

Feb. 8, 1938.

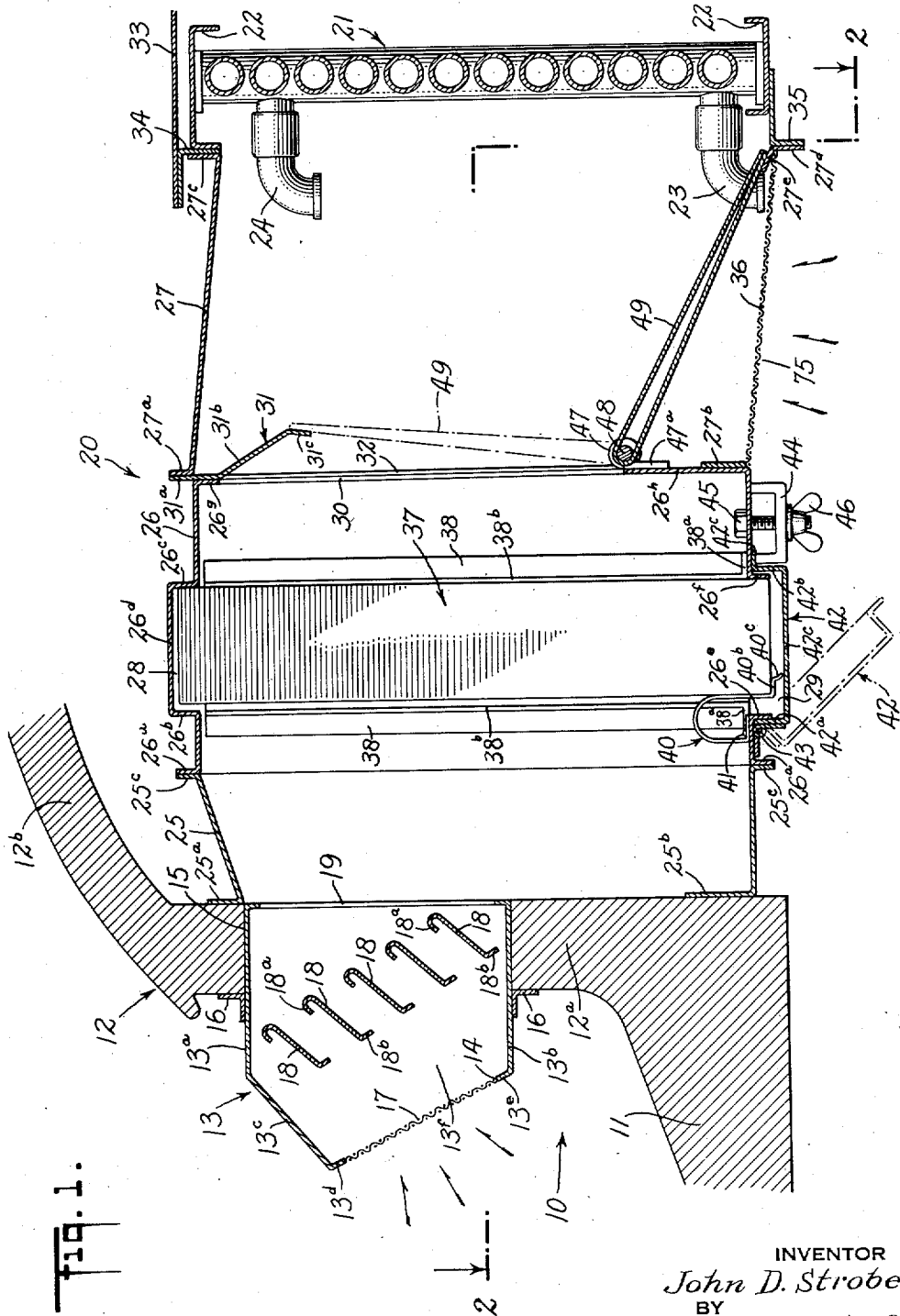
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2,107,653

