

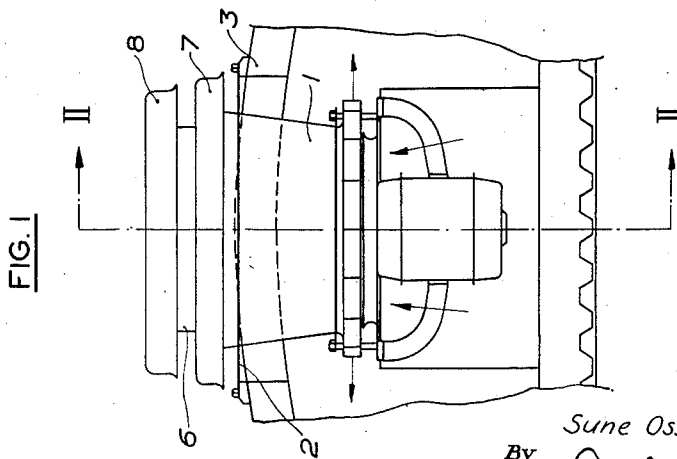
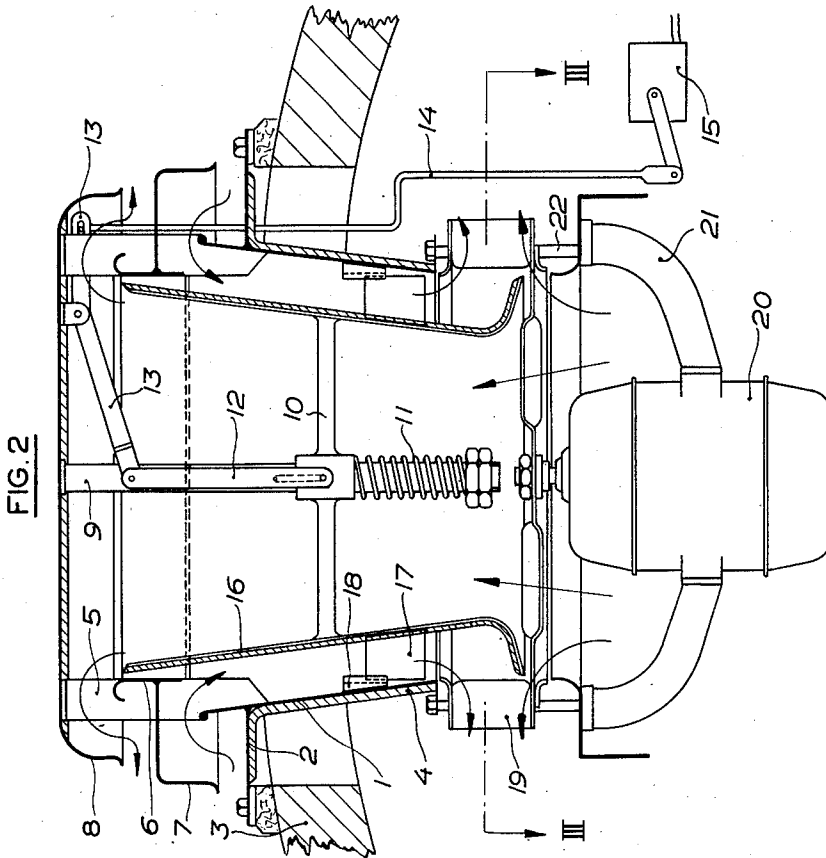
May 6, 1952

