

Nov. 5, 1940.

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2,220,587

APPARATUS FOR AND METHOD OF AIR DISTRIBUTION

Filed Dec. 18, 1937

2 Sheets-Sheet 1

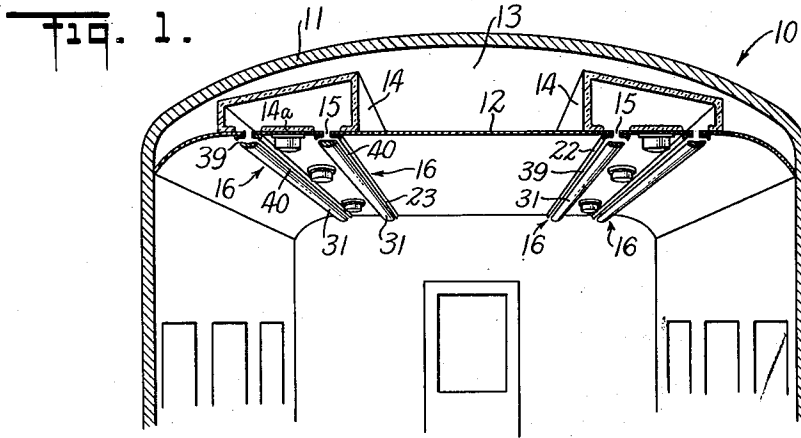
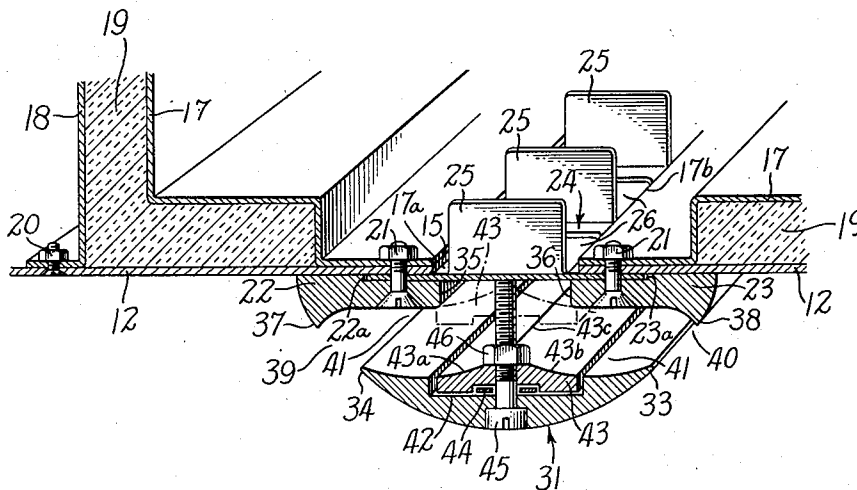


Fig. 2.



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Fig. 3.

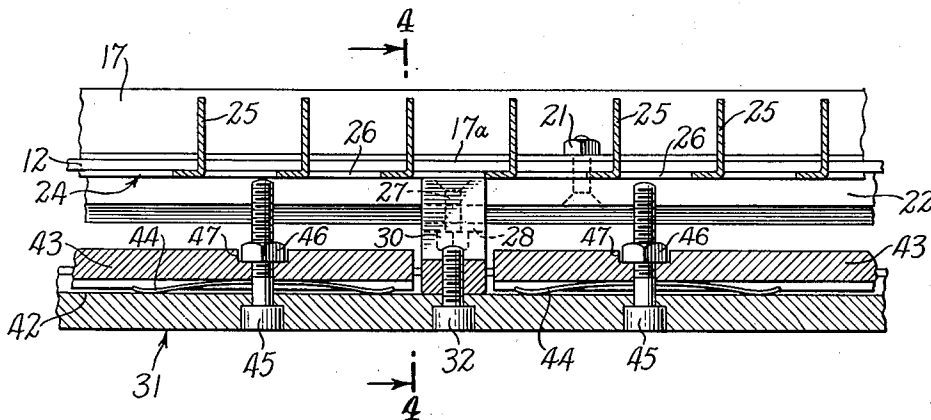
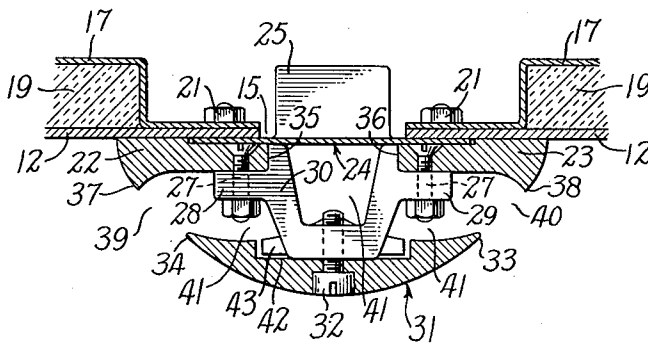


Fig. 4.



