

(No Model.)

3 Sheets—Sheet 1.

S. G. CURRY.
VENTILATION OF CARS.

No. 510,001.

Patented Dec. 5, 1893.

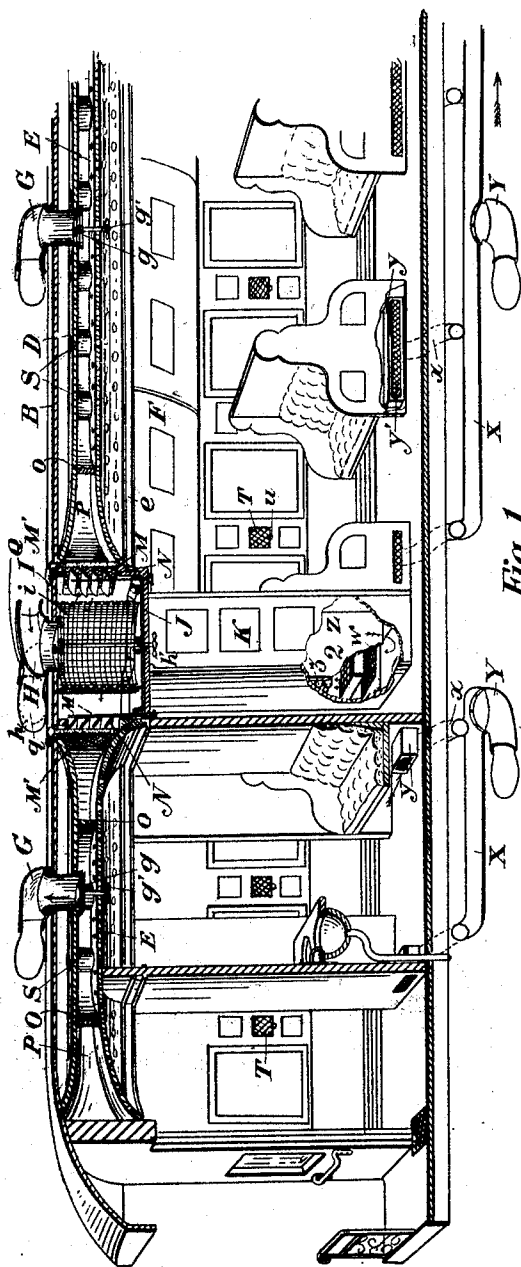


Fig. 1.

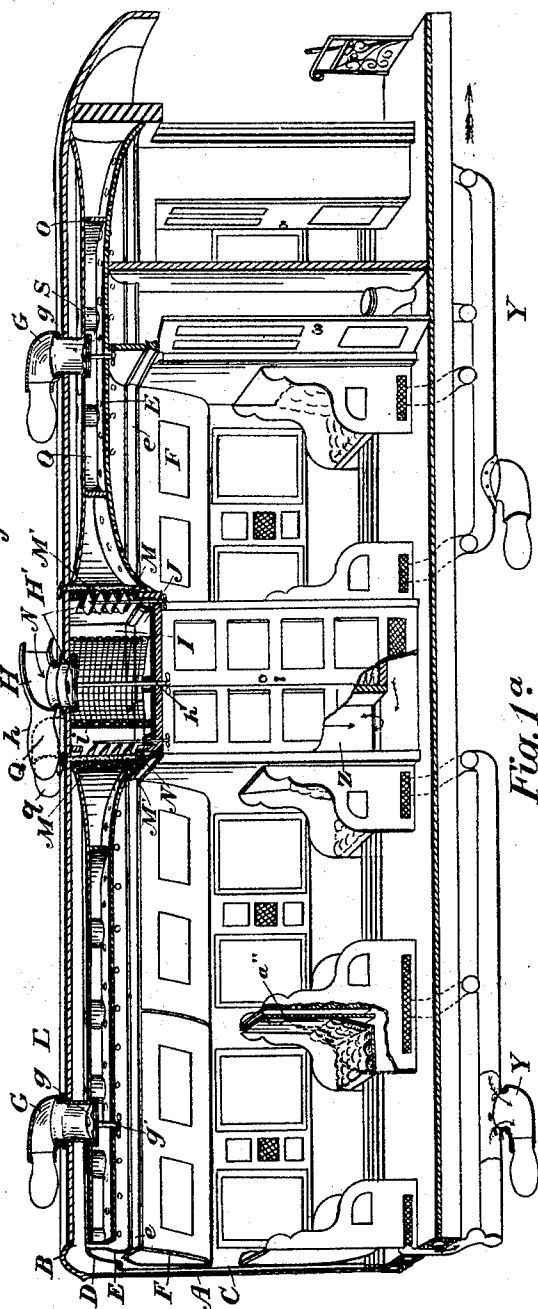


Fig. 1a.

