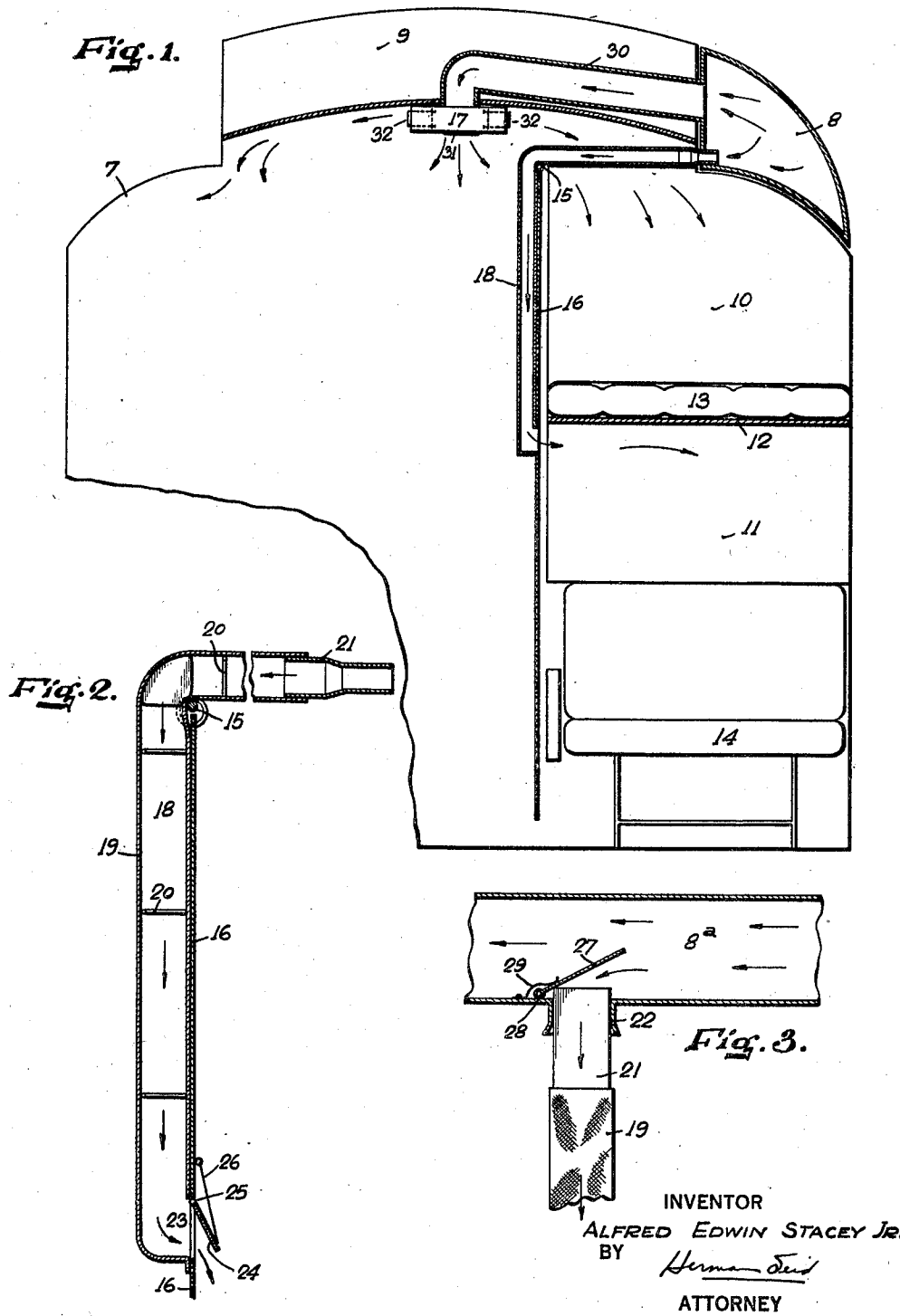
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2,134,588

RAILROAD CAR AIR DISTRIBUTING SYSTEM

Filed Nov. 12, 1934

3 Sheets-Sheet 1



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Fig. 4.