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2,220,587

APPARATUS FOR AND METHOD OF AIR DISTRIBUTION

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Application December 18, 1937, Serial No. 180,535

4 Claims. (Cl. 98—13)

This invention relates to apparatus for and a method of air distribution.

One of the objects of this invention is to provide air distributing apparatus which is simple and inexpensive in construction, sturdy and durable under conditions of rigorous use, and which may be installed in a car without extensive alteration thereof. Another object of this invention is to provide apparatus of the above nature which harmonizes with the appearance of the car and effectively and efficiently distributes conditioned air therein without causing objectionable or discomforting drafts. Another object of this invention is to provide a method of air distribution for a railroad car or the like by which conditioned air is effectively diffused substantially uniformly through the car and at a substantially constant pressure without the production of unhealthy drafts. Other objects will be in part apparent and in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements, arrangements of parts, and in the several steps and relation and order of each of the same to one or more of the others, all as will be illustratively described herein, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings in which is shown one of the various possible embodiments of my invention;

Figure 1 is a perspective view of a portion of a railroad car or the like in which my apparatus is installed;

Figure 2 is an enlarged fragmentary perspective view of an air duct with my air distributing apparatus installed therein;

Figure 3 is a fragmentary longitudinal sectional elevation of a portion of my air distributing apparatus; and,

Figure 4 is a fragmentary transverse sectional elevation taken along the line 4—4 of Figure 3.

Similar reference characters refer to similar parts throughout the various views of the drawings.

As conducive to a clearer understanding of certain features of my invention, it might here be pointed out that the problem of air distribution in air conditioned railroad cars presents numerous difficulties. It is important that all portions of the car be maintained at a substantially uniform temperature, and that the air be introduced into the car noiselessly and at a pressure not exceeding a predetermined maximum, thus to avoid bothersome noises and unhealthy drafts. Many railroad car air distribution devices are not only ungainly in appearance, but operate indifferently because of structural deficiencies which result in whistling or roaring noises and drafts on the passengers. Other devices of this

character are quite complicated both structurally, and functionally, and are difficult to install in a car without extensive alteration thereof. Accordingly, it is another object of this invention to provide a method of and apparatus for distributing air in a railroad car or the like which overcomes the above-noted difficulties in a thoroughly practical and efficient manner.

Referring now to Figure 1 of the drawings, a railroad car or the like generally indicated at 10 has a roof 11 below which a ceiling 12 extends from one side of the car to the other, forming with roof 11 a space 13. One or more ducts 14 is preferably mounted on ceiling 12 and extends longitudinally of the car in space 13 preferably substantially coextensive therewith. The bottoms 14a of ducts 14 are conveniently formed by portions of ceiling 12 and have one or more slots or openings 15. My air distributing apparatus generally indicated at 16 is operatively associated with these openings. While I have illustratively shown a pair of ducts, each provided with a pair of air distributors, it is to be understood that under certain conditions one centrally disposed duct with a single air distributor may be utilized.

Referring now to Figure 2, the sides of duct 14 are preferably formed of inner and outer walls 17 and 18 respectively between which suitable insulating material 19 is disposed, walls 17 and 18 being secured in any suitable manner, as by nuts and bolts 20 and 21, to car ceiling 12. Edges 17a and 17b of inner duct wall 17 are preferably spaced by substantially the width of opening 15.

Bolts 21 extend through a pair of vanes 22 and 23 to secure the vanes to car ceiling 12 adjacent the edges of opening 15. Vanes 22 and 23 are provided respectively with recesses 22a and 23a in which the opposite longitudinal edges of a deflector generally indicated at 24 are disposed. Deflector 24 has a suitable number of equally spaced upstruck lips or baffles 25, which extend through opening 15 into duct 14, leaving openings or ports 26 in deflector 24 which communicate with the interior of the duct. Preferably bolts 21 extend through the opposite longitudinal edges of deflector 24 also, these bolts thus mounting vanes 22 and 23, deflector 24, and duct wall 17 on ceiling 12.

As is more clearly shown in Figure 4, vanes 22 and 23 carry a plurality of bolts 27 which extend downwardly through the ears 28 and 29 of a preferably U-shaped bracket or bridge 30. A plurality of these bridges are equidistantly spaced along vanes 22 and 23 and carry a baffle generally indicated at 31 which is preferably secured to bridges 30 by suitable bolts 32 (see also Figure 3) which extend upwardly through the baffle and are threaded into the bottoms of bridges 30. Preferably the bottom of baffle 31 is arcuate in shape and its longitudinal edges 33 and 34 are

spaced outwardly of the longitudinal adjacent edges 35 and 36 of vanes 22 and 23, these latter edges preferably registering with the edges of opening 15. Baffle edges 33 and 34 are, however, spaced inwardly of outer edges 37 and 38 of vanes 22 and 23, and form with these vane edges openings 39 and 40, which communicate with duct 14 by way of duct opening 15 (Figure 2) and deflector ports 26. Thus baffle 31 and vanes 22 and 23 form an expansion chamber 41, the purpose of which will be described below.