Witnesses.

H. R. Case.
E. R. Case.

Inventor.

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by J. H. Sturtevant & Co
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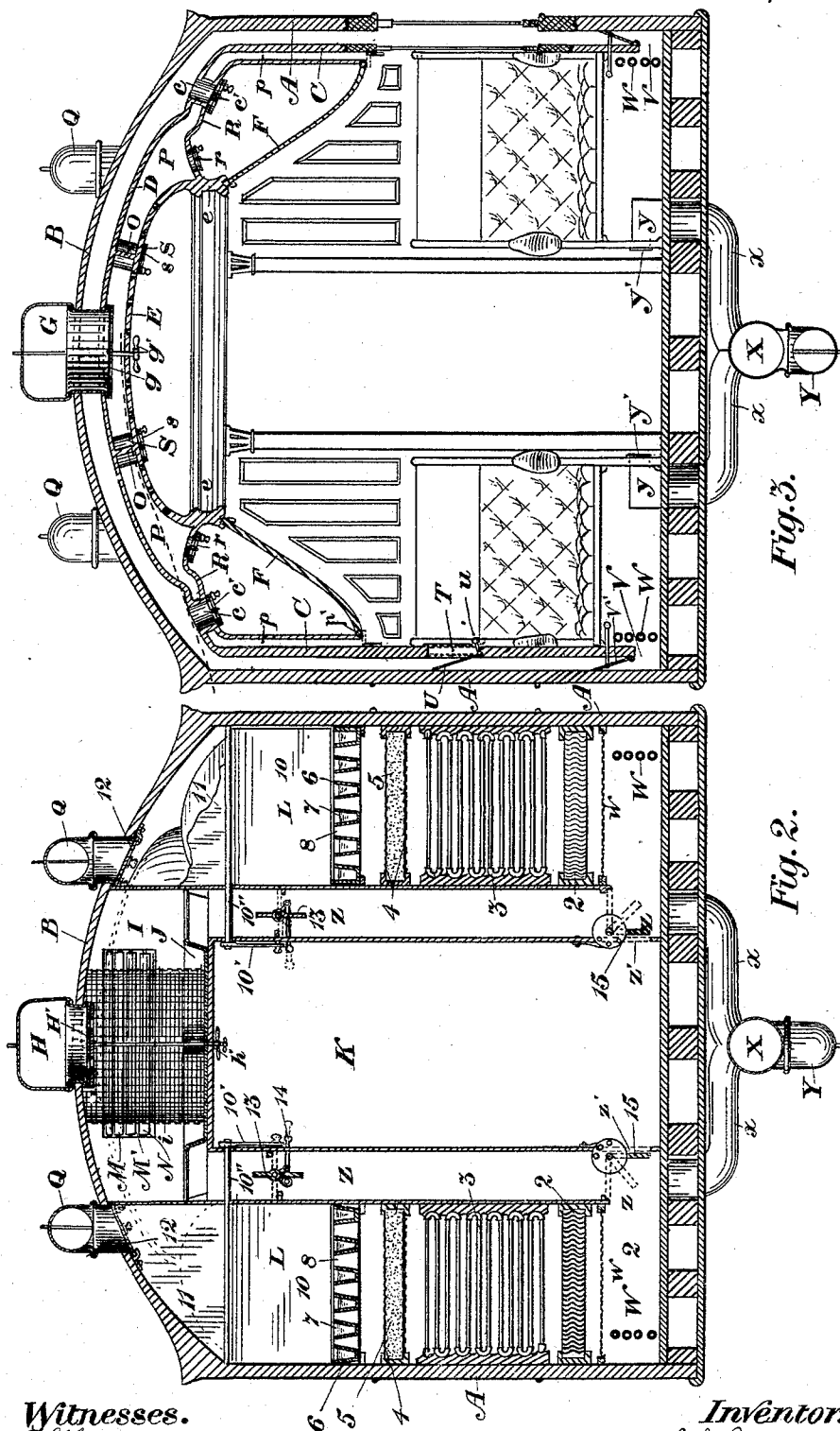
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Witnesses.
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(No Model.)

