April 8, 1941. J. D. STROBELL 2,237,771

VENTILATING APPARATUS

Filed Jan. 2, 1937 4 Sheets-Sheet 1

Fig. 1.

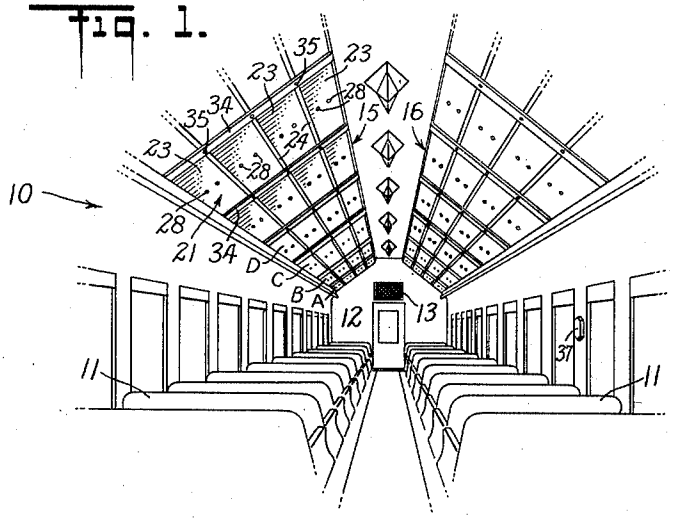
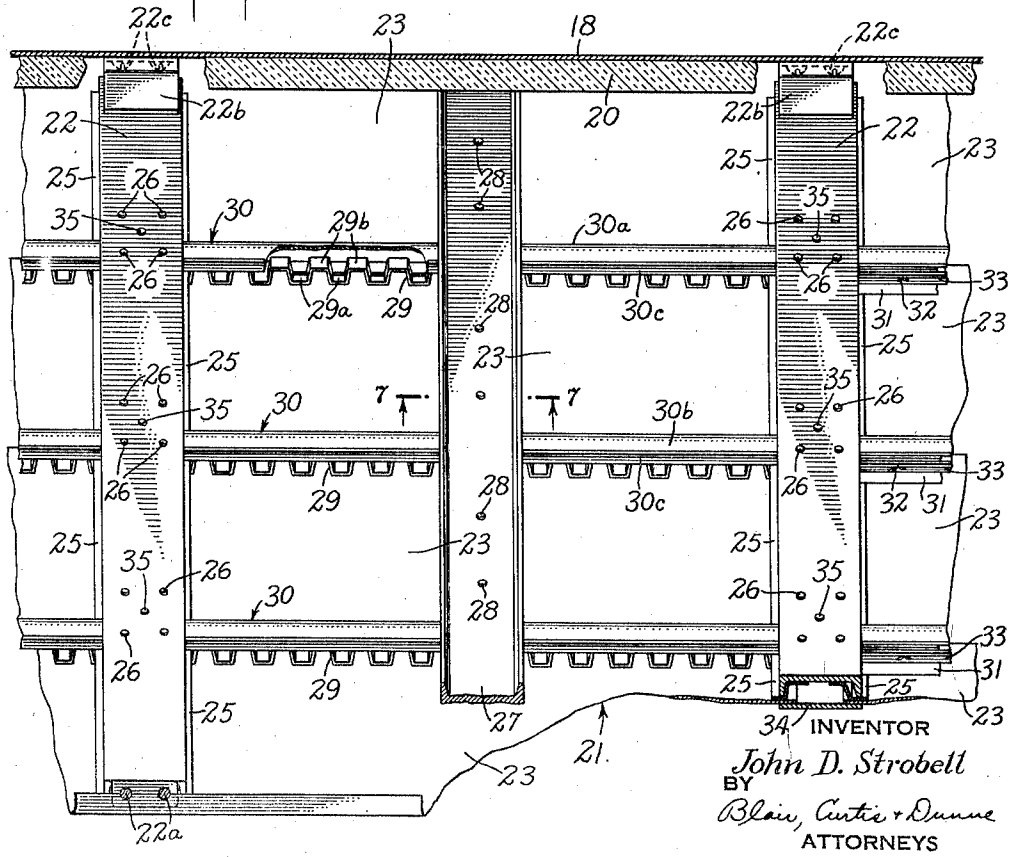


Fig. 2.



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VENTILATING APPARATUS

Filed Jan. 2, 1937 4 Sheets-Sheet 2

Fig. 3.

