

Oct. 21, 1952

M. WATTER

2,615,115

SPACE-HEATING MEANS

Filed Sept. 30, 1949

FIG. 1

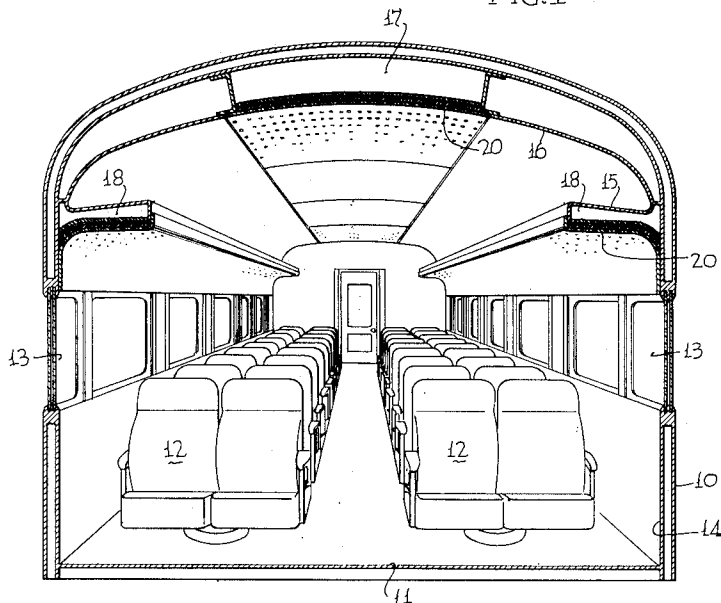


FIG. 2

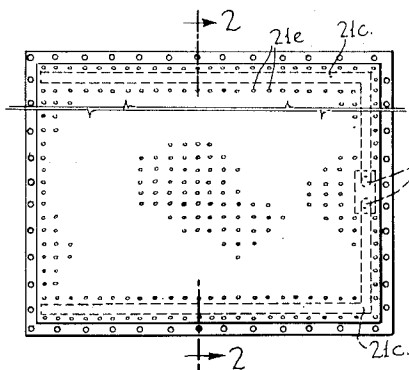
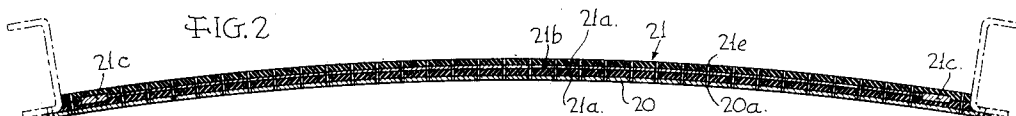


FIG. 3

INVENTOR.

Michael Watter.

BY

Maurice A. Crews

ATTORNEY

UNITED STATES PATENT OFFICE

2,615,115

SPACE-HEATING MEANS

Michael Watter, Philadelphia, Pa., assignor to
The Budd Company, Philadelphia, Pa., a corpo-
ration of Pennsylvania

Application September 30, 1949, Serial No. 118,801

2 Claims. (Cl. 219—34)

1

This invention relates to space-heating means, especially to combined convection and radiant heating means applied to extensive surface areas, and has for an object the provision of improvements in this art.

One of the particular objects of the invention is to increase the available area of radiant heating in a space which has heretofore had only a limited amount of surface area available for the normal application of radiant heat. An example is a rail car in which the major portion of the ceiling is covered by a diffuser plate through which warm conditioned air is supplied and in which all other available wall surfaces, including even the windows are already used as radiant heating panels. By using the surface of the extensive diffuser plate for radiant heat the amount of radiant heat is greatly increased and the feeling of unheated cold zones is avoided. For a given amount of total radiant heat the unit wall radiant temperature may thereby be reduced.

Another object is to provide a simple form of means for furnishing radiant and convection heat.

The above and other objects, features and advantages of the invention will be apparent from the following description of an illustrative embodiment thereof, reference being made to the accompanying drawings, wherein:

Fig. 1 is a vertical cross section and perspective view of the interior of a rail car provided with heating means according to the present invention;

Fig. 2 is an enlarged partial section taken about on the same plane as Fig. 1 and also on line 2—2 of Fig. 3; and

Fig. 3 is a plan view of a diffuser-heating panel alone.

In Fig. 1 there is shown a compartment, such as a rail car 10, having a floor 11, seats 12 adjacent windows 13, side walls 14, baggage rack 15, and ceiling 16 with a longitudinal air duct 17. Means are provided for heating all of the exposed surface areas by radiant heat, preferably by electrical resistance heating means, the different areas being heated to different temperatures depending on their distance from occupant accommodations (seats, berths, etc). The adjacent areas such as floor, lower side walls and windows are heated to a lower temperature than the baggage rack, upper side walls and ceiling, not only to prevent harm to the occupants but to produce a generally uniform feeling of comfort due to radiant heat on all sides of the occupant's body. The windows are preferably heat-

2

ed by transparent metallic or other resistance films or other sheet-form bodies of known types.