S. O. RYGDÅRD
ARRANGEMENT FOR VENTILATING OF RAILWAY
CARRIAGES, BUSES AND SIMILAR VEHICLES

2,595,370

Filed Oct. 23, 1947

2 SHEETS—SHEET 1



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FIG. 3

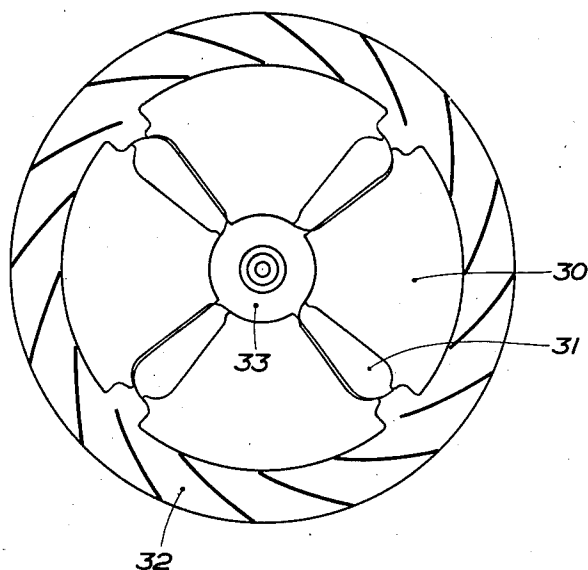
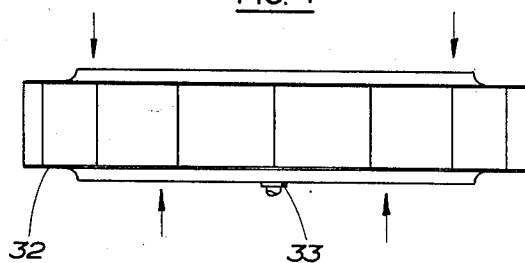


FIG. 4



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ARRANGEMENT FOR VENTILATING OF RAILWAY CARRIAGES, BUSES AND SIMILAR VEHICLES

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14 Claims. (Cl. 98—10)

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In railway carriages, buses and similar vehicles which are exposed to wind of variable direction and velocity relative to the direction of movement of the vehicle the problem of ventilating the vehicle by mechanical means is very complicated, among other things owing to the different pressure which appears in the inlet and outlet openings of the ventilating air. The difference of pressure which may arise between said openings may become several times greater than the pressure which is produced by the fan, and may change from a positive to a negative one according to said variations in the direction and the velocity. To that must be added the demand on the ventilating plant in connection with the variations of the number of passengers.

The vehicles are often fully occupied, the quantity of heat generated by the passengers is large, and removing this will require a large quantity of ventilating air. In connection herewith the fresh outer air is admitted and the warm inner air is discharged from the vehicle in quantities adjusted to the number of passengers. By mixing the fresh air with the warm inner air a sufficiently low temperature of the air in the vehicle is obtained.

Because the quantity of ventilating air per square metre of the floor-surface is very large in a vehicle in comparison with a stationary plant, and simultaneously the space available for the structure to control ventilation, is very small in vehicles it is clear that a solution of the problem is difficult, especially as the inlet and outlet openings of the ventilating air must be independent of the moving direction and the velocity of the vehicle and of the wind.

The present invention is a solution of the above mentioned problem. The invention consists, substantially, in that the air inlet and outlet tubes of the ventilating arrangement are placed one inside the other and separated by a body displaceable by a lever mechanism or the like which is arranged to cooperate with a fan or fans connected to the inlet tube and preferably also to the outlet tube in such a manner that a displacement of the body will permit mixing of admitting and discharging air. The openings for the entering air as well as the discharging one are in connection therewith preferably located so that the direction of flow of the air in the openings substantially will be at right angles to the axis of the apparatus.

By this arrangement is achieved the result that the apparatus will be insensible to variations in velocity and direction of the wind, that the ap-

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paratus will require small dimensions, and that the proportion of the mixture between fresh air and recirculating air will be adjusted in a simple manner.

5 The invention will be clear in the following description with reference to the enclosed drawings.

Fig. 1 illustrates a side-view of an apparatus according to the invention.

10 Fig. 2 is a sectional view on the line II—II of Fig. 1.

Fig. 3 is a sectional view on the line III—III of Fig. 2 and

Fig. 4 is a side-view of a detail.