3 Sheets—Sheet 3.

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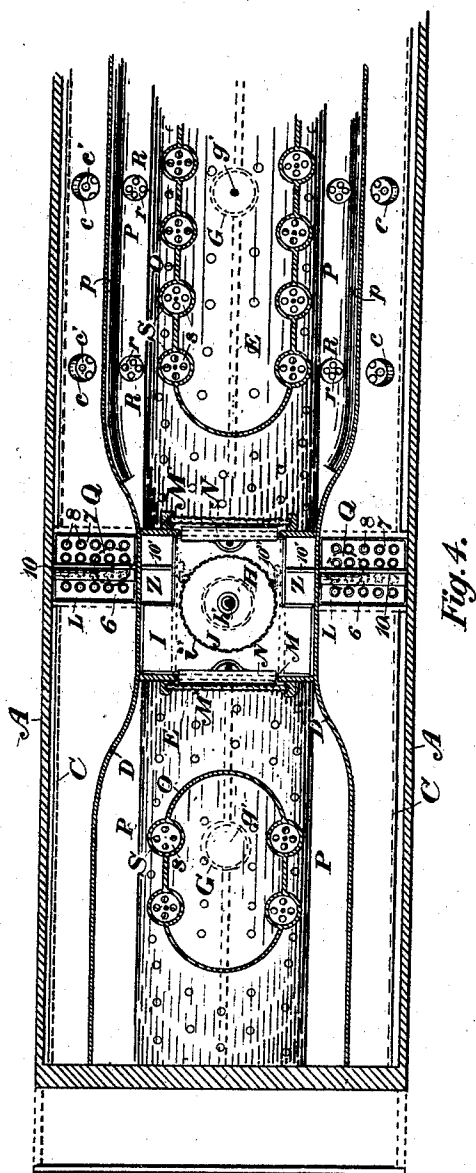


Fig. 4.

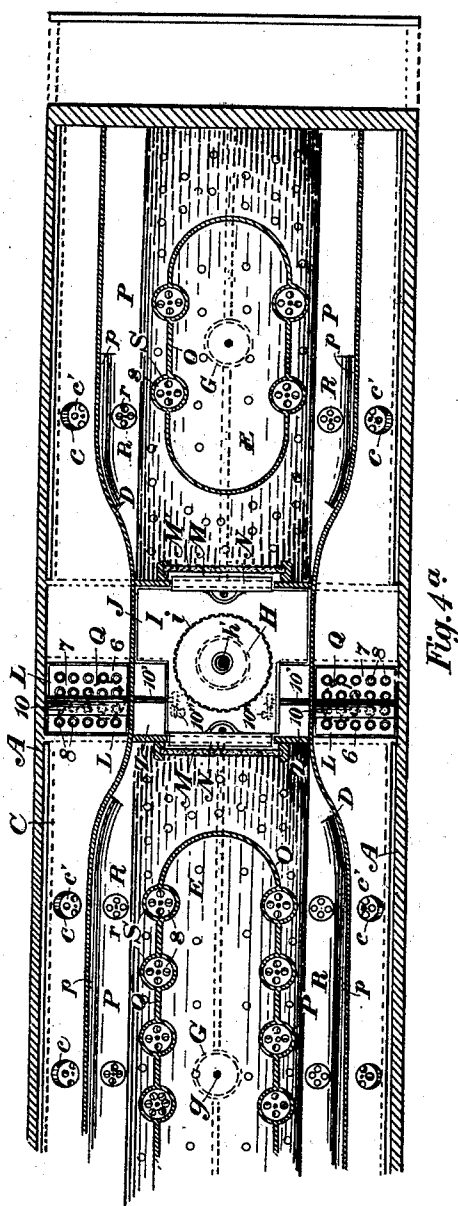


Fig. 4a.

Witnesses:
J. H. Young
C. R. Case

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UNITED STATES PATENT OFFICE.

SAMUEL GEORGE CURRY, OF TORONTO, CANADA.

VENTILATION OF CARS.

SPECIFICATION forming part of Letters Patent No. 510,001, dated December 5, 1893.

Application filed May 19, 1893. Serial No. 474,787. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL GEORGE CURRY, architect, of the city of Toronto, in the county of York, in the Province of Ontario, Canada, have invented certain new and useful Improvements in the Ventilation of Cars, of which the following is a specification.

My invention relates to improvements in the ventilation of cars more particularly sleeping cars and the object of the invention is to so construct a car that in winter time it may be thoroughly heated and ventilated and all vitiated air exhausted, so that the air of the car may be kept pure and all danger from drafts avoided and it consists essentially of forming the car with an inner and outer shell and supplemental roof shell and dividing it preferably into three compartments and furthermore in providing a system of heating and ventilation throughout the different compartments and operating in the manner hereinafter more particularly explained.

Figures 1, 1^a, show a perspective longitudinal section of a car in two views exhibiting the construction of my improved car. Fig. 2, is a cross section of the car through the heaters, purifying apparatus and inlet cowl. Fig. 3, is a cross section through the sleeping berth compartments of the car showing the upper berth closed. Figs. 4, 4^a, show a longitudinal plan through the line $x'-y'$.

In the drawings like letters and numerals of reference indicate corresponding parts in each figure.

