Sept. 8, 1964 S. NOVITSKY 3,147,909

AIR DISTRIBUTOR FAN

Filed Sept. 5, 1962

2 Sheets-Sheet 1

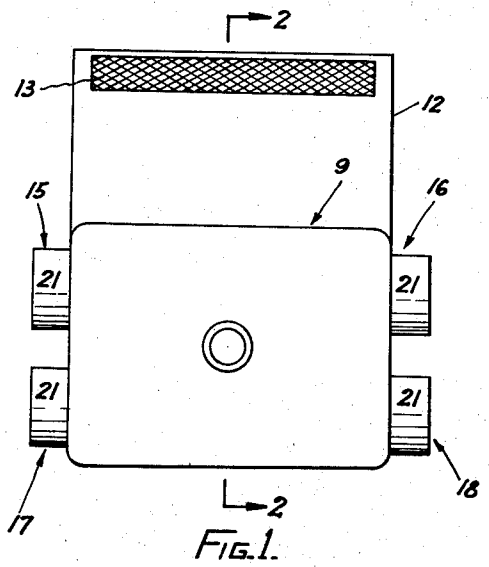

FIG. 1.

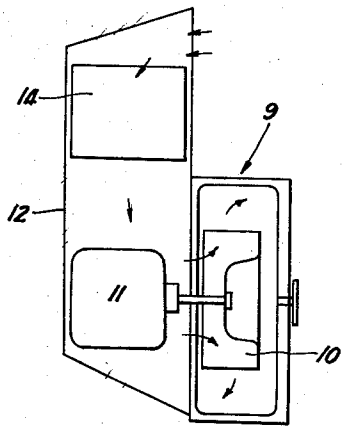

FIG. 2.

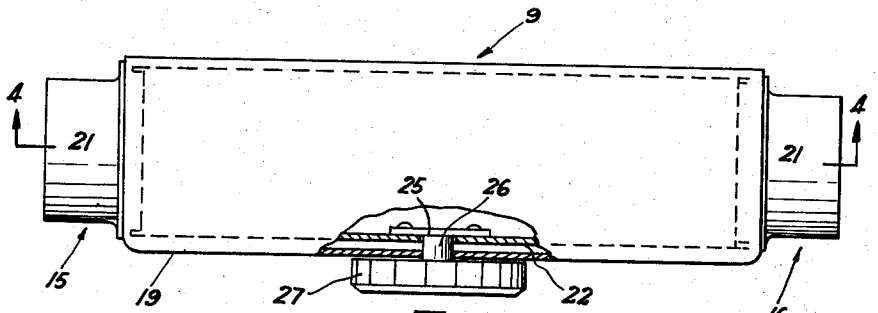

FIG. 3.

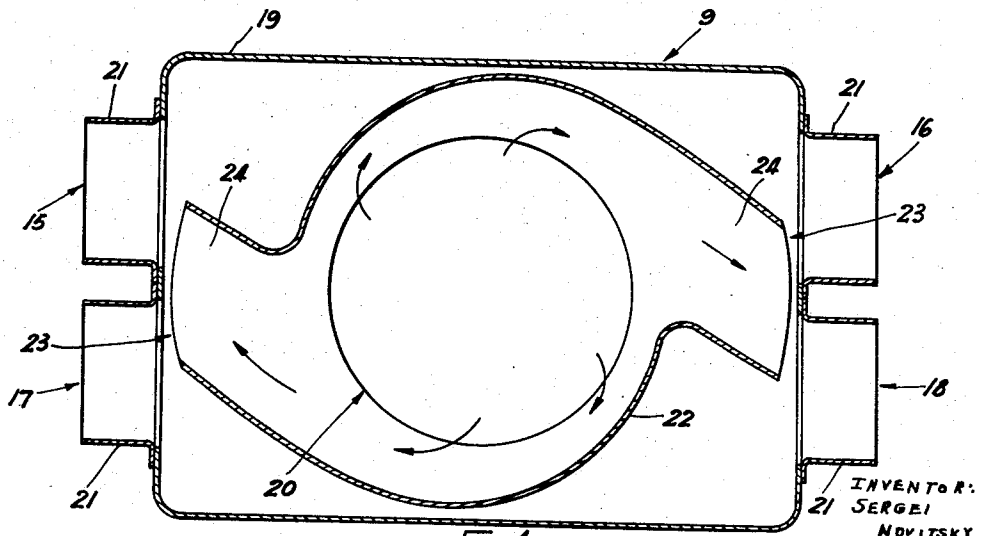

FIG. 4.