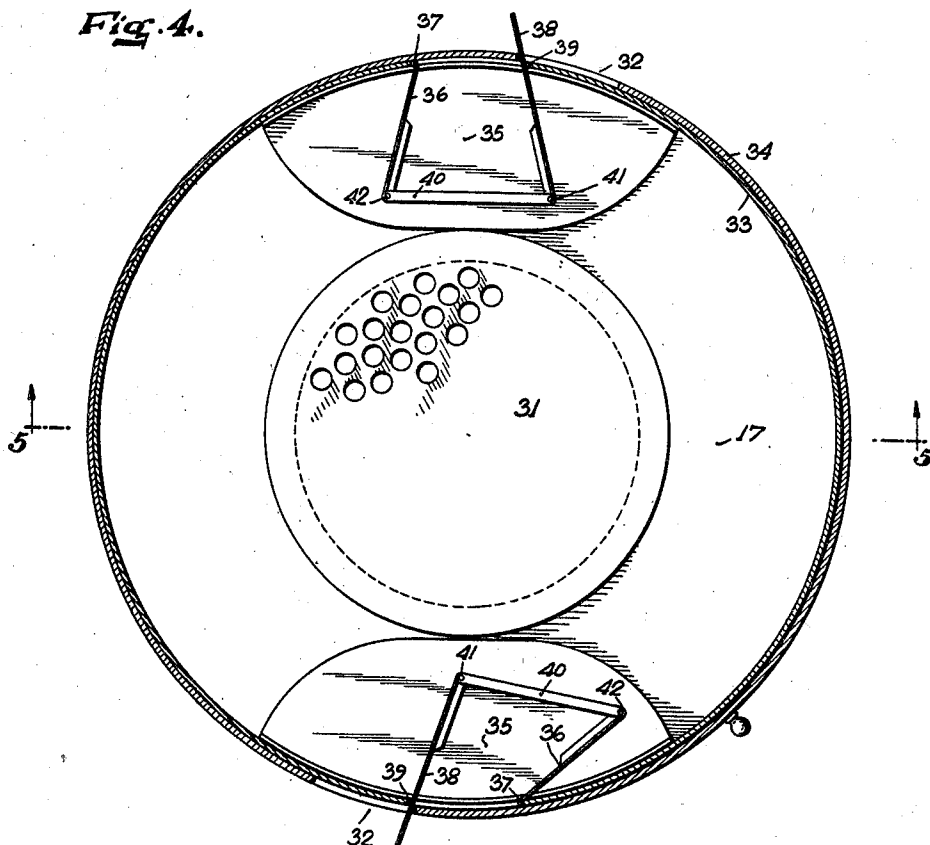
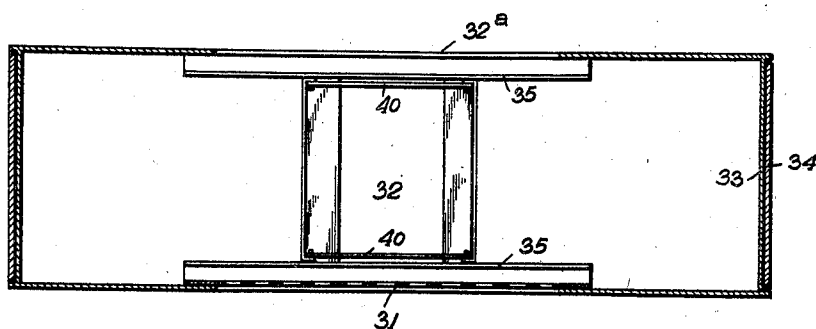


Fig. 5.



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Fig. 6.