A, is the outer wall of the car; B, the roof; C, the inner wall, and D, the inner roof, and E, the ceiling.

F, is the bottom board of the upper berth, which when the berth is raised as shown in Fig. 3, fits beneath the molding, e , made around the ceiling, E. The ceiling, E, is perforated as shown except that portion beneath the outlet cowls, G. The outlet cowl, G, is provided with a double disk damper, g , which is regulated by a rod, g' , extending from the ceiling, E, and provided with a handle as shown in Fig. 3.

I may here state that the car is supposed to be going in the direction indicated by arrow, so that the wing of the cowl is swung toward the now rear of the car.

H, is the inlet cowl through which the air

enters into the chamber, I, through the wire netting casing, i . At the bottom of the chamber is placed a pan, J, in which may be placed water which is designed to catch any dust, which may be brought in through the cowl, H. The netting casing, i , may be filled with ice. It will be seen on reference to the drawings that the chamber, I, is situated directly above the vestibules, K, to the sides of which are situated the heating compartments, L. Beneath the cowl, H, I pivot the circularly adjustable double disk damper, H', which is manipulated by means of the rod, h' , which extends down through the center of the compartment to a point about the center of the vestibule.

M, are openings made at each end of the chamber, I, and provided with slat dampers, N, which are manipulated through the rod n , extending down through the bottom of the chamber as shown.

M', are double wire netting screens situated inside the openings, M, and having placed between them light fluffy mineral wool particles which are large enough to be retained between the screens. These screens are provided to prevent the possibility of any dust escaping through the openings, M, and the passage-ways, P, into the car. The cowls, H, are swiveled as shown and provided with the usual wing, h .

O, are partitions which extend from between the inner roof and the ceiling, E, separating it into two passageways P, at each side of the partitions, O.

R, is the top paneling of the upper berth, which is provided with a double disk damper, r , connecting the spaces of the upper berths with the passage-ways, P.

c , are passage-ways leading from the spaces beneath the outer roof B, and inner roof, D, to the spaces above the upper berth, F. The passage-way, c , is provided with a double disk damper, c' .

p , are passage ways leading from the passage-ways, P, to a point above the seats or lower berth. These passage-ways are intended for the ventilation of the lower berths when the upper berths are lowered, particularly for the supply of fresh air.

Q, are cowls secured on the roof immediately above the heating chambers, L, (see

dotted circles in Figs. 1 and 1^a, and full lines in Figs. 1, 1^a, 2, and 3.) The wings, *q*, of the cowls extend rearwardly as to the end of the car, which is now the front.

5 S, are a series of passage-ways situated on a line with the partitions, O, and provided with double-disk dampers, s.

T, are openings covered with netting situated in the central panel of each berth between the windows.

U, are hinged flaps provided with regulating handles, *u*, which are designed when in the position shown in Fig. 3, to close the space between the outer shell, A, and inner shell, 15 C, so as to direct the air directly down through the opening, T. When the flap, U, is placed in the position shown in dotted lines in Fig. 3, the circulation of the air would pass down the side of the car through the openings, V, and cowls, W. In this figure the side of the car to the right hand side of the figure is shown in broken sections at that portion of the car in which the window is situated, and through the panel—as exhibited by the section at the 20 opposite side of the car.

X, are exhaust ducts suitably supported in the bottom of the car and provided with the ordinary swivel cowls, Y.

z, are branch ducts leading from the main exhaust ducts, X, to the casings, *y*, situated 30 beneath the outer end of the seat and provided with openings, *y'*, covered with fine wire netting as shown in Figs. 1, 1^a, and 3. In case of the smoking compartments the casings, *y*, would still be situated beneath the seat but be placed differently as indicated.

I shall now describe the construction and contents of the heating compartments, L.

40 Z, are passage-ways formed outside the heating chamber and leading from the chamber, I, to the opening, z.

w, is a fine wire netting extending beneath the chamber, L, and, 2, are series of baffle plates extending throughout the width and 45 length of the chamber, L, and supported in position immediately above the wire netting, w. The plates, 2, are before they are placed in position dipped into some adhesive or sticky liquid so as to coat them with the same and thereby when they are placed in position 50 cause any particles of dust which may have passed through the screens, w, to adhere to such plates and arrest their passage upwardly through the heater. The baffle plates, 2, are 55 made of metal and placed in a frame and may be removed at terminal points if required and the accumulation of dust burned off them when they may again be dipped into the liquid and replaced in position.

60 3, are the heating coils which are situated immediately above the baffle plates, 2, and are suitably supported within the walls or shells of the heating chamber as shown.

4, are fine wire netting casings in which is 65 preferably placed mineral wool, 5, in fluffy particles. The casings, 4, are situated immediately above the heating coils, 3.