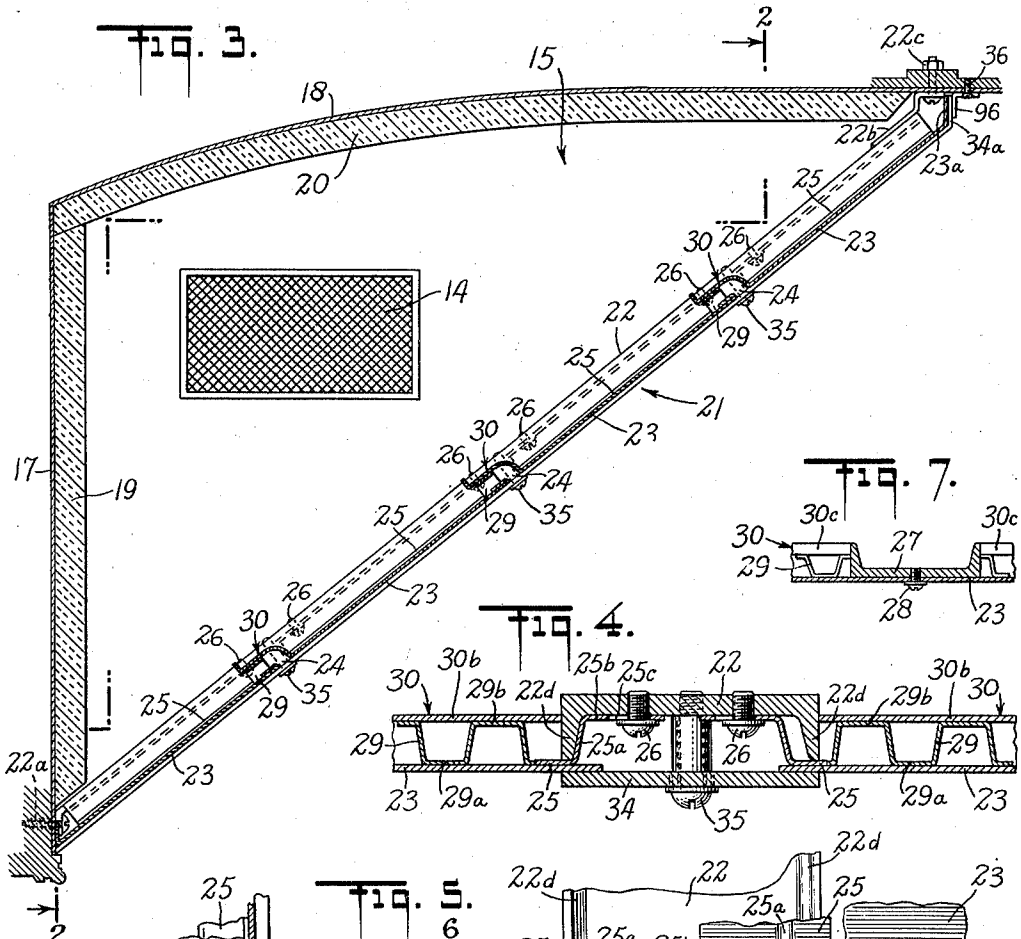


Fig. 7.

Fig. 4.

Fig. 5.

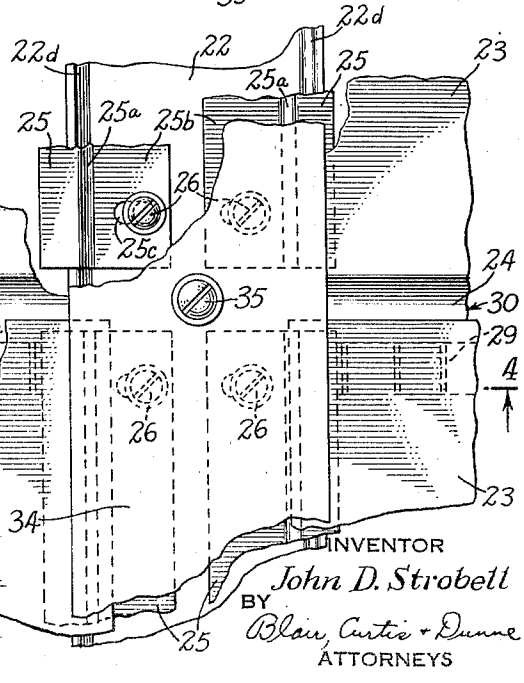
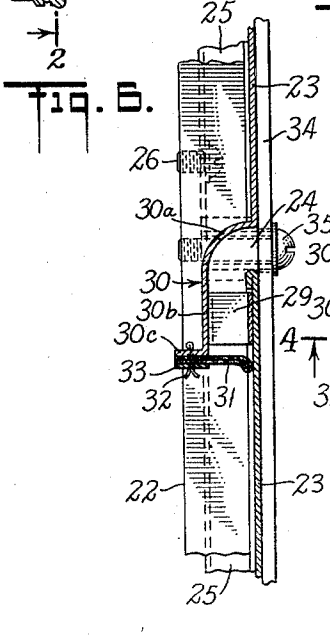


Fig. 6.



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VENTILATING APPARATUS

Filed Jan. 2, 1937 4 Sheets-Sheet 3

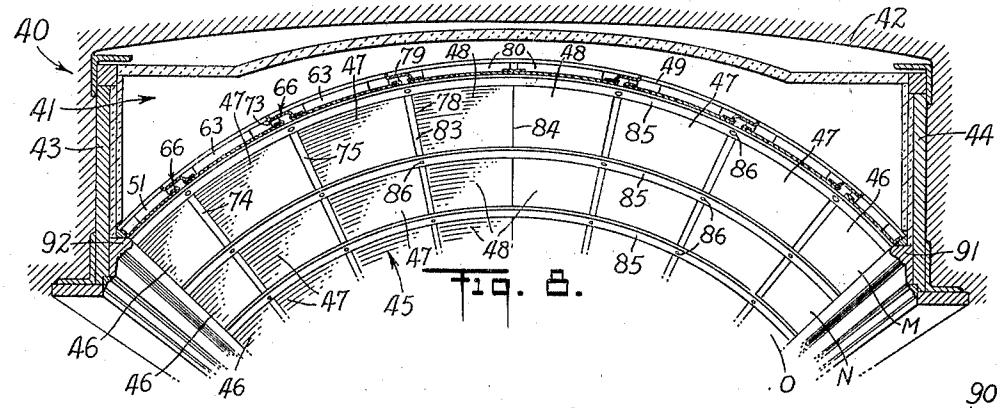

Fig. 8.