Baffle 31 (Figure 2) has a central longitudinal recess 42 which receives a valve or closure 43 whose upper surfaces 43a and 43b are preferably arcuate, and which meet along a central line 43c. As shown in Figure 3, valve 43 rests on a plurality of leaf springs 44 disposed between the valve and baffle 31 in recess 42, these springs being so curved so as to constantly bias valve 43 upwardly. To permit adjusted positioning of valve 43, a plurality of bolts 45 extend through baffle 31, springs 44 and valve 43, suitable nuts 46 being set in recesses 47 on valve 43 and threaded on bolts 45. Thus rotation of bolts 45 in one direction permits springs 44 to move valve 43 upwardly, whereas rotation of bolts 45 in the opposite direction draws valve 43 downwardly into recess 42 against the bias of springs 44.

As is more clearly shown in Figure 2, valve 43 is adjustable from the full line position to the dotted line position, the former position permitting maximum flow of air from the duct, the latter position completely shutting off the air flow. Valve 43 may accordingly be positioned anywhere between its two extreme positions to meter air flow from duct 14 into the car as desired.

It now appears that the edges of valve 43 and edges 35 and 36 of vanes 22 and 23 form openings of variable width. When these openings are narrow, as when valve 43 is almost in its dotted line position, as viewed in Figure 2, the volume of air flowing into expansion chamber 41 from duct 14 is relatively small, but the velocity and pressure of the air is high. This high velocity and pressure might cause objectionable noises and drafts were it not for expansion chamber 41, which permits expansion of the air and decrease in velocity and pressure, so that the air is diffused from openings 39 and 40 (Figure 4) at a considerably less velocity.

It may now be seen that air flows longitudinally through duct 14 and is deflected in a substantially vertical direction by lips 25 of deflector 24, through opening 15 and deflector ports 26 into expansion chamber 41. As the air flows into the chamber, it expands and its velocity and pressure is decreased. Baffle 31 directs the air transversely of the car. As edges 37 and 38 of vanes 22 and 23 are curved downwardly and are spaced outwardly of edges 33 and 34 of baffle 31, the transversely flowing air is diffused downwardly through openings 39 and 40 (Figure 1) into car 10 at a pressure not exceeding a predetermined maximum throughout the length of the openings, and in such a manner that no bothersome or unhealthful drafts are created in any part of the car. Furthermore, the simplicity of construction of baffle 31 and vanes 22 and 23 results in pleasing simplicity of line, which harmonizes well with the interior of the car. Accordingly, I have provided a method of and apparatus for distributing air in a car, which accomplishes the above-noted objects in a thoroughly practical and efficient manner.

As many possible embodiments may be made of the mechanical features of the above invention and as the art herein described might be varied in various parts, all without departing from the scope of the invention, it is to be understood that all matter hereinabove set forth, or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. In railroad car construction, in combination, means forming an air duct in the upper part of the car extending longitudinally thereof, means forming a longitudinally extending opening in said duct, a deflector secured to said duct below said opening, the edges of said deflector forming with the duct elongated openings of constant width, and an elongated damper substantially coextensive longitudinally with said deflector and movably associated with said deflector and movable toward and away from said first-mentioned opening to vary the amount of air flowing therethrough.

2. In railroad car construction, in combination, means forming an air duct in said car, said duct having an opening therein, a deflector secured to said duct below said opening to deflect air flowing downwardly through said opening transversely only of said car, a damper movably interposed between said opening and said deflector, and spring means disposed between said damper and deflector and constantly biasing said damper toward a closed position with respect to said opening.

3. In railroad car construction, in combination, means forming an elongated air duct in the upper part of the car extending substantially coextensive longitudinally thereof, means forming a longitudinally extending opening in said duct, said opening being substantially coextensive with said duct, means associated with said opening for deflecting air flowing through said duct downwardly thereof through said opening, an elongated deflector secured to said duct below said opening and substantially coextensive therewith to deflect the downwardly flowing air transversely only of said car substantially throughout the length thereof, a damper movably mounted between said duct and said deflector below said opening whereby the volume of air flowing through said opening may be varied at will, and means for maintaining said damper in any adjusted position between said deflector and said opening.

4. In railroad car construction, in combination, means forming an elongated air duct extending longitudinally of said car, said duct having an elongated opening therein, a plurality of supports extending downwardly from said means and spaced longitudinally of said opening, an elongated deflector secured to said supports and extending longitudinally of said opening substantially coextensive therewith, said deflector being at least as wide as the lateral extent of said opening and being adapted to deflect air flowing downwardly through said opening transversely of said car, an elongated damper interposed between said opening and said deflector, and means for variably positioning said damper between said deflector and said opening to vary volumetrically the air flowing through said opening into said car.

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