6, are water pans provided with a number of recesses, 7, in which the water is situated and a number of openings, 8, through which 70 the air may pass.

10, are flaps hinged to the diaphragm, 11, and extending down to above the water pan, 6. The flaps, 10, are manipulated by the handles, 10', which are secured on the end of 75 the rods, 10'', upon which the dampers are hinged.

When the car is going in the direction indicated by arrow as indicated in Figs. 4, 4^a, the hinged flaps are swung to the rear so as to direct the heat in the car toward the two 80 forward compartments. It will be understood of course from this description that the sleeping car is divided into three compartments and that when the flaps are thrown rear- 85 wardly as above described a greater volume of heated air would be directed into the forward compartments and thus insure when the car is traveling in either direction of the compartments being heated more uniformly 90 throughout.

12, are slide dampers or valves which slide in passage-ways beneath the cowls, Q, and are designed to control the exit of the air 95 through such cowls.

13, are dampers or valves pivoted in the passage-way, Z, and provided with a regulating handle, 14, by which the dampers may be manipulated. Ordinarily the dampers, 13, are 100 left open as shown in the drawings.

15, is a hinged damper or flap, which is designed to close the opening, z', or the bottom of the passage-way, Z.

Having now described the principal parts involved in the construction of my car in order 105 to carry out my improved means of ventilation, I shall proceed to describe—first—the manner in which the car is heated and ventilated in the winter or cold weather and—secondly—in which it is ventilated in the 110 warm weather.

When the car is moving in the direction indicated by arrow the air would pass through the cowls, H, down through the netting, z, chamber, I, through the passage-ways, 115 Z, through the opening, z, into the heating chamber, L. In passing through the chamber, I, the air would be relieved of all dust within the netting, z, and the dust descend into the water in the pan, J. After passing 120 through the openings, z, the air would pass through the netting, w, baffle or corrugated plates, 2, up through the heating coils and the casing, 4, inclosing the particles of mineral wool by which the air is entirely relieved 125 from all dust and then through the openings, 8, in the pan. In passing through the openings in the pan the air would be moistened and would ascend and pass along between the roof, B, and the inner roof, D; thence it would 130 pass down the sides of the car and out through the coils, W, from which it would ascend in a compartment through the interior of the car. Ordinarily the cowls, G, situated within

the partition, O, would be closed and the impure air would be withdrawn through the casings, *y*, branch ducts, *x*, and main exhaust ducts, X, and cowls, Y. The openings to the outlet cowls, G, and Y, may be provided with electric fans which when the car is not in motion may be used to exhaust the air. The fans would be preferably run by a storage battery. Of course in practice it might be found that they would be quite unnecessary or might only be used occasionally for a short period when the car is not in motion.

Should it be desirable to relieve the car quickly of the warm air it will be seen by opening the double disk damper, *g*, of the cowls, G, that the car would be quickly relieved of any oppressive heat through the perforated ceiling. I think in the winter however that the cowl, G, would need to be used but seldom.

When the air is passing down the sides of the car between the walls, A, and the walls, C, the windows would have the effect of chilling the heated air which will assist in bringing the fresh air into the car. The glass of the windows by means of this current it will be seen would be relieved from the accumulation of frost on them. Through the air being brought into contact with the exterior walls of the car as before described and the glass surface of the windows it will part with a portion of its heat and in so doing will freely pass down through the space between the outer wall, A, and inner wall, C, so as to have the effect of cutting off all cold air drafts which pass through the outer wall. If the air should enter the car at too low a temperature it would be heated a second time by the regular heating coils passing through the car from end to end.

In very cold weather as it would be very probably inexpedient to draw all air through the cowls, H, they might be partially closed by the double disk dampers, H', and the dampers, 15, opened and thrown into a horizontal position shown in dotted lines in Fig. 2. In this manner the air in the car might be utilized over and over again, the impure air being drawn off as before described through the casings, *y*, branch ducts, *x*, and exhaust ducts, X, and cowls, Y.

It will be noticed that all impure air is carried out of the car by ducts, X, which are divided into sections and have a cowl, Y, for each division. As the outlet cowls in all cases are swiveled it will be seen that they will naturally turn in the opposite direction to which the train is going. As there is always an ample supply of warm fresh air entering the car the cold or impure air at the bottom of the car would even when the car is standing still, rapidly pass out of the car owing to its greater density without the assistance of the vacuum caused by the car when moving.

In winter the damper regulating the outflow of warm air may be governed by ther-

mostats, which would close the openings as soon as the standard temperature in the car had been regained.