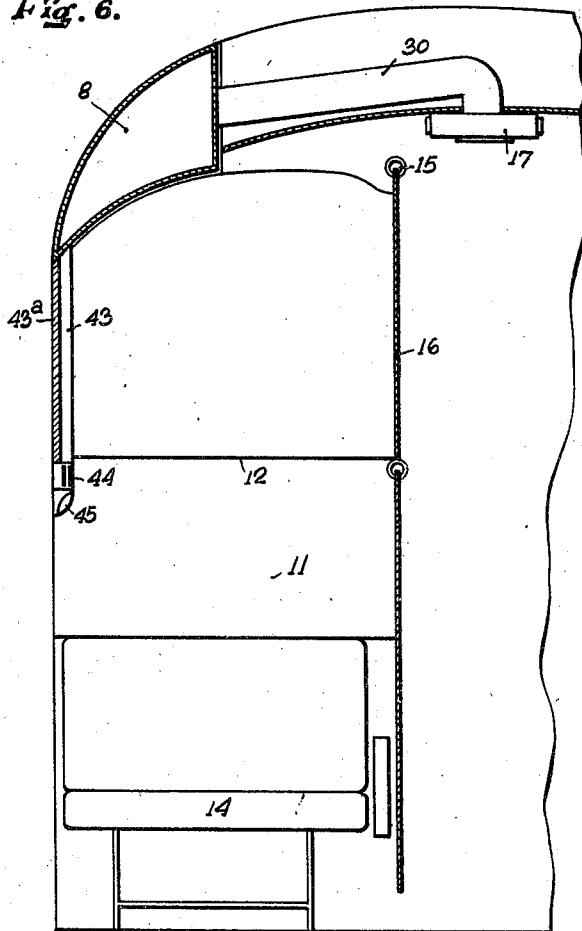


Fig. 9.

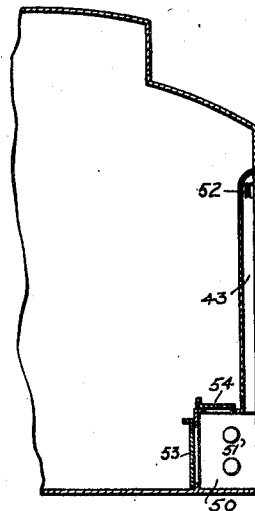


Fig. 7.

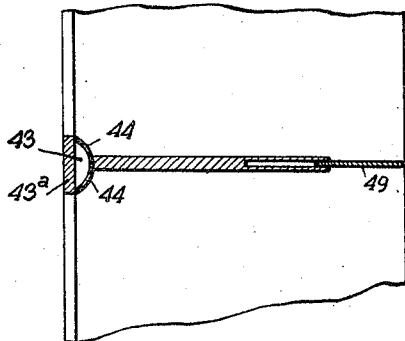
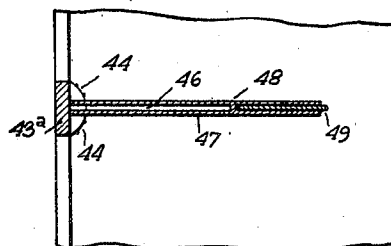


Fig. 8.



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2,134,588

RAILROAD CAR AIR DISTRIBUTING SYSTEM

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Application November 12, 1934, Serial No. 752,548

6 Claims. (Cl. 98-5)

This invention relates to air conditioning systems for railway cars and more particularly to methods of and apparatus for distributing air in sleeping cars, or cars where a plurality of confined areas are provided for the use of passengers.

The general object of the invention is to provide for efficient and adequate distribution of conditioned air in compartment, berth and aisle areas of sleeping cars so that the full benefit of the conditioned air may be made available to the occupants, regardless of impediments to free circulation. In passenger cars generally, where conditioning systems are employed more especially for day time use, the interior of the car is usually one free area. This is true of coaches and, except for compartments, also of Pullman type cars. The air may be introduced without regard to partitions or impediments to free circulation, because no such impediments exist. Thus, the air may be introduced in the upper part of the car, above the zone of occupancy, and will then filter down into the passenger occupancy area. Normally, especially under summer operating conditions when it is desirable to introduce air at a temperature below that of the atmosphere in the car, the air will be discharged from a central source of supply through outlets located adjacent the ceiling area. The distribution is such that the relatively cold and dehumidified air will reach the zone of occupancy in comfortable condition and be distributed equally free from streaks or drafts. In a sleeping car, however, the provision of curtained areas, and of upper and lower compartment areas, make the problem of adequate and controlled distribution a difficult one embracing special factors not found in the open area or non-sleeping cars.