The hot air from the overhead duct 17 and the baggage rack ducts 18 supplies heat by convection to avoid high panel temperatures, especially in very cold weather. In some cases heat-radiators may be used near the floor at the side walls or under the seats.

Supply of heat by the various heating means is made responsive to both outside and inside temperatures in known manner.

The air which is supplied through ducts 17 and 18 is conditioned and heated and forced through the ducts by known means, usually located in or near the overhead vestibule spaces. See Patent No. 2,179,873, Anderson. The diffuser plates 20 for distributing the heated air (or cooled air in summer) are also of a known type. See, for example, Patent No. 2,251,682, Leadbetter. These diffuser panels occupy large areas and spread the heated air over the entire car in large volume but at low velocity whereby to avoid drafts.

But the fact that these diffuser panels do cover large areas leaves cold zones in the radiant heating area with a consequent feeling of chill on the side of the occupant which may be oriented toward the unheated zone.

The present invention eliminates this objectionable cold zone trouble and increases the available radiant heating area by providing means for heating the diffuser panel locally without in any way disturbing the diffusion of air therethrough.

On a surface of the diffuser panel, preferably on the back surface, there is disposed and evenly distributed a heating means 21. Most conveniently, this is an electrical resistance heating device which is properly insulated from the diffuser sheet, if made of metal. One suitable heating means comprises a pad of a type available on the market having outer insulating coverings 21a of a rubber-like material and an inner layer 21b of resistance material, apparently carbonaceous in nature. Current is supplied to the edges of the resistance layer by buses 21c having conductor connections 21d. The resistor 21 is open above the diffuser holes 21a of the diffuser sheet and if made as a continuous pad, as mentioned, will have formed in it holes 21e which register with the holes 20a in the diffuser sheet. The holes in the pad do not affect in any appreciable way its heating value. The increase in thickness gives increased length to the diffuser holes 20a—21e and provides better directional

effect to the air. By forming the holes at an angle to the plane of the sheet the air may be directed in various ways.

The present invention operates on a different principle and serves a different purpose from deep-finned and highly-heated radiators through which air is forced for the purpose of heating the air as it is delivered to a compartment. The heating layer here is spread in another plane and is so thin in the direction of air flow through it that it does not appreciably change the temperature of the air. On the other hand the air does not furnish enough heat to the diffuser panel to make it an effective radiant heater, the heat for this purpose being supplied by the local heating means spread over the whole area of the panel.

With the present arrangement it is still possible to supply warm air over large areas to furnish the desired ambient heat and fresh air and at the same time it provides radiant heat over large areas which heretofore have constituted cold zones in the total radiant heating scheme. These cold zones and consequent discomfort to occupants have existed for a considerable time with the general opinion that it was impossible to have diffused warm conditioned air and radiant heat over the diffusion areas at the same time.

While one embodiment of the invention has been specifically illustrated and described, it is to be understood that there may be various modifications within the scope of the invention.

What is claimed is:

1. Heating means for a compartment comprising a duct and a thin diffuser plate thereover for supplying diffused air at a low velocity through the plate throughout its surface area to said compartment, the diffuser plate presenting a smooth wall surface to the interior of the compartment and having a great number of small holes there-through over its entire surface, and thin local heating means spread over the plate for heating said diffuser plate throughout its entire area without obstructing the air diffuser holes to make of it a radiant heating panel, as well as an air diffuser panel, said heating means comprising a continuous electrical resistance heating blanket secured on the back of said diffuser sheet and having holes "registering" with the holes in said diffuser sheet.

2. Heating means for a compartment comprising a duct and a thin diffuser plate thereover for supplying diffused air at low velocity through the plate throughout its surface area to said compartment, the diffuser plate presenting a smooth wall surface to the interior of the compartment and having a great number of small holes there-through over its entire surface, and thin local heating means spread over and in thermal contact with the entire rear surface of the plate but leaving its holes unobstructed and the exposed front surface smooth for heating said diffuser plate throughout its entire area to make of it a radiant heating panel while leaving the holes without impairment of their normal function of passing air in the usual manner, said heating means comprising electrical resistance heating elements disposed on the back of said diffuser sheet.

MICHAEL WATTER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
Re. 21,474	McCleary	June 4, 1940
725,663	Bolling	Apr. 21, 1903
1,271,494	Swartwout	July 2, 1918
1,577,434	Kempston et al.	Mar. 16, 1926
1,911,747	Burkle	May 30, 1933
2,165,970	Jaspers	July 11, 1939
2,172,771	Norris	Sept. 12, 1939
2,179,873	Anderson et al.	Nov. 14, 1939
2,239,957	Genda	Apr. 29, 1941
2,251,682	Leadbetter	Aug. 5, 1941
2,314,766	Bull et al.	Mar. 23, 1943
2,382,340	Smith	Aug. 14, 1945
2,411,677	Christenson	Nov. 26, 1946
2,466,085	Dowrello	Apr. 5, 1949

FOREIGN PATENTS

Number	Country	Date
118,300	Great Britain	Aug. 19, 1918
489,424	Great Britain	July 24, 1938
607,152	Great Britain	Aug. 26, 1948