AIR FILTER FOR RAILROAD CARS

Filed Sept. 12, 1935

2 Sheets-Sheet 1



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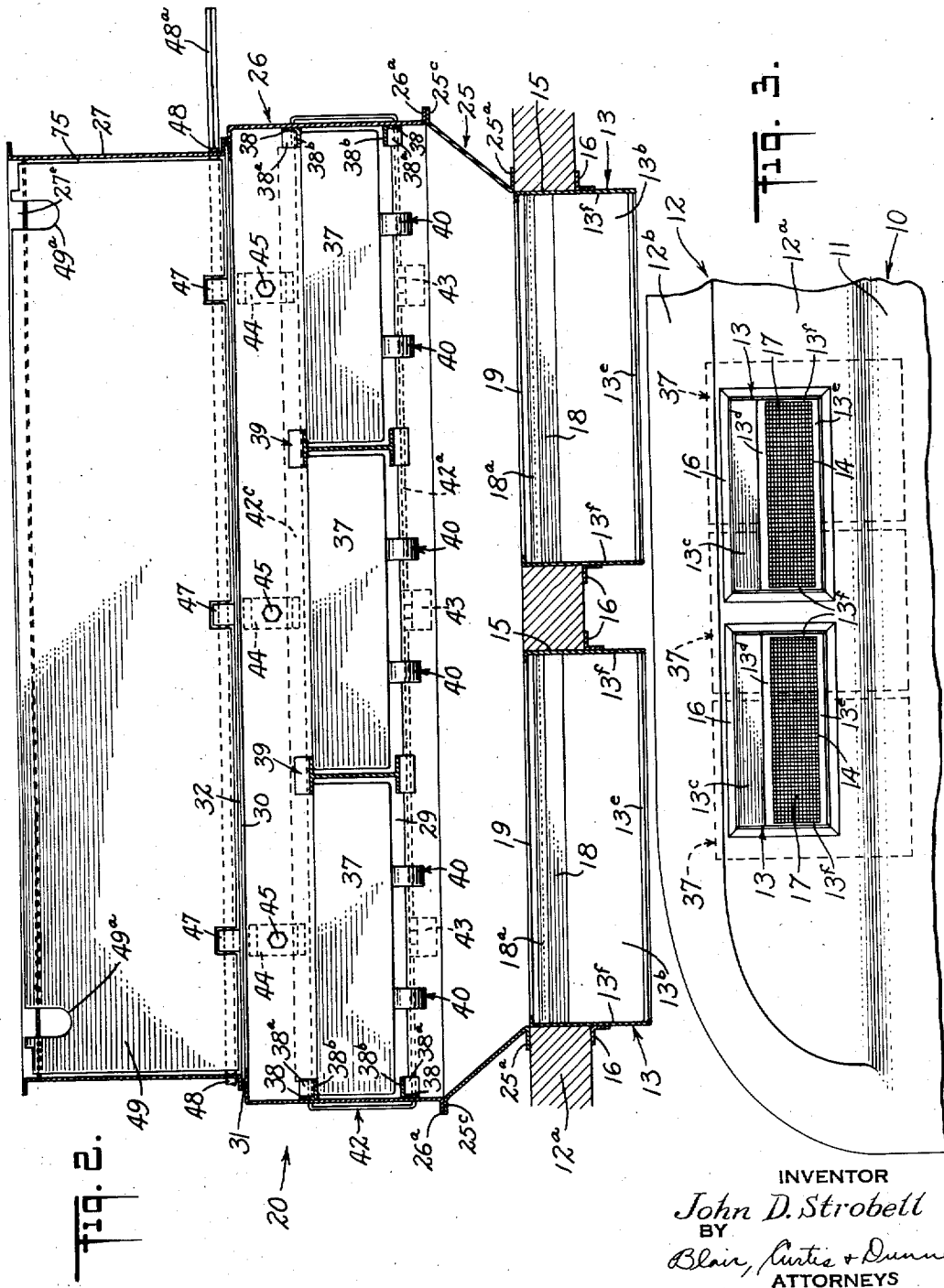
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UNITED STATES PATENT OFFICE

2,107,653

AIR FILTER FOR RAILROAD CARS

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Application September 12, 1935, Serial No. 40,217

10 Claims. (Cl. 183—41)

This invention relates to an air filtering apparatus and more particularly to apparatus of this general character designed for use as a fresh air inlet for railroad cars or the like.