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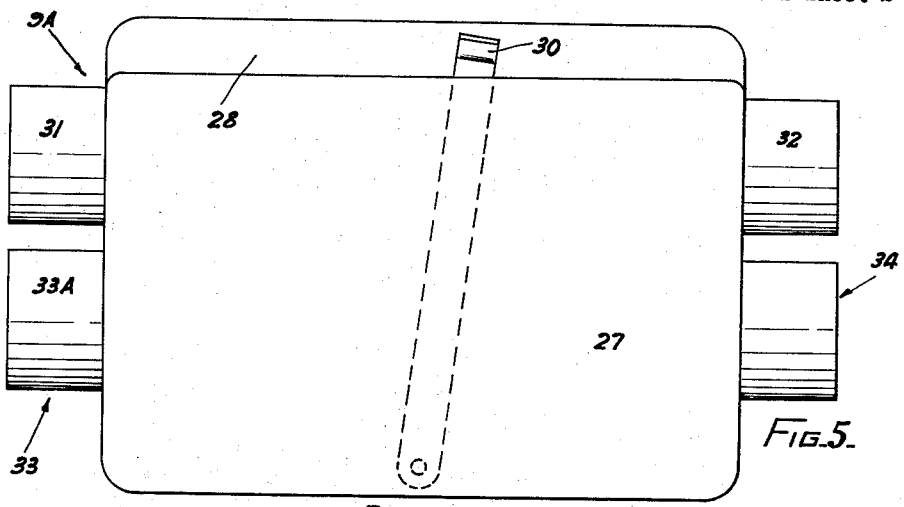

FIG. 5.

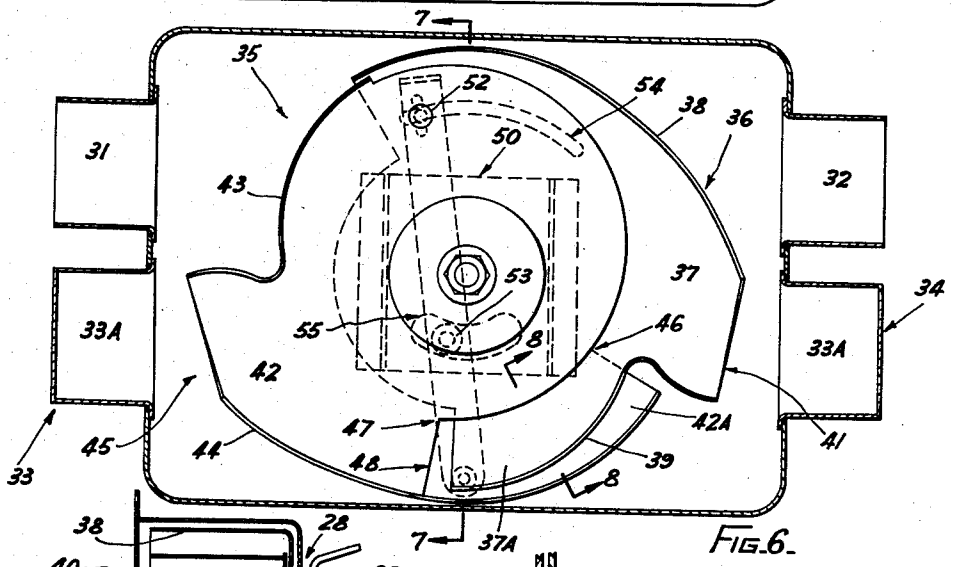

FIG. 6.

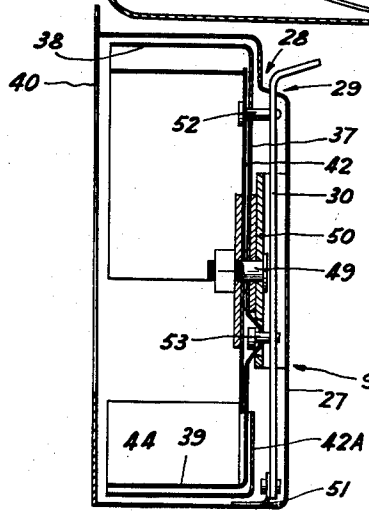

FIG. 7.