So far in this specification I have confined myself to the explanation of the heating and ventilation of the car during the cold weather. I shall now describe the means whereby the construction and arrangement of the parts as hereinbefore described serve not only to keep the car well ventilated in winter but are equally effective during the warm weather. As it is not necessary to use the heating chamber, L, for the circulation of the air in the car I preferably close the dampers, 13, in the passage-ways, Z. The air now passing through the cowl, H, into the chamber, I, would pass through the slat dampers, M', through the openings, M, into the passage-ways, P, on each side of the partition, O, thence down through the perforations, into the car. The vitiated or impure air will be drawn out as shown through the casings, *y*, branch ducts, *x*, and exhaust ducts, X, and cowls, Y.

In the warm weather all the cowls in the car will preferably be left open. The space between the outer roof, B, and inner roof, D, and outside walls or shells, A, and inside walls or shells, C, will in warm weather become heated and as the cowls, Q, are open will pass out of such space continually thereby serving to keep the inner roof, D, and shell, A, perfectly cool. As the dampers, *s*, beneath the passage-way, S, are also left open it will be seen that the heated air arising to the ceiling, E, of the car will pass out into the outer space between the roofs, B, and D, and out through the cowls, Q. The heated air will also pass through the perforations in the ceiling, E, into the space within the partition, O, and will pass out through the cowls, G. It will be generally advisable to close the dampers, *r*, leading from the upper berth, F, to the passage-ways, P, and the dampers *c'*, beneath the roof, B, leading from the upper berth into the outer space may if desired be opened. As it is not necessary that the air should pass down beneath the flap damper, U, between the windows I would preferably throw these dampers into the position shown in full lines in Fig. 3, so that the heated air which is being withdrawn through the cowls Q, through the upper space between the shells would tend to cause a suction of the air through the openings, T, thereby facilitating the ventilation of the berths at night. If it should become too cool within the berth of course the flap damper, U, may be easily drawn into the position shown in dotted lines by means of the handle, *u*. It will of course necessarily be seen that the warm and impure air, will be drawn off through the passage ways, S, and cowls, Q, in addition to the impure air drawn off through the casings, *y*, branch ducts, *x*, and exhaust ducts, X.

Practically in warm weather there will be such a free circulation of air in the car by means of my system of ventilation that the

air will be kept perfectly cool and as free from impurities as the outside air. All dust also will have been removed from the air before it enters the car.

5 It will of course be understood that the damper, 15, may be regulated if desired so that the air in the car may be utilized over again and pass through the heating chamber or portion taken from the outside and passed
10 through the heating chamber as indicated by the dotted oblique position of the damper as shown in Fig. 2. In summer also if found desirable the heating chamber may be used for the removal of the impure air from the car
15 as it can be made to pass through the openings, z' , and through the heaters and be allowed to escape directly to the outer air by means of the cowls, Q, instead of passing through the space between the roofs.

20 It is intended in my system of ventilation that the coils of the heating chamber should be supplied with steam or hot water from the engine although of course it might be arranged to have a heater of any suitable form
25 located in the heating chamber.

As it will be seen from what has been before described and on reference to the drawings that the car is divided in three divisions it will be understood that each division may
30 be controlled independently of the other so that the smoking compartment would be entirely independent from the balance of the car in its heating and ventilation arrangements.

35 In order to provide for the admission of fresh air into the lower berth I provide at the bottom of the passage-way, p , a damper p' . (See Fig. 3.) I also provide for the opening, V, to the bottom of the inner shell, C, a damper, V' , which may be opened or closed by
40 means of the rod, V'' , which extends beneath the bottom of the seat.

Although I show no means for controlling the exhaust of the air through the ducts, x , and main duct, X, it will be understood that
45 a suitable damper might be arranged to control such exhaust. I have also shown to the left hand of Fig. 1^a, in between the backs of the seats as indicated by broken lines in this
50 figure a space, a'' , by which the air may be allowed to ascend from underneath the seats and circulate with the main body of air in the car.

What I claim as my invention is—

55 1. The combination with the inlet cowls, H, and air chamber situated at the top of the car connected therewith, of passage-ways leading downwardly from the air chamber to the bottom of the heating chamber, which
60 communicates at the top with the air space between the roofs so that the heated air will pass down the space between the side walls of the car and through openings and coils at the bottom into the interior of the car from
65 which it will ascend and means whereby the impure air is drawn off from the bottom of the car as and for the purpose specified.

2. The combination with the cowls, H, and air chamber, I, and the fine wire netting casing, i , of the passage ways, Z, heating chamber, L, communicating with the air space between the roofs B, and, D, and side walls, A, and, C, the openings, V, made in the bottom of the side walls, C, coils, W, and means whereby the impure air is exhausted from
75 the bottom of the car as and for the purpose specified.