One of the objects of this invention is to provide an air filtering apparatus of simple and sturdy construction and marked operating efficiency. Another object is to provide apparatus of the above nature which can be easily and quickly installed in railroad cars or the like of standard construction without material alterations thereof. Another object is to provide apparatus of the above nature capable of filtering a large quantity of air although occupying but a small amount of space within the car. Another object is to provide apparatus of the above nature having filtering units which are readily accessible and easily removed for replacement or the like. 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, 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 is shown one of the various possible embodiments of my invention,

Figure 1 is a vertical section of my fresh air inlet filtering apparatus installed in a railroad car, certain portions of the car being broken away;

Figure 2 is a reduced horizontal sectional view of a portion of the apparatus shown in Figure 1 taken along the line 2—2 thereof; and

Figure 3 is a reduced side elevation of a portion of the railroad car in which my filter is installed.

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

In order that certain features of this invention may be more easily comprehended, it might first be pointed out that air filters such as are used on railroad cars have, in many instances, been a source of inconvenience and expense not only in the installation but also in subsequent maintenance. The capacity of many of these filters is often inadequate for the fresh air requirements of the car and, in many instances, do not properly filter dust and cinders from the incoming air. Space is at a premium on a railroad car and the filtering equipment should, therefore, be as compact as possible. Further

difficulties are encountered in installing the filter units themselves and removing them for replacement. The filtering units per se must be removed every so often for cleaning. In present constructions, these units are often in poor locations difficult to reach thus necessitating additional labor when replacements are made. Another object of this invention is to provide an air filtering apparatus in which the above difficulties in addition to many others are overcome in a thorough and efficient manner.

Referring now to the drawings and more particularly to Figure 3, a railroad car generally indicated at 10 has the usual roof portion 11 from which a clerestory generally indicated at 12 extends, the clerestory comprising vertical side walls 12a and a top or roof 12b. In the side walls 12a (Figure 3) of clerestory 12 preferably near one end of the car, I provide a suitable number of enclosures generally indicated at 13, two enclosures being shown herein by way of illustration; these enclosures form fresh air inlet ports 14.

As is more clearly shown in Figure 1, clerestory side wall 12a is provided with an opening 15 in which enclosures 13 are mounted and held in position preferably by suitable brackets 16 or the like secured to side wall 12a, and top 13a and bottom 13b of the enclosures. Preferably enclosures 13 are provided with an outwardly and downwardly extending front wall portion 13c which has a flange 13d. Bottom wall 13b of the enclosures is provided with a similar flange 13e and preferably extending between and secured to flanges 13d and 13e are suitable screens 17 or the like; screens 17 are also secured to the side walls 13f (Figure 3) of enclosures 13.

A plurality of louvers 18 are desirably secured to side walls 13f (Figure 1) thus bridging the space therebetween (Figure 1). Louvers 18 preferably slope downwardly as viewed in Figure 1 and are preferably arranged in staggered relation. Each of louvers 18 is provided with an overlapping edge 18a and a downwardly depending flange 18b to impede the passage of moisture and cinders through the enclosures. Screens 17 preferably have a mesh small enough to prevent the entrance of larger cinders and other foreign particles but not so small as to materially hinder the normal passage of air therethrough. Accordingly the inner side enclosures 13 (Figure 1) form fresh air inlet ports 19 for car 10.

Still referring to Figure 1, an air duct generally indicated at 20 is connected at one end to fresh air inlet port 19 and at its other end to suitable air conditioning apparatus generally indicated 55

at 21; apparatus 21 may be supported between brackets 22 or the like which are secured to the car frame in any suitable manner. Apparatus 21 preferably includes heating and cooling coils 5 connected to the steam pipes (not shown) of the car and to suitable cooling equipment (not shown) by suitable pipe connections 23 and 24.

Air duct 20 preferably has a larger sectional area than air inlet ports 19 and the top of the 10 air duct is preferably secured to the inside of the side wall 12a (Figure 1) at a point adjacent the top of inlet ports 19 whereas the bottom of the air duct is secured to the wall at a point spaced substantially therebelow. Air duct 20 15 preferably comprises an outer section 25, an intermediate section 26, and an inner section 27.

Outer section 25 preferably is provided with flanges 25a and 25b which are secured to wall 12a of the car and a flange 25c secured in any suitable manner, for example by spot welding, to a 20 flange 26a on one side of intermediate section 26. Section 26 is also provided with upwardly extending portions 26b and 26c joined along the top by a portion 26d to form a recessed section 28 the 25 purpose of which will be described hereinafter.