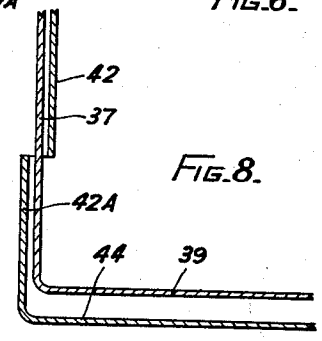

FIG. 8.

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AIR DISTRIBUTOR FAN

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This invention relates to air conditioning systems whereby air is delivered by way of a plurality of air outlets to a space to be heated, cooled or simply ventilated as the case may be.

More particularly the invention relates to components of such a system by which the air discharge from each outlet may be regulated so that the proportion of the total discharge provided by each outlet may be selected as desired.

While applicable to air conditioning systems in general, the present invention was devised primarily for application to vehicle heating systems which supply heated air to the passenger space of the vehicle by way of at least two outlets, one (the body outlet) conveniently placed for the supply of air to the vehicle interior generally and the other (the de-mister outlet) for the supply of a fairly direct stream of air to the windscreen for de-misting thereof. For this reason, the invention is described primarily hereinafter with reference to its application to a vehicle heating system.

It is known to use, in vehicles, air heating systems of the kind comprising a motor driven centrifugal fan adapted to pass air over a heater and then through ducts to de-mister and body outlets respectively.

In such known air heating systems it is customary to provide a flap valve which in one position permits some of the heated air to pass to the body outlet or outlets while permitting the remainder of the air to pass to the de-mister outlet or outlets. In its alternative position the flap valve causes all the air to be sent to the de-mister outlet or outlets. Such a system has been found to suffer from the disadvantage that the flap valve constitutes an obstruction in the duct system bringing about turbulence in the air flow with consequent inefficiency and noise.

The primary object of the present invention is to provide an improved way of regulating the discharge from each outlet of an air conditioning system which overcomes or at least ameliorates the above indicated disadvantage of known systems.

The invention consists in an air distributor fan comprising an outer casing pierced by an air inlet port and at least two air discharge ports, a rotationally adjustable volute casing within said outer casing having at least one air outlet mouth, a fan rotor within said volute casing adapted to draw air through said inlet port and deliver that air into the volute casing for release through said mouth, and discharge selector means whereby said volute casing may be rotationally adjusted to bring said mouth into register with either discharge port as desired.

By way of example, two air distributor fans according to the invention as applied to a vehicle heating system are described hereinafter with reference to the accompanying drawings.

FIG. 1 is a front elevation of an air heating unit incorporating a fan according to the invention.

FIG. 2 is a diagrammatic sectional elevation of the unit shown in FIG. 1 taken on line 2—2 of that figure.

FIG. 3 is a plan view of the air distributor fan indicated by the reference numeral 9 in FIG. 1, drawn to a larger scale.

FIG. 4 is a sectional elevation taken on line 4—4 of FIG. 3.

FIG. 5 is a front elevation of another form of air distributor fan according to the invention.

FIG. 6 is a rear elevation of the fan shown in FIG. 5 with the back wall of its outer casing removed.

FIG. 7 is a sectional elevation of the fan shown in FIG. 6 (including the back wall of its outer cover) taken on line 7—7 in that figure.

FIG. 8 is a detailed sectional view taken on line 8—8 of FIG. 6, drawn to a larger scale.

Referring to FIGS. 1 to 4, the illustrated air heating unit includes a distributor fan 9 according to the invention as a component part of a unitary air heater. The fan rotor 10 is mounted on the output shaft of an electric motor 11 in the bottom of a trunk 12 to which the fan 9 is secured. When the fan is running air is drawn into the trunk 12 through a filter 13 to pass over a conventional heater 14 for eventual discharge by way of air discharge ports 15, 16, 17 and 18 respectively (as indicated by the arrows in FIG. 2). The heater 14 may be electrical or a hot water heater fed from the vehicle's cooling system, as well understood.