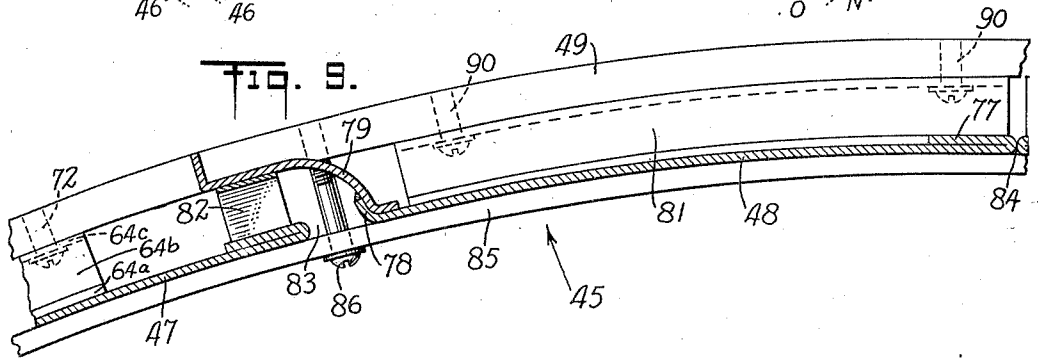

Fig. 9.

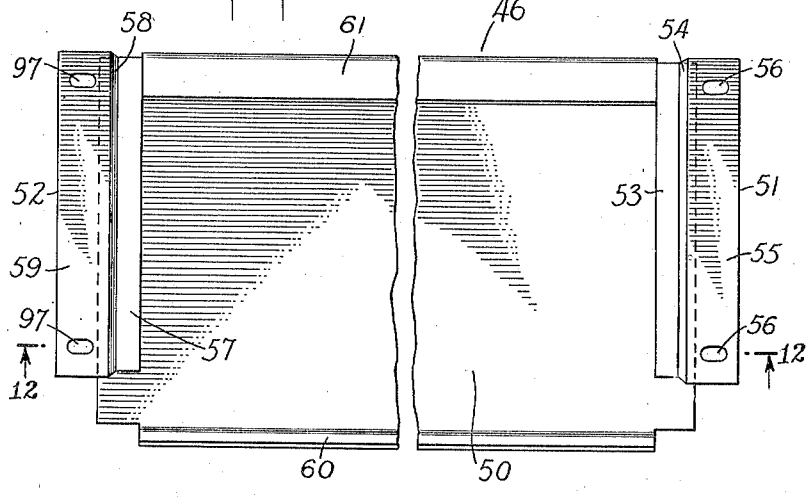

Fig. 10.

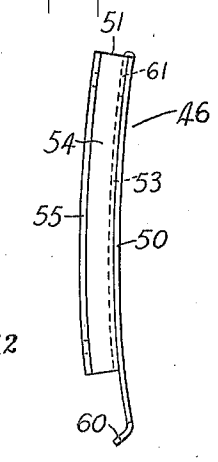

Fig. 11.

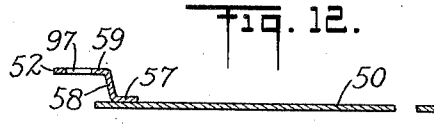

Fig. 12.

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April 8, 1941. J. D. STROBELL 2,237,771

VENTILATING APPARATUS

Filed Jan. 2, 1937 4 Sheets-Sheet 4

Fig. 13.

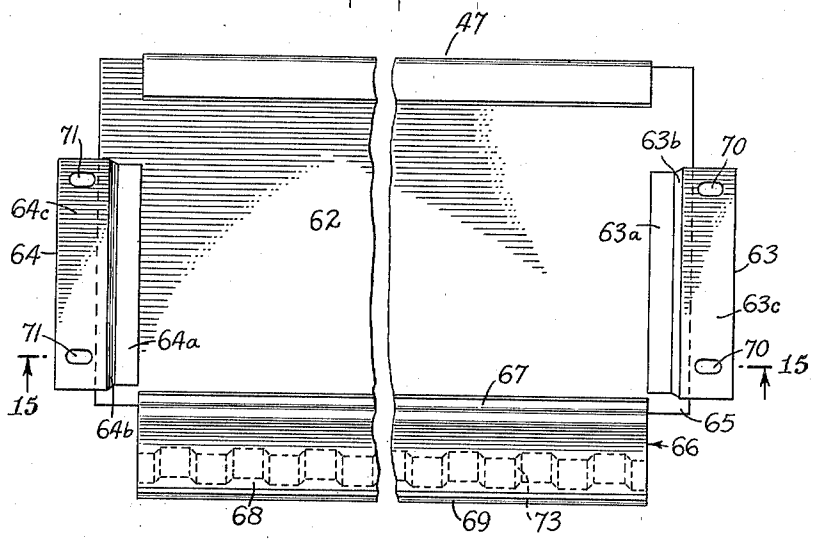


Fig. 14.