Applicant's solution provides for distributing controlled volumes of air to lower berth, upper berth, compartment, and aisle areas, so that the benefits of air conditioning, with respect to production and maintenance of desired temperature, relative humidities, and air motion, will be available to all parts of the car, regardless of barriers to free circulation of air within the car interior.

A further object of the invention is to provide a system of air distribution which will be capable of effective use not only when the car is divided up into confined areas enclosing upper and lower berths, but which will be equally effective during non-sleeping periods, when the berths

are made up and the car interior presents substantially a single free area.

Another object of the invention is to provide for distributing conditioned air within a sleeping car or the like through a series of ducts positioned within or in connection with existing partitions between adjacent sections or berth areas. As a result, the ducts will be accommodated within or as part of existing structural elements, and hence, will not mar the appearance or interfere with the scheme of interior decoration of the car.

Another object of the invention is to utilize the conventional steam coils positioned at the floor level and along the sides of the car, in combination with an enclosing duct and branch supply conduits, whereby the coils may be used under winter operating conditions to heat air circulating within the duct, and the duct utilized throughout the year for distributing conditioned air to the car. The duct may be arranged with suitable ports to enable heating of the car to be carried on in winter by natural air circulation due to convection, the steam coils alone being used if desired; whereas in the summer time the duct would be supplied with air from any suitable conditioning and air handling apparatus.

A feature of the invention resides in the provision of a plurality of outlets arranged to distribute air to produce equable conditions throughout a car interior during non-sleeping periods, when the berths are made up.

Another feature of the invention resides in the provision of volume and directional controlled devices whereby the quantity and direction of discharge of air may be suitably regulated in accordance with demands of different parts of the car or the desires of passengers accommodated therein.

Another feature embraces the provision of flexible conduits or duct structures adapted to be removably connected to a source of air supply. These flexible ducts may be made of textile material arranged as non-collapsible structures. Their detachable character enables them to be placed in desired position to serve lower berth or compartment areas when the car is made up for sleeping purposes, and to be taken down when the curtains are removed and the car made up during non-sleeping periods.

A further feature resides in the provision of outlets which may serve for direct introduction of air into the car during non-sleeping periods, and as receptacles for branch ducts into which they will discharge air for distribution into des-

ignated berths when the car is made up for sleeping purposes. The outlets, therefore, serve a double purpose and, additionally, provide for directing and throttling air quantities discharged therethrough.

Another feature of the invention resides in the provision of a duct serving as an enclosure for steam coils running along the side of the car at the floor level, and means including slides or the like for enabling air from the car to circulate by convection in contact with the coils and then out into the car again.

Another feature resides in the provision of a supply duct serving as an enclosure for steam coils, in combination with a plurality of branch distributing ducts connecting to the supply ducts, the distributing ducts being positioned upon or constituting passages constructed integrally with permanent partitions or structural members of the car.

Another feature resides in the preservation of the conventional appearance of the car interior, and the avoidance of unsightly structure tending to mar the interior decorative effect, either during sleeping or day time periods.

A further feature covers the use of a combination outlet and socket, which normally retains an air discharge port in closed position, but which opens against tension responsive to insertion therein of a duct structure or the like whereupon a measured quantity of air will be directed within the duct structure.

Another feature enables the occupant of a berth or compartment area to control the volume of air admitted to said area from a source of supply fed to the area through a flexible duct.