Referring more particularly to FIGS. 3 and 4, it will be seen that the fan 9 comprises an outer casing 19, the back wall of which in the present instance is also a partition wall between the casing 19 and the trunk 12, which wall is pierced by an air inlet port 20 in the form of a circular hole of substantially the same diameter as the pump rotor 10. For the sake of clarity the rotor 10 is not shown in FIG. 4.

The outer casing 19 is also pierced by the four air discharge ports 15 to 18 respectively, each in the form of an air discharge hole rimmed by pipe spigots 21 whereby discharge ducts may be connected to the pump.

According to the example of the invention now being described discharge ports 15 and 18 may be duct connected to passenger side and driver side de-mister outlets respectively and discharge ports 16 and 17 to corresponding body outlets.

A rotationally adjustable volute casing 22 is housed within the outer casing 19. The volute casing 22 is provided with two outlet mouths 23 at the respective ends of two outlet spout portions 24.

Each half of the volute casing 22 terminating in one of the spouts 24 is shaped in a manner analogous to the conventional single outlet volute casing customarily used as the fixed outer casing in conventional centrifugal pumps or fans. That is to say each half of the casing diverges from the rotor in the direction of rotor movement, commencing at a point more or less diametrically opposite to an outlet spout and terminating in that spout. Thus, when the rotor 10 is spinning, air is drawn in through the inlet port 20 (there being a corresponding hole in the back wall of the volute casing 22) and then is discharged through the mouths 23 as indicated by the arrows appearing in FIG. 4.

The volute casing 22 is riveted or otherwise secured to a flange 25 on one end of a shaft 26 carrying a selector knob 27. The shaft 26 is co-axial with the rotor 10 and is frictionally gripped where it passes through the front wall of the casing 19 such that the volute casing 22 remains stationary while the fan is in operation. On the other hand, the volute casing 22 may be rotationally adjusted by the manual application of a turning force to the knob 27 sufficient to overcome the frictional restraint on the shaft 26. Thus, the knob 27 constitutes the discharge selector means of the example of the invention now being described whereby the volute casing 22 may be rotationally adjusted to bring its mouths 23 into register with the discharge ports 15 and 18 respectively, to cause substantially all of the heated air to flow to the de-mister outlets; or into register with the discharge ports 16 and 17 respectively, to cause substantially all of the heated air to flow to the body outlets; or to any intermediate position (such as that shown in FIG. 4) where

the discharged air is shared between the de-mister outlets and the body outlets in selected proportions.

Turning now to FIGS. 5 to 8 which illustrate an air distributor fan 9A suitable for replacing the fan 9 in air heating units otherwise similar to that illustrated in FIGS. 1 and 2. The fan 9A comprises an outer casing 27 similar to the casing 19 of the first described example of the invention but having a recess 28 in its front wall having a slot 29 in its floor, through which protrudes one end of a selector lever 30, the function of which will be described in detail hereinafter. The casing 27 is also adapted for use in a car heating system having both passenger and driver side de-mister outlets and passenger and driver side body outlets, thus the casing 27 has four air discharge ports, 31, 32, 33 and 34 respectively. Of these ports, 31 and 32 are similar in structure to air discharge port 15 of FIGS. 1 to 4 and these two ports may be duct connected to the respective de-mister outlets. On the other hand, ports 33 and 34 each comprise an outlet opening partially rimmed by an open-backed box-like structure 33A. The open back of each structure 33A allows air to escape directly into the passenger space of the vehicle and thus ports 33 and 34 are not only air discharge ports but at the same time constitute the body outlets for the heater system as a whole.

The volute casing of the example of the invention now being described is in two parts, 35 and 36 respectively.

The volute part 36 comprises a substantially flat front wall 37 and two rearwardly directed edge wall portions 38 and 39 respectively. The volute part 36 has no back wall as the proximity of the free edges of walls 38 and 39 to the back wall 40 of the fixed outer casing 27 is relied upon to prevent the escape of substantial quantities of air from the volute part 36 other than by way of a mouth 41 defined by the edge walls 38 and 39.