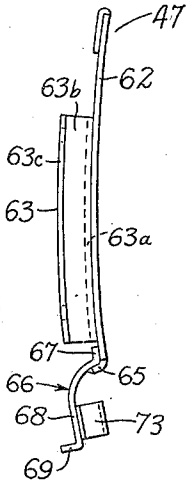


Fig. 15.

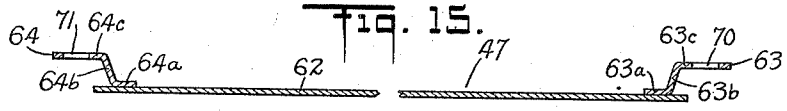


Fig. 16.

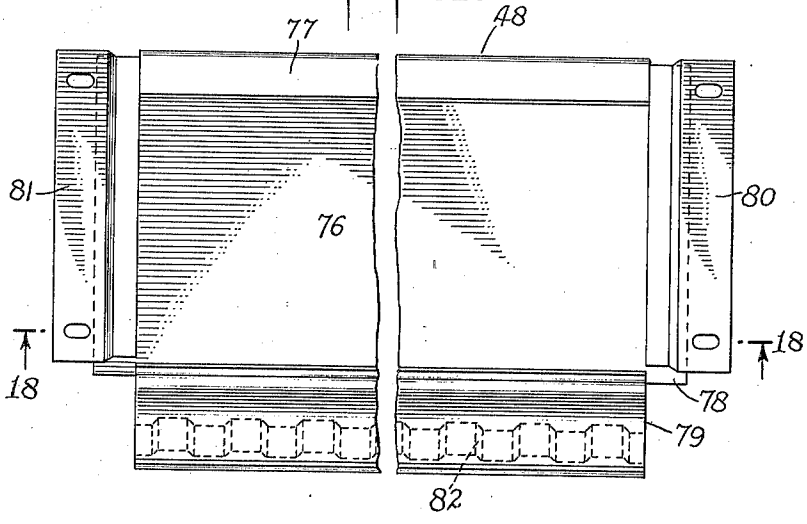


Fig. 17.

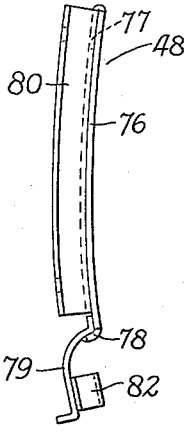
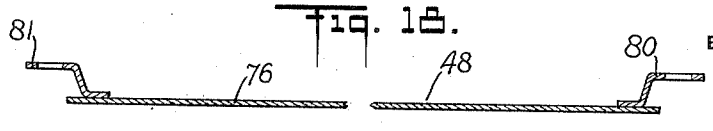


Fig. 18.



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Patented Apr. 8, 1941

2,237,771

UNITED STATES PATENT OFFICE

2,237,771

VENTILATING APPARATUS

John D. Strobell, New Haven, Conn., assignor to The Safety Car Heating & Lighting Company, a corporation of New Jersey

Application January 2, 1937, Serial No. 118,873

10 Claims. (Cl. 98—4)

This invention relates to a ventilating apparatus, and particularly to an air distributing construction for installation in vehicles such as railroad cars or the like.

One of the objects of this invention is to provide a simple and practical ventilating apparatus, efficient in operation and of simple, inexpensive construction. Another object is to provide apparatus of the above nature which is durable and sturdy, but which may be constructed of light and inexpensive materials. Another object is to provide apparatus of the above nature which is readily installable in railroad cars or the like without necessitating substantial alteration of the original car structure, and which enhances rather than detracts from the appearance of the interior of the car. Another object is to provide apparatus of the above nature which efficiently and rapidly ventilates the car without causing unhealthful drafts in any particular locality, while maintaining a substantially even temperature throughout the car. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts as will be exemplified in the structure to be hereinafter described and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, in which are shown several of the various possible embodiments of my invention—

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

Figure 2 is a vertical sectional view taken along the line 2—2 of Figure 3;

Figure 3 is a vertical section of one of the air ducts forming a part of my apparatus;

Figure 4 is a sectional elevation taken along the line 4—4 of Figure 5;

Figure 5 is a fragmentary plan view of a portion of one wall of the air duct, portions thereof being broken away;

Figure 6 is a section taken along the line 6—6 of Figure 5;

Figure 7 is a section taken along the line 7—7 of Figure 2;

Figure 8 is a sectional perspective view of the upper portion of the interior of a railroad car in which a modification of my apparatus is installed;

Figure 9 is a fragmentary enlarged sectional elevation of a portion of one wall of the air duct shown in Figure 8;

Figures 10, 11 and 12 are an orthographic projection of one of the lower wall plates of the air duct wall;

Figures 13, 14 and 15 are an orthographic projection of an intermediate wall plate of the air duct wall; and,

Figures 16, 17 and 18 are an orthographic projection of a top plate of the air duct wall.