Other objects and features, making for simplicity, economy and effectiveness of air distribution in passenger cars, will be more apparent from the following description of a typical application of the invention, to be read in connection with the accompanying drawings, in which:

Fig. 1 is a fragmentary cross-section of a sleeping car, showing applicant's method of distributing air to aisle and berth sections;

Fig. 2 is a diagrammatic view of a flexible fabric duct mounted over an upper berth rail, with connecting means to the source of supply and discharge outlet adapted to serve a lower berth;

Fig. 3 is a fragmentary section of a supply duct fitted with a connection for receiving the socket end of a flexible branch conduit;

Fig. 4 is a plan view of a ceiling outlet;

Fig. 5 is a section on the line 5—5 of Fig. 4;

Fig. 6 illustrates a distributing duct formed as part of a side member positioned between adjacent berth sections;

Fig. 7 is a diagrammatic fragmentary plan view of two adjacent berth sections equipped with the distributing duct arrangement of Fig. 6;

Fig. 8 is a plan view in section of a distributing duct located within a partition structure separating adjacent berth sections; and

Fig. 9 is a diagrammatic sectional view of another modification of the invention in which the conventional steam coils utilized for heating a car are combined with an enclosing duct and branch distributing conduits adapted for use throughout all seasons of the year.

Considering the drawings, similar designations referring to similar parts, numeral 7 represents a sleeping car or the like having a number of enclosed areas, such as compartments or upper and lower sections made up into berths and substantially enclosed by curtains. In Fig. 1, duct

8 supplies conditioned air from any desired source, such as a cooling unit or air washer. The duct runs longitudinally of the car on the outside thereof and therefore does not mar the interior appearance thereof. However, the position of duct 8 forms no part of the invention, and if desired, a source of supply from a conditioning means may be otherwise suitably positioned as in the monitor area 9. An upper berth 10 and lower berth 11 are divided by the usual partition 12 which provides a bed support for mattress and bedding 13, when the car is made up for sleeping purposes. In non-sleeping periods, partition 12 is thrown upwardly against the side of the car, in the usual manner. Seat 14, during sleeping periods, also serves as the usual bed support, when made up as a berth. Railing 15 serves as a support for curtains 16 which may be suitably designed to give individual confinement and privacy both to upper and lower berths.

Between rail 15 and the side of monitor 9, is the usual opening which communicates with the aisle area. Air from the aisle delivered through outlet 17 thus enters the upper berth, as shown by the arrows. Air for the lower berth is provided from duct 8 through flexible conduit or duct 18. As best shown in Fig. 2, the duct has sides 19 made of canvas or suitable textile material having stiffening means 20 to prevent collapse. One end of the conduit has a nozzle 21 of metal, fibre or other stiff material. The nozzle fits within the duct 8 of Fig. 1 or 8a of Fig. 2. The duct may have a suitable socket such as 22 in which the nozzle 21 is snugly received. The duct is of such length that the discharge end terminates adjacent the head portion of the lower berth, as shown in Fig. 1. With the nozzle 21 fitted within a suitable socket, the length of the duct is fixed so that discharge opening 23 will admit air to the lower berth between the mattress supporting portion 14 and division 12 at any desired point along the length of the berth.

As shown in Fig. 2 flaps 24 or the like suitably hinged at 25 may be raised or lowered to admit more or less air into the berth. Fastening cord 26 may be manipulated to set the flap in any desired position. A slide or other device may be substituted for the flap to enable the occupant to regulate the volume of air delivered.

During non-sleeping periods when the curtains are removed, the flexible ducts 18 may be collapsed and stored away with the bedding. In such event, the nozzle is removed from the supply duct and the stiffening members 20 adjusted to allow the duct to collapse.

In the showing of Fig. 3, where duct 8a is employed, the insertion of nozzle 21 raises cover 27, thus permitting air to enter duct 19. The cover swings on hinge 28, and upon removal of the nozzle, will return to normally closed position under the influence of spring 29.