Extending from the bottom of intermediate section 26 are flanges 26e and 26f, these two flanges bordering opening 29 preferably in registry with recess 28. The inner end of intermediate 30 section 26 has an opening 30 formed by a top flange 26g and a relatively large upwardly extending bottom flange 26h.

Still referring to Figure 1, inner section 27 is provided with outer flanges 27a and 27b, flange 35 27b being secured in any suitable manner as by spot welding to bottom flange 26h of intermediate section 26. Interposed between sections 26 and 27 I provide a plate or the like generally indicated at 31, this plate having a portion 31a disposed 40 between and secured to flanges 26g and 27a of sections 26 and 27, respectively. The bottom portion of plate 31 is secured in any suitable manner to bottom flange 26h of section 26, plate 31 also having an opening 32 preferably in registry 45 with and corresponding in size to opening 30 in section 26. A portion 31b of plate 31 slopes downwardly and away from opening 32 terminating in a flange or stop portion 31c. The inner end of inner section 27 is flanged as at 27c and 50 27d, section 27 also having another flange or stop 27e for a purpose to be described hereinafter.

A support plate 33 (Figure 1), which may conveniently be a part of the cabinet (not shown) in which a part of the cooling equipment is located, 55 has secured thereto a bracket 34 secured in turn to flange 27c of inner section 27. Lower flange 27d of section 27 is secured to another bracket 35 and brackets 34 and 35 are preferably secured to and assist in supporting brackets 22 60 which in turn support the conditioning element 21. Section 27 is preferably open substantially throughout the bottom portion thereof as viewed in Figure 1 and this opening 75, desirably in communication with the interior of the car, is preferably covered by a screen 36 or the like. 65

It will thus be seen that fresh air inlet ports 19 communicate with air duct 20 to direct air to conditioning element 21 after being suitably mixed with recirculated air entering through 70 opening 75, all as will be more fully explained hereinafter.

Referring now to Figure 2, it may be seen that air duct 20 is preferably wider than inlet ports 19 and houses within intermediate section 26 75 thereof a plurality of filter units generally indi-

cated at 37. While any suitable number of filter units may be provided, I have shown three by way of illustration. Thus the end units of the set of three are slidably received in supporting channels formed by bracket members 38 secured 5 to opposite sides of intermediate section 26 and channel members generally indicated at 39 secured to the top and bottom of intermediate section 26 and preferably equidistantly spaced from the opposite sides of the section and from each 10 other. Thus channel members 39 conveniently provide a third supporting channel which slidably receives the intermediate filtering unit 37 of the set of three.

As is more clearly shown in Figure 1, side 15 brackets 38 extend substantially throughout the height of intermediate section 26 and are provided with bottom web portions 38a (see also Figure 2) which are suitably secured to the bottom of section 26 adjacent opening 29 (Figure 1). 20 Brackets 38 are also provided with guide flanges 38b (Figures 1 and 2) which face each other to cooperate with channel members 39 to guide and hold filter units 37.

The top of filter units 37 conveniently fit with- 25 in recess 28 formed in the top of section 26. Spring clip members generally indicated at 40 are substantially U-shaped (Figure 1) and have one leg secured, as by rivets 41, to the bottom of section 26. The other leg of U-shaped spring mem- 30 bers 40 have flanges 40b and a finger engaging portion 40c extends therefrom. Thus spring members 40 may be compressed in a left hand direction as viewed in Figure 1 to permit the 35 insertion of filter units 37 between guide brackets 38 and channel members 39, and when the filter unit is in position spring member 40 may be released to snap over with flange 40b thereof fitting under the units 37 to hold them in position.

Thus, as shown in Figure 2, spring members 40 40 are provided for the support of each of filter units 37 and channel members 39 cooperate with guide brackets 38 to guide units 37 into and out of operative position. Thus the units may be easily installed and removed and are securely 45 held in position after installation.