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

In providing ventilating apparatus for railroad cars, difficulty is encountered in many cases in installing the apparatus in the car without materially altering the original car structure. In other instances, the installation of such apparatus detracts from the appearance of the car interior and takes up an undue amount of space therein. Still other installations result in unhealthful and uncomfortable drafts on the passengers, and cause non-uniform air distribution and uneven temperature conditions in various localities of the car. It is accordingly another of the several objects of this invention to provide ventilating apparatus in which the several difficulties mentioned hereinabove, as well as many others, are successfully overcome.

Referring now to the drawings, and Figure 1 in particular, a railroad car, generally indicated at 10, having the usual seats 11, has located preferably at one end thereof an air conditioning unit 12, provided with a suitably screened inlet or recirculating port 13. Air conditioning unit 12 also has an outlet port 14 (Figure 3) which communicates directly with an air duct generally indicated at 15 (Figure 1) extending longitudinally of car 10 and preferably coextensive therewith. Duct 15 is located in an upper corner of the car, the other upper corner of the car being provided with a similar duct generally indicated at 16 which likewise communicates with air conditioning unit 12 by any suitable channel, duct or the like (not shown). As ducts 15 and 16 are substantially similar in construction and operation, duct 15 only will be described hereinafter.

As is more clearly shown in Figure 3, duct 15 is formed by portions of the car side wall 17 and car roof 18, these side wall and ceiling portions preferably being lined respectively with suitable insulating bodies, 19 and 20, the other side of the duct being generally indicated at 21. It may be seen, accordingly, that duct 15 is substantially triangular in shape, thus providing an efficient conduit for air flow while utilizing a minimum amount of space within the car. It should also

be noted that a triangular duct, having but three sides, substantially reduces heat loss by way of absorption through the duct walls.

At preferably regularly spaced intervals throughout the length of the car, I provide supports 22 (Figure 2), each preferably being channel shaped in cross section and having its lower end (see Figure 3) screwed to the wall of the car as by screws 22a. The upper end of support 22 has secured thereto in any suitable manner a bracket 22b, which is secured as by a nut and bolt 22c to the ceiling or roof of the car. Thus, each support 22 is securely anchored to the car and if the interior of the car is paneled, supports 22 may conveniently be positioned to coincide with such paneling, for a purpose noted hereinafter.

Preferably supports 22 are so positioned that the legs 22d (Figure 4) of each extend downwardly toward the floor of the car, and this for a purpose described hereinafter. Each adjacent pair of supports 22 has secured therebetween a suitable number of plates or panels 23 (Figures 2 and 3) the upper longitudinal edge of each plate being spaced from the lower edge of the adjacent upper plate to form openings 24 (Figure 3). Thus each adjacent pair of supports 22 and the plates 23 secured therebetween comprise what is hereinafter referred to as a section of the air duct 15, the complete duct accordingly comprising a plurality of sections as indicated at A, B, C, D, etc., in Figure 1.

The lateral or upwardly extending edges of plates 23 (Figures 2 and 4) have secured thereto in any suitable manner, as for example by spot welding, strips or brackets 25 (Figure 4), each provided with an upwardly projecting portion 25a and a top portion 25b. Portions 25a and 25b of bracket 25 are preferably fabricated to conform in shape to the side or leg 22d of support 22, against which bracket 25 rests; top portion 25b of the bracket preferably has a slot 25c formed therein to adjustably receive a screw 26 which is threaded into the body of support 22 to secure bracket 25 thereto. As is more clearly shown in Figures 2 and 3, bracket 25 is secured to support 22 by screws 26 at its upper and lower ends, thus securely holding plate 23 between adjacent supports 22.

Under certain circumstances, plates 23 (Figure 2) are so long as to necessitate intermediate support between supports 22. Accordingly, I provide a reinforcing member 27 between each pair of supports 22, and each of plates 23 is secured to member 27 as by screws 28 (see also Figure 1). Reinforcing member 27 is also preferably channel shaped but has its flat side down and its leg portions projecting upwardly, as viewed in Figure 2. The upper and lower ends of reinforcing member 27 are secured respectively in any suitable manner to the ceiling and side wall of the car, thus preventing vibration of plates 23.

Still referring to Figure 2, the upper edge of each plate 23, except the uppermost plate, has an air deflecting part 29 which may conveniently be a corrugated strip, the bottom portions 29a of which are secured in any suitable manner to plates 23. The lower edge of each plate 23, except the bottom-most plate, is provided with a curved projection generally indicated at 30 (Figures 3 and 6). Projection 30 comprises a curved portion 30a (Figure 6) overlying opening 24, a flat portion 30b overlying the upper edge of the adjacent plate and bearing against the tops 29b of corrugated strip 29 (Figure 2) and an upstanding portion 30c (Figures 3 and 6). Corrugated strip 29 and projection 30 effect an even flow of air from the interior of duct 15 through opening 24, substantially at right angles to the axis of the duct, thus directing the air downwardly into the car to circulate it therethrough.