The volute part 35 is similarly constructed, having a substantially flat front wall 42, two rearwardly directed edge wall portions 43 and 44 and no back wall. The edge wall portions 43 and 44 define a mouth 45 similar to mouth 41. The walls 37 and 42 overlap at all times to constitute a front wall for the volute casing as a whole. For the most part the front wall 42 lies behind the front wall 37 but an arcuate portion 42A of the wall 42 is partly separated from the remainder of that wall by an arcuate slit extending from point 46 to point 47 in FIG. 6. This arcuate portion 42A is displaced forwardly relative to the floor 42 as a whole by virtue of a step 48 extending from the point 47 radially outwardly to the edge of the floor 42. The wall 37 extends through the mentioned slit and thus a portion 37A of the wall 37 lies behind and overlaps the portion 42A of the wall 42.

Both the volute parts 35 and 36 are mounted upon a through bolt 49 extending through the front walls 37 and 42 and through a bridge piece 50 secured to the front wall of the casing 27. The bolt 49 is co-axial with the fan rotor (and with a circular air inlet port in the back wall 40 of the casing 27). Each of the volute parts 35 and 36 may rotate upon the bolt 49 but there is sufficient frictional restraint to hold the volute parts stationary while the fan is operating.

Furthermore, the volute parts 35 and 36 may rotate independently to some extent whilst retaining some degree of overlap between the wall portions 42A and 37A respectively.

Discharge selector means are provided whereby rotational adjustment of the volute parts 35 and 36 may be effected. These means comprise the selector lever 30 which is pivotally mounted on a bracket 51 at one end and two connector pins 52 and 53 fixed to the walls 42 and 37 respectively and extending through clearance slots in the lever 30. The pin 52 extends through a curved

clearance slot 54 in the front wall 37. The head of the pin 53 is housed within a recess in the wall 37 so that it does not foul the wall 42. The bridge piece 50 has a curved slot 55 in it so that the bridge piece does not obstruct movement of the pin 53.

With the volute portions 35 and 36 in the position illustrated in FIG. 6 substantially all of the air issuing from the mouths 41 and 45 will be discharged by way of discharge ports 34 and 33 respectively. On the other hand if the protruding end of the lever 30 is grasped and swung to the left of FIG. 5, that is to the right of FIG. 6, then the volute part 35 will be rotated by the pin 52 in a clockwise direction, as seen in FIG. 6, until the mouth 45 comes into register with discharge port 31, and at the same time the volute part 36 will be rotated by pin 53 in an anti-clockwise direction, as seen in FIG. 6, until its mouth 41 comes into register with the discharge port 32. In this last position substantially all of the air will be fed to the de-mister outlets. It is obvious that intermediate positions may be adopted in which a greater or lesser proportion of the air is to the de-mister outlets with the remainder going to the body outlets.

We claim:

1. An air distributor fan comprising an outer casing having an air inlet port and having a plurality of discharge ports, a rotational adjustable volute casing within said outer casing having two air outlet mouths, a fan rotor within said volute casing adapted to draw air through said inlet port and deliver said air into the volute casing for release through said mouth, said volute casing comprising two independently rotatable parts each having a front wall and rearwardly directed edge walls, a discharge selector means connected to each of said parts and capable of being moved in two opposite directions such that the movement of the lever in one direction causes one volute casing part to move in a clockwise direction and the other volute casing part to move in a counterclockwise direction whereby the mouths of said volute casing are brought into register with two of said discharge ports.

2. The air distributor fan of claim 1 wherein the front wall of one volute casing part overlaps the front wall of the other volute casing part.

3. An air distributor fan comprising an outer casing having an air inlet port and at least one pair of upper air discharge ports and one pair of lower discharge ports, a rotationally adjustable volute casing within said outer casing having two air outlet mouths, a fan rotor within said volute casing adapted to draw air through said inlet port and deliver said air into the volute casing for release through said mouth, said volute casing comprising two independently rotatable parts each having a front wall and rearwardly directed edge walls, a discharge selector means connected to each of said parts and capable of being moved in two opposite directions such that the movement of the lever in one direction causes one volute casing part to move in a clockwise direction and the other volute casing part to move in a counterclockwise direction whereby the mouths of said volute casing are brought into register with at least one of said pairs of discharge ports.

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