In the figures 1 designates a mantle provided with a flange 2 and with means for fastening the apparatus on a boarding 3. The mantle 1 as well as the flange 2 are provided with sound insulation 4. A number of bars 5 extend upwards from the mantle 1. These bars support partly an annular piece 6 and partly also two caps 7 and 8. These caps are provided with rims bent downwards to prevent the rain-water entering into the apparatus. Between the caps 7 and 8 there is an open annular space which serves as an outlet opening for air and between the cap 7 and the flange 2 there is another open space which serves as an inlet opening for fresh air. A vertical spindle 9 extends downwards from the cap 8 and a cross 10 consisting of two arms crossing each other, is slidably journaled round said spindle. The cross 10 is slidable up and down under the action of a spring 11 and a lever mechanism 12, 13, 14. The lever mechanism is adjustable by hand or by a servo motor 15. The cross 10 supports a body 16 preferably a conical one, the lower part of which is provided with a curved flange bent outwards. Between the mantle 1 and the body 16 there is an annular channel which is in communication with the inlet opening for fresh air. The body 16 serves as an outlet channel for spent air and its wall separates the inlet and the outlet channels from each other. The body 16 is guided by lugs 17 and guides 18 to prevent it from rotating.

A fan-wheel 19 for sucking in air is arranged immediately below the mantle 1 so that the latter also serves as an inlet cone for the fan-wheel. The fan-wheel is mounted on the shaft of a motor 20 which is supported by arms 21 and bolts 22 fixed at the lower part of the mantle 1. The said fan-wheel is constructed to operate as a double-sided sucking fan. To this end the hub-disc of the fan-wheel is provided with openings 30. The arms 31 which connect the wheel-rim 32 with

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the hub 33, may preferably be formed as blades in a propeller-fan for sucking out of air.

The body 16 extends into the fan-wheel and the body is displaceable over the total width of the blade of the fan-wheel 19. On that account the fan 19 may be adjusted for sucking air either from the fresh air inlet channel or from the suction inlet for the used air or also from both of them in variable proportions.

The arrangement acts in the following manner. The air is sucked in through the opening between the cap 7 and the flange 2 and passes through the annular channel between the mantle 1 and the body 16 to the fan-wheel 19. From the latter the air will be conducted by way of a channel-system (not shown) into the vehicle to be ventilated. From the interior of the vehicle the air escapes through the openings 30 in the hub-disc of the fan-wheel 19. According to the position occupied by the body 16 a greater part or a smaller part of the used air and the entering fresh air will be mixed together and in this way the mixture will be tempered to the extent desired.

The invention is not limited to the illustrated embodiment. It may be varied in several ways without departing from its principle.

The body 16 may for instance be made as a fixed one, the lower part of which is provided with adjustable openings, and the inlet and outlet channels may be changed, so that the inlet channel is placed in the centre and the outlet channel becomes the annular channel between the mantle and the body 16.

The ventilating arrangement is preferably mounted in the ceiling of the vehicle in the manner indicated in Figures 1 and 2 and it may in usual manner be combined with a filter, heat-batteries and cold ones, humidifying devices etc. which may be required for an air-conditioning plant.

Having now described my invention, what I claim as new, and desire to secure by United States Letters Patent, is:

1. In an apparatus for ventilating vehicles: a tubular passageway opening at one end to the atmosphere; a combined suction and exhaust fan at the other end of said passageway; means covering the atmospheric end of said passageway and providing separate lateral annular channels communicating therewith; and a tubular member mounted for axial movement bridging the distance between said means and fan dividing said passageway into concentric intake and exhaust channels, the axial position of said member governing intercommunication of said intake and exhaust channels to control mixing of entering and exhaust air.

2. A ventilating device for railway carriages, buses and similar vehicles comprising: inner and outer conduits adapted to be mounted substantially perpendicularly to a wall of the vehicle and providing an inner centrally disposed channel and an outer coaxially situated channel, said channels each connecting with the inside and outside of the vehicle; fan means associated with said conduits to draw fresh air for the vehicle through one channel and exhaust air from the vehicle through the other channel, means providing an opening for admission of exhaust air into the fresh air channel; and adjustable means to vary said opening whereby the proportion of exhaust air admixed with fresh air supplied to the vehicle is varied.