It may now be seen that the bottom side 21 of air duct 15 is substantially coextensive with car 10 and presents a substantially flat surface, as plates 23 all lie in the same plane. It may also be seen that openings 24 are also substantially coextensive longitudinally of the car, and accordingly effect an even distribution of air therethrough. In order to produce a uniform flow of air into the car, I have found it preferable to block or close one or more of openings 24 in one or more of sections A, B, C, D, etc. Under certain circumstances it is preferable to close openings 24 in section A only. However, the amount of blocking of the openings should be proportioned at any particular location to produce the uniformity of air flow desired. Thus for example (Figure 6) strips of felt or heavy canvas 31 are secured to the upstanding portion 30c of projection 30 by a suitable securing plate 33 which clamps strips 31 in position; securing plate 33 is attached to portion 30c by cotter pins 32. Strip 31 thus effectively prevents air flowing through opening 24 in section A.

In order both to strengthen side 21 of duct 15 and also to enhance its appearance, I prefer to secure a cover strip 34 (Figures 1, 4 and 5) over the seam formed by the adjacent lateral edges of plates 23. As shown in Figures 4 and 5, cover strip 34 is substantially as wide as support 22 and has a hole through which a screw 35 is threaded into support 22. Where supports 22 coincide with the decorative paneling in the car, cover strips 34 accordingly carry out the decorative scheme. Preferably cover strip 34 (Figure 3) is secured to support 22 at each of openings 24 and the upper end of the strip is bent upwardly as at 34a (Figure 3) and lies against the upper end 23a of uppermost plate 23. A small bracket 96 is secured to the ceiling of the car by a screw 36 and this bracket presses bent portion 34a of cover strip 34 against the upper edge 23a of plate 23 to hold the strip and plate in place.

It may now be seen that air duct 15 is substantially unobstructed throughout its entire extent, as the height or thickness of supports 22 and reinforcing members 27 are negligible in comparison to the cross section area of the air duct. In this connection, it might be noted that projections 30 (Figure 7) and corrugated strips 29 are cut away intermediate adjacent supports 22 to allow reinforcing members 27 to fit flush against plates 23.

According to the dictates of a thermostat 37 (Figure 1) suitably positioned in car 10, conditioned air is forced from air conditioner 12 through outlet port 14 (Figure 3) into air duct 15. The conditioned air is forced longitudinally through the duct and is deflected substantially at right angles therefrom into openings 24 by corrugated strips 29. The conditioned air is, accordingly, forced directly downwardly into the car through which it is free to circulate, ultimately to be recirculated through inlet port 13. Thus an even distribution of air is effected throughout the car and a substantially even temperature is maintained therein. The triangular shape of ducts 15 and 16 does not appreciably cut down the head room in the car,

and the paneled appearance of side 21 of the ducts enhances, rather than detracts from the appearance of the car.

Referring now to Figure 8, in which is shown a modification of my ventilating apparatus, a car clerestory generally indicated at 40 has formed therein an air duct generally indicated at 41. Air duct 41 is formed by the top 42 and side walls 43 and 44 of clerestory 40, the other side of the duct comprising a curved wall or bottom generally indicated at 45. In effect, bottom 45 forms a false ceiling in the clerestory.

Generally speaking, duct wall 45 is formed by a plurality of curved plates 46, 47 and 48 which are secured at their opposite transverse edges to curved ribs or supports 49. Supports 49 are preferably U-shaped in cross section and are preferably regularly spaced from one another throughout the length of the car, thus being positioned generally in the manner of supports 22 (Figure 2). The opposite ends of each support 49 are secured in any suitable manner to clerestory walls 43 and 44. For example, they may be suitably supported on moldings 91 and 92.

Plates 46, 47 and 48, while generally similar, have different features of construction which particularly adapt them for the different positions they assume in wall 45. Thus plate 46, hereinafter called the lower plate (Figures 10, 11 and 12) comprises a curved body portion 50 along the opposite transverse edges of which are secured, as by welding for example, mounting brackets 51 and 52. Bracket 51 has a lower portion 53 (Figure 12) which is secured to the plate, an upstanding portion 54 and a top portion 55 having slots 56 (Figure 10) formed therein. Similarly, mounting bracket 52 includes bottom portion 57, upstanding portion 58, a top portion 59 and slots 97. Portions 54 and 58 of the brackets are preferably so formed as to fit snugly within channel shaped supports 49 in substantially the same manner as pointed out above with respect to brackets 25 and supports 22 (Figure 4). Thus when lower plate 46 is correctly positioned between adjacent supports 49, brackets 51 and 52 lie between the legs of the U-shaped support and are secured therein preferably by screws (not shown) extending through slots 56 and 97 and threaded into supports 49. It should also be noted that the lower edge 60 (Figure 10) of plate 46 is bent (see Figure 11) in order that a suitable rest or support may be provided for the plate when in assembled position. Preferably the upper horizontal edge 61 of plate 46 is lapped or folded over to increase the rigidity of the plate.

Plates 47, hereinafter referred to as intermediate duct wall plates comprise, as shown in Figures 13, 14 and 15, a body portion 62 along the opposite vertical edges of which are welded mounting brackets 63 and 64, these brackets being substantially similar to one another and to brackets 51 and 52 (Figures 10 and 12). Brackets 63 and 64 are shorter, however, than brackets 51 and 52 for a reason pointed out hereinafter. Thus brackets 63 and 64 have respectively portions 63*a* and 64*a* which may be welded or riveted to plate 47, upstanding portions 63*b* and 64*b*, and top portions 63*c* and 64*c*, having slots 70 and 71 to receive screws 72 (Figure 9) for securing the brackets to supports 49.