3. The combination with the inlet cowls, H, and air chamber I, provided with a fine wire netting casing and water pan, of the
80 passage-ways, Z, heating chamber, L, communicating with the air space between the roofs, B, and, D, and side walls, A, and, C, the openings, V, made in the bottom of the side walls, C, coils, W, and means whereby the impure
85 air is exhausted from the bottom of the car as and for the purpose specified.

4. The combination with the inlet cowls, H, air chamber, I, passage-ways, Z, connected at the bottom by the opening, z , to the heating chamber, of the wire screens, w , situated at the bottom of the heating chamber, the heating coils, 3, the top of the heating chamber communicating with the air space between the roofs, B, and, D, and side walls, A, and, C, the openings, V, made in the bottom of the side walls, C, coils, W, and means whereby the impure air is exhausted from
95 the bottom of the car as and for the purpose specified.

5. The combination with the inlet cowls, H, air chamber, I, passage ways, Z, connected at the bottom by the opening, z , to the heating chamber, of the baffle plates, 2, coated with adhesive sticky substances, the heating coils, 3, the top of the heating chamber communicating with the air space between the roofs, B, and, D, and side walls, A, and, C, the openings, V, made in the bottom of the side walls, C, coils, W, and means whereby the
100 impure air is exhausted from the bottom of the car as and for the purpose specified.

6. The combination with the inlet cowls, H, air chamber, I, passage-ways, Z, connected at the bottom by the opening, z , to the heating chamber, of the heating coils, 3, wire casings, 4, having the mineral wool particles situated in them the top of the heating chamber communicating with the air space between the roofs, B, and, D, and side walls, A, and, C, the openings, V, made in the bottom of the side walls, C, coils, W, and means whereby the impure air is exhausted from the bottom of the car as and for the purpose specified.

7. The combination with the inlet cowls, H, and air chamber, I, provided with fine wire netting casings, of the passage-ways, Z, heating chamber, L, provided with the heating coils, 3, and moisture pans, 6, having the recess, 7, filled with water and openings, 8, for the passage of the heated air, the top of the heating chamber communicating with the air space between the roofs, B, and, D, and side walls, A, and, C, the openings, V, made in the
125
130

bottom of the side walls, C, coils, W, and means whereby the impure air is exhausted from the bottom of the car as and for the purpose specified.

5 8. The combination with the inlet cowls, H, air chamber, I, provided with fine wire netting casings, *i*, water pan, J, passage ways, Z, leading to the bottom of the heating chamber, wire netting *w*, baffle plates, 2, heating cowls, 10 3, wire casings with mineral wool particles located in the same and moisture pan constructed as specified, the top of the heating chamber communicating with the air space between the roofs, B, and, D, and side walls, 15 A, and, C, the openings, V, made in the bottom of the side walls, C, coils, W, and means whereby the impure air is exhausted from the bottom of the car as and for the purpose specified.

20 9. The combination with the inlet cowl, H, air chamber, I, passage-ways, Z, and heating chamber, L, all constructed and arranged as specified, the heating chamber communicating with the air space between the roofs, B, 25 and, D, and side walls, A, and, C, the openings, V, located at the bottom of the side walls, C, and coils, W, of the perforated ceiling, E, and means whereby the impure air is exhausted from the bottom of the car as and for the purpose specified.

30 10. The combination with the inlet cowls, H, air chamber, I, passage-ways, Z, and heating chamber, L, all constructed and arranged as specified, the heating chamber communicating with the air space between the roofs, B, 35 and, D, and side walls, A, and, C, the openings, V, located at the bottom of the side walls, C, and coils W, of the perforated ceiling, E, passage-ways, P, and openings, *r*, leading to the upper berth, F, and ways, *p*, leading to the lower berth and means whereby the impure air is exhausted from the bottom of the car as and for the purpose specified.

45 11. The combination with the inlet cowls, H, air chamber, I, passage-ways, Z, and heating chamber, L, all constructed and arranged as specified, the heating chamber communicating with the air space between the roofs, B, and, D, and side walls, A, and, C, the outlet cowls, Q, located above the heating chamber, the openings, V, located at the bottom of the side walls, C, and coils, W, of the perforated ceiling, E, passage-ways, P, and means whereby the impure air is exhausted from the 50 bottom of the car as and for the purpose specified.

55 12. The combination with a railroad passenger car divided into three divisions and having two, inlet cowls, H, and two air chambers, I, connected therewith, of the passage-ways, Z, heating chamber, L, provided with a flap, 10, hinged to the diaphragm, 11, the air chambers and heating chambers being constructed and arranged as specified, and 60 the heating chamber communicating with the air space between the roofs, B, and, D, and side walls, A, and, C, the openings, V, located

at the bottom of the side walls, C, and cowls, W, the perforated ceiling, E, passage-ways, P, and means whereby the impure air is exhausted from the bottom of the car as and for the purpose specified.