Filter units 37 may be of any suitable construction and, as is more clearly shown in Figure 1, are not only substantially spaced from air inlet ports 19 but are considerably greater in 50 surface area than ports 19. To further adequately support filter units 37 I provide a closure member generally indicated at 42. Closure 42 is preferably secured to a plurality of hinges 43 which are in turn attached to the bottom of intermediate section 26 (Figure 1). As is more 55 clearly shown in Figure 2, hinges 43 are each preferably centrally disposed with respect to filter units 37. Thus closure 42 extends completely across opening 29 (Figure 1) in the bottom 60 of section 26 and is preferably channel shaped (Figure 1) having side portions 42a and 42b connected by a bottom portion 42c. When closure 42 is in a closed position, portion 42a thereof preferably rests against flange 26e of section 26 65 whereas portion 42b is preferably slightly spaced from flange 26f of section 26. A flange 42c extends at right angles from portion 42b of the closure and rests against the bottom of section 26 when the closure is in the closed position. 70

To hold the closure 42, as shown in the full line position in Figure 1, closed I provide a plurality of substantially U-shaped securing brackets 44 suitably spaced along section 26 (Figure 2) and having a leg positioned to engage portion 75

42c of the closure; suitable bolts 45 extend through the bottom of section 26 and through brackets 44, the bolts being provided with a wing nut 46. Thus when wing nuts 46 are tightened against brackets 44, the legs thereof engage portion 42c of closure 42 and the bottom of section 26 respectively to hold the closure in a closed position. Upon loosening wing nuts 46, securing brackets 44 may be moved out of their securing position and closure 42 swung downwardly into the dotted line position shown in Figure 1, thus permitting access to filter units 37.

Referring now to Figures 1 and 2, I provide a plurality of eyelets 47 which have base portions 47a secured to bottom flange 26b of intermediate section 26 substantially adjacent opening 30. As is best shown in Figure 2, a rod 48 extends through eyelets 47 and is secured to a damper 49 in any suitable manner. Preferably one end 48a of rod 48 extends from section 27 (Figure 2) and is provided with suitable gripping surfaces for any suitable handle or operating mechanism (not shown). Damper 49 is preferably provided with suitable openings 49a; thus when the damper is in its bottom-most position and resting against stop or flange 27e (Figure 1), its pipes 23 may protrude therethrough. When the damper is in its topmost position (the dotted line position in Figure 1) it rests against stop or flange 31c on plate 31. Thus it may be seen that damper 49 may be operated to shut off completely the inflow of fresh air flowing through fresh air inlet ports 19 and thence through opening 30, or to shut off recirculated air coming through screen 36 (Figure 1). Furthermore, the damper may occupy any desired intermediate position to provide the desired mixture of fresh and recirculated air, all according to the requirements within the car. It will be noted that thermostatically controlled mechanism may be connected to rod 48 to control the position of damper 49 automatically.

It may now be seen that as fresh air enters enclosure 13 (Figure 1) through screen 17, it passes between the interstices of louvers 18 and any large particles not stopped by screen 17 and some of the moisture which may have passed therethrough impinges against the louvers and drops therefrom to the bottom of enclosure 13. When, however, finer particles of dust or foreign matter flow with the air through ports 19, they are filtered out as the air passes through filter units 37. Thence the filtered air passes in varying amounts through openings 30 and 32, according to the position of damper 49, into section 27 where the fresh air and recirculated air is mixed and directed through conditioning element 21 from whence it passes into the car. It will thus be seen that the effective surface of filter units 37 is substantially larger than the area of inlet ports 19. Hence the filter units 37 can accommodate all the air entering the car by way of the inlet ports and may be used for a greater length of time before removal for cleaning becomes necessary. Furthermore, it will be seen that this apparatus is compact so that it may occupy a small amount of space in the car. Further still, the filter units 37 may be easily replaced by opening closure 42 and releasing spring catches 40 as explained more fully above.

Accordingly I have provided an air filter apparatus which is thoroughly practical and efficient in operation and in which the several objects hereinabove set forth in addition to many others are successfully achieved.

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 apparatus of the character described, in combination, a car having a clerestory, means forming an air inlet port in said clerestory, an enclosure within said car opening into said port, means forming an outlet from said enclosure, means forming an inlet port from the interior of said car into said enclosure adjacent said outlet, and a single damper disposed within said enclosure adjacent said inlet port and said last-mentioned outlet and adapted to regulate the mixture of air which has entered from said port and said opening before it exits from said enclosure.