As may be seen in Figure 9, screws 72 extend through the slots 70 and 71 and into support 49, thus securing plate 47 in proper position. The lower longitudinal edge 65 of plate 47 (Figures 13 and 14) is preferably bent to receive a curved projection or air shield generally indicated at 66. Projection 66 is similar in many respects to projection 30 (Figure 6) but includes an edge portion 67 which is welded or riveted as desired to bent up edge 65 of plate 47. Projection 66 curves upwardly and away from its edge 67 to form a flattened top portion 68 and an upstanding edge 69 (see Figures 8 and 9). On the under side of portion 68 of projection 66 I weld or rivet an air distributor 73 (Figures 13 and 14) which may conveniently be corrugated in form and thus similar to distributor or air deflector 29, Figure 2.

It may now be seen that when plates 47 are secured to supports 49 in proper position (see Figure 8) adjacent and above plates 46, projection 68 overlaps or overlies the upper longitudinal edge of plate 46 so that air deflector or distributor 73 lies against edge 61 of plate 46. Under certain circumstances, it may be preferable to secure distributor 73 directly to edge 61 of plate 46 so as to prevent rattling or vibration therebetween. When plates 46 and 47 are so secured a space 74 (Figure 8) is formed between the plates to provide an air outlet from conduit 41 to the interior of the car.

As shown in Figure 8, two intermediate plates 47 are provided. It will be understood, however, that according to dimensional requirements any number of intermediate plates such as plate 47 may be used. Where more than one intermediate plate 47 is used, the relation between adjacent plates 47 is the same as the relation between plates 46 and 47, thus to provide an opening as for example opening 75 (Figure 8) between adjacent intermediate plates.

In order to facilitate the positioning and installation of plates 47, brackets 63 and 64 (Figures 13 and 14) are substantially shorter than the vertical edges of the plate so that the upper ends of the brackets are spaced below the top longitudinal edge of the plate. This spacing of the bracket end from the plate edge provides sufficient clearance to prevent air shield or projection 77 (Figure 16) of an adjacent plate 48 from abutting against the brackets.

The center portion of air duct wall 45 (Figure 8) is formed by top or center plates 48, the details of which are more clearly shown in Figures 16, 17 and 18. Thus top plate 48 is substantially similar to intermediate plate 47 and comprises a body portion 76, whose upper edge 77 is overlapped, and whose lower edge 78 has secured thereto an air shield or projection 79 which is substantially similar to shield or projection 66 (Figures 13 and 14). The opposite vertical edges of plate 48 have secured thereto slotted mounting brackets 80 and 81, substantially similar to brackets 63 and 64 (Figure 13) but extending substantially the full length of the vertical edges of plate 48. An air distributor or deflector 82, substantially similar to deflector 73 is riveted or welded to projection 79. Plate 48 is secured between adjacent supports 49 in the same manner as plates 46 and 47 as for example by screws 90 threaded into support 49, and accordingly the lower edge 78 (Figure 8) of plate 48 is spaced from the upper edge of adjacent plate 47 to provide an opening 83 between the plates. Also, projection or shield 79 of plate 48 overlies the upper edge of plate 47 so that distributor or air deflector 82 is correctly positioned with respect to opening 83.

As pointed out above, the upper edge 77 of

plate 48 is overlapped. This feature of construction stiffens the plate and provides a smooth edge for abutment against the similar edge of a similar plate to form a seam 84 which is preferably coincident with the center line of the clerestory 40.

It may now be seen that side 45 of conduit or air duct 41 is arcuate in shape and is built up in sections as for example sections M, N and O, each section comprising a plurality of curved plates whose adjacent longitudinal edges (with the exception of abutting edges of plates 48) are spaced from one another to provide openings through which air may flow from duct 41 into the car.

As in the case of duct wall 21 (Figure 3), I preferably provide on duct wall 45 (Figures 8 and 9) a concealing strip 85 to cover the seam where longitudinally adjacent plates are secured to support 49. Concealing strip 85 is accordingly arcuate in form and of substantially the same length as support 49 to which it is secured as by screws 86 or the like extending through openings 74, 75 and 83 and threaded into the support.

In operation duct 41 is connected to the air conditioning unit 12 (Figure 1) in the car in any suitable manner so as to receive conditioned air. Air thus forced into the duct flows longitudinally therethrough and is forced therefrom into the car interior through openings 74, 75 and 83 (Figure 8). It should be noted that the air is forced into the car from the duct substantially at right angles to the direction of air flow in the duct, this being affected by distributors or deflectors 73 and 82 on plates 47 and 48. Thus a uniform and even distribution of air is effected throughout the car and uncomfortable and unhealthful drafts in any locality in the car are avoided.

Accordingly it may be seen that I have provided ventilating apparatus in which the several objects noted hereinabove are achieved in a thoroughly efficient and practical manner.