3. An apparatus as specified in claim 2 where-

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in said adjustable means comprises the inner conduit movably supported for axial bodily movement.

4. An apparatus as specified in claim 3 having a cap surmounting said inner conduit on the exterior of the vehicle in spaced relation to said inner conduit, whereby axial movement of the inner conduit adjusts the space between the cap and inner conduit to vary the air flow through the inner conduit.

5. Apparatus as specified in claim 2, wherein said adjustable means comprises the inner conduit movably supported for axial bodily movement, and a remote-control lever mechanism for moving said inner conduit.

6. Apparatus as specified in claim 2, wherein said adjustable means comprises the inner conduit movably supported for axial bodily movement, and wherein the conduits have cooperating guide means to prevent rotation of the inner conduit.

7. A ventilating device for railway carriages, buses and similar vehicles comprising: inner and outer conduits adapted to be mounted in a wall of the vehicle and providing an outer channel for air surrounding an inner channel, said channels communicating between the inside and outside of the vehicle; a fan adjacent the inner ends of said conduits, said fan having central blades for forcing air through the inner channel and peripheral blades for drawing air through the outer channel and discharging the air tangentially; said inner conduit being located between the central and peripheral blades; and means supporting said inner conduit for axial movement to and from said fan to provide an adjustable space between the inner conduit and fan for proportioning admixture of exhaust air with fresh air supplied to the vehicle.

8. A ventilating apparatus as specified in claim 7 wherein the end of the inner conduit adjacent the fan is outwardly flared with its flared edge substantially in alignment with the edge of the outer conduit whereby axial movement of the inner conduit simultaneously inversely varies the space between the fan and the inner conduit, and the space between the edge of the outer conduit and the flared edge to restrict flow of air through the outer channel.

9. An apparatus for ventilating vehicles comprising: an inner wall providing a central air channel; an outer wall surrounding the inner wall in spaced relation to provide an outer end channel therebetween; fan means in at least one of said channels for driving air therethrough; means controlling communication between said channels adjacent said fan means; a cap surmounting said inner wall in spaced relation thereto; and means for varying the space between the cap and inner wall.

10. An apparatus as specified in claim 9 having a lateral flange dividing the space between said cap and the edge of the second wall remote from the fan means, said cap and flange providing circumferential lateral passages connecting said respective channels and the surrounding atmosphere.

11. A ventilating apparatus as specified in claim 9 having a spindle secured to said cap and said latter means comprises said inner wall slidably carried on said spindle.

12. An apparatus for ventilating vehicles comprising: a fan having a central set of blades disposed to direct air axially in one direction, and a set of peripheral blades to direct air tangen-

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tially; a sleeve mounted for axial movement toward and away from the fan between said sets of blades and providing a central air channel; a second sleeve surrounding the first sleeve in spaced relation to provide a second channel for air to the peripheral blades; a cap for the first sleeve carried in spaced relation thereto by the second sleeve; and a flange carried by the second sleeve between the cap and second sleeve to provide circumferential passages connecting said air channels to the atmosphere.

13. An apparatus for ventilating vehicles comprising an outer wall; a hood surmounting said wall in spaced relation to the edge thereof and having a downturned exterior flange and a central opening; a cap surmounting the opening of the first hood in spaced relation thereto and having an exterior downturned flange; a fan adjacent the opposite end of said wall; and a sleeve in spaced relation to said wall forming a central and a peripheral air passage and axially movable between the fan and the hood, said sleeve having its end flared adjacent the fan.

14. An apparatus for ventilating vehicles comprising: a fan having a central set of blades disposed to direct air axially in one direction, and a set of peripheral blades to direct air tangen-

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tially; a sleeve having a flared end adjacent the fan and mounted for axial movement between said sets of blades to provide a central air channel; a second sleeve surrounding the first sleeve in spaced relation to provide a second channel for air to the peripheral blades; and a cap for the first sleeve carried in spaced relation thereto by the second sleeve.

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