13. The combination with the roofs, B, and, D, side walls, A, and, C, forming a continuous air space around the top and sides of the car, 75 and perforated ceiling, E, of the outlet cowls, G, provided with a damper, *g*, as and for the purpose specified.

14. The combination with the roofs, B, and, D, side walls, A, and, C, forming a continuous 80 air space around the top and sides of the car, and perforated ceiling, E, of the inlet cowls, H, air chamber, I, openings, M, leading into the passage-ways, P, situated between the roof, D, and perforated ceiling, E, and 85 means whereby the impure air is drawn off from the bottom of the car as and for the purpose specified.

15. The combination with the roofs, B, and, D, side walls, A, and, C, forming a continuous 90 air space around the top and sides of the car and perforated ceiling, E, of the inlet cowls, H, air chamber, I, openings, M, leading into the passage-ways, P, situated between the roof, D, and perforated ceiling, E, dampers, 95 13, designed to close the passage-ways, Z, and means whereby the impure air is drawn off through the bottom of the car as and for the purpose specified.

16. The combination with the roofs, B, and, 100 D, side walls, A, and, C, forming a continuous air space around the top and sides of the car and perforated ceiling, E, of the inlet cowls, H, air chamber, I, wire netting casings, *i*, openings, M, leading into the passage-ways, P, situated 105 between the roof, D, and perforated ceiling, E, and means whereby the impure air is drawn off from the bottom of the car as and for the purpose specified.

17. The combination with the roofs, B, and, 110 D, side walls, A, and, C, forming a continuous air space around the top and sides of the car and perforated ceiling, E, of the inlet cowls, H, air chamber, I, provided with a wire netting casing and water pan, openings, M, leading 115 into the passage-ways, P, situated between the roof, D, and perforated ceiling, E, and means whereby the impure air is drawn off from the bottom of the car as and for the purpose specified.

18. The combination with the roofs, B, and, D, side walls, A, and, C, forming a continuous air space around the top and sides of the car and perforated ceiling, E, of the inlet cowls, H, provided with a damper, H', the air chamber, I, provided with openings M, leading into the passage-ways, P, situated between the roof, D, and perforated ceiling, E, and means whereby the impure air is drawn off from the bottom of the car as and for the purpose 130 specified.

19. The combination with the roofs, B, and, D, side walls, A, and, C, forming a continuous air space around the top and sides of the car

and perforated ceiling, E, of the inlet cowls, H, openings provided with a slat damper, N, and the fine double wire netting screens enclosing the mineral wool particles situated at the inner side of the opening, M, and the passage-ways, P, situated between the roof, D, and perforated ceiling, E, and means whereby the impure air is drawn off from the bottom of the car as and for the purpose specified.

20. The combination with the roofs, B, and, D, side walls, A, and, C, forming a continuous air space around the top and sides of the car and perforated ceiling, E, of the inlet cowls, H, air chamber, I, openings, M, leading into the passage ways, P, situated between the roof, D, and perforated ceiling, E, and the cowls, G, provided with dampers, as and for the purpose specified.

21. The combination with the roofs, B, and, D, side walls, A, and, C, forming a continuous air space around the top and sides of the car, and perforated ceiling, E, of the passage-ways, S, leading from the ceiling, E, to the outer space, provided with dampers, and the cowls, Q, as and the purpose specified.

22. The combination with the roofs, B, and, D, side walls, A, and, C, forming a continuous air space around the top and sides of the car and perforated ceiling, E, of the passage-ways, S, leading from the ceiling, E, to the outer air space and provided with dampers, the pas-

sage-ways, c, leading from the upper berth to the air space between the roofs, and the cowls, Q, as and for the purpose specified. 35

23. The combination with the roofs, B, and, D, side walls, A, and, C, forming a continuous space around the top and sides of the car, and perforated ceiling, E, of the openings, T, provided with a flap damper, U, located in the air space between the walls A, and, C, between the windows of the car as and for the purpose specified. 40

24. The combination with the roofs, B, and, D, side walls, A, and, C, forming a continuous air space around the top and sides of the car, of the heating chamber, L, arranged as specified, the openings V, at the bottom of the side walls, C, coils, W, and dampers, 15, arranged to close the passage ways, Z, at the bottom and allow of the circulation of the air of the car through the opening, z, and heating chamber as and for the purpose specified. 50

25. The combination with the walls or shells and roofs forming an air space or jacket and the openings at the bottom of the inner shell, of an air space or opening extending up between the backs of the seats as and for the purpose specified. 55

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Witnesses:

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