As many possible embodiments may be made of the above invention and as many changes might be made in the embodiment above set forth, it is to be understood that all matter hereinbefore 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, a car having a wall and ceiling, means forming a conduit in said car, said means including a plurality of plate members all lying in the same plane and extending longitudinally of said car and extending upwardly from said wall of said car toward the ceiling thereof, a plurality of supporting elements each extending from said wall to said ceiling and spaced from one another longitudinally of said car and secured to said car, means securing said plate members to said supporting elements in spaced relationship to form an opening between adjacent longitudinal edges of said plate members, said opening extending longitudinally of the car, said conduit being substantially unobstructed throughout its entire extent to permit free passage of air longitudinally therethrough, and means for forcing air longitudinally through said conduit and through said opening into said car.

2. In railroad car construction, in combination, a car having a wall and a ceiling, means forming a conduit in said car, said means including a plurality of plate members all lying in the same plane and extending longitudinally of said car and extending upwardly from said wall of said car toward the ceiling thereof, a plurality of supporting elements spaced from one another longitudinally of said car and secured to said car, means securing said plate members to said supporting elements in spaced relationship to form an opening between adjacent longitudinal edges of said plate members, said opening extending longitudinally of the car, said conduit being substantially unobstructed throughout its entire extent to permit free passage of air longitudinally therethrough, an air shield secured to one of said plates and extending therefrom over said opening, and means for forcing air longitudinally through said conduit and through said opening into said car.

3. In railroad car construction, in combination, a car having a wall and a ceiling, means forming a conduit in said car, said means including a plurality of plate members all lying in the same plane and extending longitudinally of said car and extending upwardly from said wall of said car toward the ceiling thereof, a plurality of supporting elements spaced from one another longitudinally of said car and secured to said car, means securing said plate members to said supporting elements in spaced relationship to form an opening between adjacent longitudinal edges of said plate members, said opening extending longitudinally of the car, said conduit being substantially unobstructed throughout its entire extent to permit free passage of air longitudinally therethrough, an air shield secured to one of said plates and extending therefrom over said opening, an air deflector secured to said air shield, and means for forcing air longitudinally through said conduit and through said opening into said car.

4. In vehicular construction, in combination, a car, an air conduit disposed in one of the upper corners of said car and having a substantially triangular cross section, said conduit including a side formed by at least two plates whose adjacent longitudinal edges are spaced to provide a longitudinal opening therebetween, means secured to one of said plates adjacent said opening to deflect air flowing through said conduit substantially at right angles to its direction of flow, and means secured to one of said plates adjacent said opening to direct said deflected air flow downwardly into said car.

5. In apparatus of the nature described, in combination, a room, means forming an air duct in said room, one side of said duct comprising a plurality of flat plate members spaced to form a plurality of parallel openings therebetween, one of said plate members including an air deflecting portion projecting out of the general plane thereof to overlie a portion of the adjacent plate member and the opening formed therebetween to deflect air downwardly from said plate member, and means for forcing air through said air duct and said openings.

6. In vehicular construction, in combination, a car having a wall and ceiling, means forming an air duct in said car including a plurality of sections extending from said wall to said ceiling, each of said sections comprising a plurality of plate members lying in one plane and secured therein in spaced relationship to form openings between adjacent plate members, insulating means blocking at least one of the openings in one of said sections, and means for forcing air into said air duct.

7. In railroad car construction, in combina-

tion, a car having side walls, means forming a conduit in said car, said means including a plurality of curved plate members extending longitudinally of said car and extending from one wall of said car to the opposite wall thereof, a plurality of curved supporting elements spaced from one another longitudinally of said car and secured to the opposite walls thereof, means securing said plate members to said supporting elements in spaced relationship to form an opening between adjacent longitudinal edges of said plate members, said opening extending longitudinally of the car, said conduit being substantially unobstructed throughout its entire extent to permit free passage of air longitudinally therethrough, means for forcing air longitudinally through said conduit and through said opening into said car, and air deflecting means associated with said plate members adjacent said opening for deflecting air through said opening downwardly into said car.

8. In vehicular construction, in combination, a car having vertical sides and a roof, a plurality of supports extending from one side of said car to the other and secured thereto, a plurality of plate members secured to said supports to form with portions of the car sides and roof a longitudinal conduit in the car, adjacent edges of said plates being spaced to form openings in said conduit longitudinally of the car, and means for forcing air through said conduit and through said openings into said car.

9. In vehicular construction, in combination, a car having vertical sides and a roof, a plurality of curved supports extending from one side of said car to the other and secured thereto, a plurality of curved plate members secured to said supports to form with portions of the car sides and roof a longitudinal conduit in the car, adjacent edges of said plates being spaced to form openings in said conduit longitudinally of said car, and means for forcing air through said conduit and through said openings into said car.

10. In vehicular construction, in combination, a car, means forming an air duct in said car, one side of said duct comprising a plurality of elongated flat plate members lying in a single plane extending longitudinally of said car, said flat plate members being spaced to form a plurality of parallel longitudinal openings extending longitudinally of said car, the lower edges of said plate members including air deflecting portions projecting out of the general plane of said plates, said air deflecting portions overlying a portion of the adjacent plate member and the opening formed therebetween to deflect air downwardly from said openings, and means for forcing air through said air duct and said openings.

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