2. In apparatus of the character described, in combination, means forming an enclosure, means forming a plurality of air inlet ports into said enclosure, said enclosure having a plurality of channels running substantially parallel to said ports, a filter unit disposed in each of said channels, a damper hingedly connected to said enclosure and located on the far side of said units with respect to said ports to regulate the passage of air through said filter units, and a plurality of catch members connected to said enclosure and adapted to hold said filter units in said position.

3. In apparatus of the character described, in combination, a car having a roof, a clerestory extending from said roof, means forming a fresh air inlet port in said clerestory, a plurality of louvers disposed within said port, said louvers being formed and arranged to permit the free passage of air therebetween and to impede the passage of foreign particles and moisture, an air duct in said car connected to said inlet port, filter units in said air duct across the path of air flowing from said port and having a capacity at least as great as that of said port, a damper member associated with said enclosure and operable to control the amount of air flowing therethrough, and an air conditioning element arranged and positioned to condition the air flowing through said enclosure from said units.

4. In apparatus of the character described, in combination, a car having a roof, a clerestory extending from said roof, means forming a fresh air inlet port in said clerestory, a plurality of louvers disposed within said port, said louvers being formed and arranged to permit the free passage of air therebetween and to impede the passage of foreign particles and moisture, an air duct in said car connected to said inlet port, filter units in said duct across the path of air flowing from said port and having a greater surface area than the area of said port, resilient catch means in said duct to hold said units in position, and an air conditioning member in said enclosure and located to receive said air after it passes through said filter units.

5. In apparatus of the character described, in combination, a railroad car having an air inlet port formed therein, means forming a conduit having one end connected to said port, air conditioning apparatus located substantially at the opposite end of said conduit, air filter means disposed in said conduit and blocking the path of air flowing from said port to said apparatus so that

the air must pass therethrough, means forming another air inlet port into said conduit from the interior of said car and located on the far side of said air filter means with respect to said first-mentioned port, and means associated with said conduit and shaped to regulate the flow of air to said air conditioning apparatus from both of said ports.

6. In apparatus of the character described, in combination, a railroad car having an air inlet port formed therein, means forming a conduit having one end connected to said port, air conditioning apparatus located substantially at the opposite end of said conduit, air filter means disposed in said conduit and blocking the path of air flowing from said port to said apparatus so that the air must pass therethrough, means forming another air inlet port into said conduit from the interior of said car and located on the far side of said filter means with respect to said first-mentioned port, and damper means disposed between said filter means and said second-mentioned inlet port and shaped to regulate the flow of air to said air conditioning apparatus from both of said ports, said filter means having a capacity at least as great as that of said first-mentioned inlet port.

7. In apparatus of the character described, in combination, a railroad car having an air inlet port formed therein, means forming a conduit having one end connected to said port, air conditioning apparatus located substantially at the opposite end of said conduit, air filter means disposed in said conduit adjacent to but spaced from said air inlet port, said filter means being adapted to block the path of air flowing through said inlet port and said conduit so that the air must pass through said filter means, means for introducing vitiated air from the interior of the car into said conduit and means in said conduit located on the far side of said filter means with respect to said inlet port for varying at will the amount of fresh and vitiated air flowing to said air conditioning apparatus.

8. In apparatus of the character described, in combination, a car, means forming a fresh air inlet port in a wall of said car, an air duct in said car connected to said inlet port, means forming a port associated with said air duct to accommodate the passage of fresh air, means forming a port in said air duct for recirculated air, and a damper member operatively associated with said air duct and operable to close said fresh air port or said recirculated air port, said damper member also being operable to assume various positions between said fresh air port and said recirculated air port whereby the amounts of fresh air and recirculated air passing said damper member may be controlled at will.

9. In apparatus of the character described, in combination, a car, means forming a fresh air inlet port in a wall of said car, an air duct in said car connected to said inlet port, means forming a port associated with said air duct to accommodate the passage of fresh air, means forming a port in said air duct for recirculated air, a damper member operatively associated with said air duct and operable to close said fresh air port or said recirculated air port, said damper member also being operable to assume various positions between said fresh air port and said recirculated air port whereby the amounts of fresh air and recirculated air passing said damper member may be controlled at will, and air filter means in said air duct positioned to filter fresh air before it flows through said fresh air port.