As may be noted from the showing of Fig. 3, duct 8a may be positioned, as in the monitor space, above the aisle area; and the removable nozzles may swing directly down into the aisle adjacent to the curtains, instead of in the manner shown in Fig. 1. If desired, hooks may be provided for removably attaching the ducts 18 to the curtains, or the ducts may be permanently affixed to portions of the curtain where the shifting of the outlet 23 to different positions is of no moment. The outlet 23 is so arranged with respect to the curtain that the curtain completely encloses the opening or encompasses the

duct so that complete privacy is assured not only with respect to the aisle area but also from the upper berth.

The aisle and upper berth areas are suitably served by main supply ducts such as 3 or 3a through outlet 17. In Fig. 1, the outlet 17 is shown connected with duct 8 through branch 30. The outlet, in the case of duct 3a, could be directly connected to the main source of conditioned air supply.

As shown in Fig. 4, outlet 17 is provided with a perforated portion 31 through which air may be diffused downwardly into the car and also has side outlets 32. The air enters through inlet 32a and is then diffused downwardly through 31 and laterally through outlets 32. Rotating drum 33 moves within outer stationary drum 34. Mounted on distributor plates 35 is one arm 36 hinged to drum 33 at 37 and another arm 38 protruding through outlet 32 and hinged to the drum 33 at 39. The two arms are linked together by arm 40 through pivots 41 and 42. By moving drum 33 with respect to drum 34, by means of arms 38, the size of opening 32 may be regulated as well as the direction of discharge of the air through outlets 32.

When the car is used during non-sleeping periods, the outlets 17 will distribute the air directly into the car area, which then comprises substantially one single enclosure. However, when the berths are made up, the air from outlet 17 will be unable to serve the lower berths, due to the curtained areas. Then, the removable collapsible ducts will meet the methods of air conditioning the enclosed areas, by effective distribution forming no part of the distributing system during daytime use.

Many sleeping cars as now designed, are provided with partitions permanently in place between sections of the car, to afford greater privacy to the occupants of each section during the day, their function during sleeping periods being identical with that of the customary removable partitions. While desirable for such purposes, these permanent partitions impede the free circulation of air throughout the car, and give rise to problems of air distribution within said areas and between said areas and the rest of the car. Also, while in the conventional open type car, the problem of air distribution within restricted areas arises during periods when the berths are made up, in cars of the partitioned or sectionalized type, the problem of distribution arises during non-sleeping periods, too.

Figs. 6, 7 and 8 illustrate methods of air distribution within a railroad car particularly applicable but not limited to sectional type sleeping cars. As illustrated, the distributing ducts which supply air to the restricted areas are permanently in place, forming part of the car interior and capable of functioning during sleeping and non-sleeping periods.

Duct 43, of sheet metal or other suitable material, is in Figs. 6 and 7 attached to and may be part of frame member 43a. The duct suitably connects with supply duct 8 and extends to a point just below partition 12 which separates the upper and lower berth areas. The conditioned air is discharged to the lower berth area through outlet 44 which may be of the general type described in copending application Serial No. 624,956, filed July 27, 1932, or may be of any other suitable design. As illustrated in Fig. 7, the duct is positioned between two adjacent sections, so that outlets 44 served by the one duct 43 may serve

both sections. The outlets are preferably individually adjustable, so that each occupant may meter the quantity of air discharged into each section. The ends of duct 43 may be designed to carry lights 45, so that the same structural member will be utilized for supporting both air conditioning and illuminating means. This method of air distribution not only preserves the appearance of the car interior, but also does not encroach upon and hence, does not shorten the useful length of the berths.

In Fig. 8, duct 46 comprises the interior of partition 47 between adjacent berth sections. Ceiling partition 48 separates the duct section of the partition from that part which accommodates the slide section 49 which is used during sleeping periods to complete the separation of one area from the other. The duct as in the case of duct 43, is supplied with conditioned air from duct 8 which is discharged within the areas through outlets 44, serving each area and suitably positioned at a level below that occupied by partition 12 when the upper berth is made up. While the interior of the partition is shown as a duct, an independent duct structure may be enclosed within the partition in those instances where it is impractical to have section 46 serve as an air tight passageway.