10. In apparatus of the character described, in combination, means forming an air conduit having a fresh air inlet at one end, means forming a port associated with said conduit to accommodate the passage of fresh air, means associated with said inlet for removing relatively large foreign particles from the air as it enters said inlet, means operatively associated with said conduit for removing relatively minute foreign particles from the air flowing through said inlet, means for altering the temperature of the air flowing from said conduit, means for introducing vitiated air into said conduit from the interior of said car, and a damper operatively associated with said conduit and operable to close said fresh air port or said last-mentioned means, said damper member also being operable to assume various positions between said outlet fresh air and said last-mentioned means whereby the amounts of fresh air and vitiated air passing said damper may be controlled at will.

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CERTIFICATE OF CORRECTION.

Patent No. 2,107,653.

February 8, 1938.

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It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 41, for "upport" read support; page 3, second column, line 17-18, claim 1, strike out the word "last-mentioned" and insert the same before "inlet", line 17; page 4, second column, line 45, claim 10, for the words "outlet fresh air" read fresh air port; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 22nd day of November, A. D. 1938.

Henry Van Arsdale

(Seal)

Acting Commissioner of Patents.

the air must pass therethrough, means forming another air inlet port into said conduit from the interior of said car and located on the far side of said air filter means with respect to said first-mentioned port, and means associated with said conduit and shaped to regulate the flow of air to said air conditioning apparatus from both of said ports.

6. In apparatus of the character described, in combination, a railroad car having an air inlet port formed therein, means forming a conduit having one end connected to said port, air conditioning apparatus located substantially at the opposite end of said conduit, air filter means disposed in said conduit and blocking the path of air flowing from said port to said apparatus so that the air must pass therethrough, means forming another air inlet port into said conduit from the interior of said car and located on the far side of said filter means with respect to said first-mentioned port, and damper means disposed between said filter means and said second-mentioned inlet port and shaped to regulate the flow of air to said air conditioning apparatus from both of said ports, said filter means having a capacity at least as great as that of said first-mentioned inlet port.

7. In apparatus of the character described, in combination, a railroad car having an air inlet port formed therein, means forming a conduit having one end connected to said port, air conditioning apparatus located substantially at the opposite end of said conduit, air filter means disposed in said conduit adjacent to but spaced from said air inlet port, said filter means being adapted to block the path of air flowing through said inlet port and said conduit so that the air must pass through said filter means, means for introducing vitiated air from the interior of the car into said conduit and means in said conduit located on the far side of said filter means with respect to said inlet port for varying at will the amount of fresh and vitiated air flowing to said air conditioning apparatus.

8. In apparatus of the character described, in combination, a car, means forming a fresh air inlet port in a wall of said car, an air duct in said car connected to said inlet port, means forming a port associated with said air duct to accommodate the passage of fresh air, means forming a port in said air duct for recirculated air, and a damper member operatively associated with said air duct and operable to close said fresh air port or said recirculated air port, said damper member also being operable to assume various positions between said fresh air port and said recirculated air port whereby the amounts of fresh air and recirculated air passing said damper member may be controlled at will.

9. In apparatus of the character described, in combination, a car, means forming a fresh air inlet port in a wall of said car, an air duct in said car connected to said inlet port, means forming a port associated with said air duct to accommodate the passage of fresh air, means forming a port in said air duct for recirculated air, a damper member operatively associated with said air duct and operable to close said fresh air port or said recirculated air port, said damper member also being operable to assume various positions between said fresh air port and said recirculated air port whereby the amounts of fresh air and recirculated air passing said damper member may be controlled at will, and air filter means in said air duct positioned to filter fresh air before it flows through said fresh air port.

10. In apparatus of the character described, in combination, means forming an air conduit having a fresh air inlet at one end, means forming a port associated with said conduit to accommodate the passage of fresh air, means associated with said inlet for removing relatively large foreign particles from the air as it enters said inlet, means operatively associated with said conduit for removing relatively minute foreign particles from the air flowing through said inlet, means for altering the temperature of the air flowing from said conduit, means for introducing vitiated air into said conduit from the interior of said car, and a damper operatively associated with said conduit and operable to close said fresh air port or said last-mentioned means, said damper member also being operable to assume various positions between said outlet fresh air and said last-mentioned means whereby the amounts of fresh air and vitiated air passing said damper may be controlled at will.

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