In Fig. 9, the supply duct 50, serves as an enclosure for the present conventional steam coils 51, extending along the sides of the car at the floor level. Under summer operating conditions, air from any desired conditioning and air handling apparatus, will be sent through duct 50 and be discharged into the car through branch supply ducts 43 which may be of the type and construction illustrated in Figs. 6 and 7. Or, if preferred, the air may be suitably supplied to and distributed from passages such as 46, in partitions illustrated in Fig. 8. The various branch supply ducts may terminate at different levels, and be suitably equipped with outlets 52 corresponding to outlets 44 of Figs. 6-8. Under winter operating conditions, conditioned air may similarly be distributed through duct 50 and distributing conduits 52, the coils being utilized to heat the air. If it is desired to eliminate the use of conditioning and air handling apparatus in winter, slide 53 may be set in open position, so that air will circulate by convection from the car, in contact with the coils, and back into the car through outlets 52. Or, if slide 54 is opened in addition to slide 53, a natural circulation in contact with the coils will be carried on through the two openings in the same way as heating now takes place with the coils exposed or surrounded by a grill.

While specific embodiments of the duct, nozzle, and distributing means have been illustrated herein, no limitation on the manner of carrying out the invention is implied thereby, applicant reserving to himself such alternatives as may be utilized in providing structures of the character and for the purposes as set forth herein. Similarly, while supply duct 8 is shown outside the car between the roof and monitor sections, applicant reserves the right to provide a central supply duct within the car or, as shown, about the steam coils at the floor level of the car, or, if desirable, suitably to accommodate such a duct under the car.

I claim:

1. In combination with a sleeping car, a supply duct, an outlet from the supply duct leading to the interior of the car, a removable distributing duct having means at one end for fitting within

the outlet, the distributing duct being made of flexible material capable of being collapsed during non-sleeping periods, stiffening members for opening the distributing duct into non-collapsible position during sleeping periods, the distributing duct being removable from the outlet during non-sleeping periods and connected to the outlet during sleeping periods, the distributing duct being arranged to fit adjacent a curtain of a berth area, the discharge end of the distributing duct having means in connection therewith for controlling the volume of air entering the berth area.

2. In a sleeping car, a berth area, a curtain for separating the area from the remainder of the car, a duct for supplying air to said area, the duct being integral with the curtain.

3. In a railroad car, a supply duct, a first berth area, a second berth area, a partition between the areas, a slide adapted to fit within one part of the partition and be withdrawn therefrom, a passageway for air in another part of the partition, means for supplying air from the supply duct to said passageway in the partition, and means for discharging air from the passageway into a berth area.

4. In an air distribution system of the character described, an outlet fixture including a plurality of members, one of which is rotatable, a plurality of ports for discharging air from the outlet fixture, the size of said ports being varied responsive to the rotation of said rotatable member, means variably controlling the direction of discharge of air from said ports, said means com-

prising a plurality of arms pivotally connected to said rotatable member, the air from said ports being discharged substantially in a horizontal direction, and means for discharging air from the outlet fixture downwardly through a discharge means independent of the ports.

5. In an air distribution system, an outlet fixture comprising a plurality of members, one of which is rotatable, a plurality of ports for discharging air from the outlet fixture, said members being formed and arranged in such manner that the rotation of said rotatable member varies the size of said ports, and means for variably controlling the direction of discharge of air from said ports, said means including a first arm pivotally mounted on said rotatable member, a second arm pivotally mounted on said rotatable member, and a bar pivotally connected to each of said arms.

6. In an air distribution system of the character described, an outlet fixture including a plurality of members, one of which is rotatable, a plurality of ports for discharging air from the outlet fixture, the size of said ports being varied responsive to the rotation of said rotatable member, and means variably controlling the direction of discharge of air from said ports, said means comprising a plurality of arms pivotally connected to said rotatable member, air from said ports being discharged substantially in a horizontal direction.

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