United States Patent

MacDonald

[15] **3,659,516**

[45] **May 2, 1972**

[54] WINDOW VENTILATORS

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[22] Filed: **Oct. 8, 1969**

[21] Appl. No.: **864,753**

[52] **U.S. Cl.** **98/2.12**

[51] **Int. Cl.** **B60h 1/24**

[58] **Field of Search** ..... 98/2.2, 88 L, 115, 92, 89, 98/90, 91, 71, 96, 2.0; 296/94; 244/121

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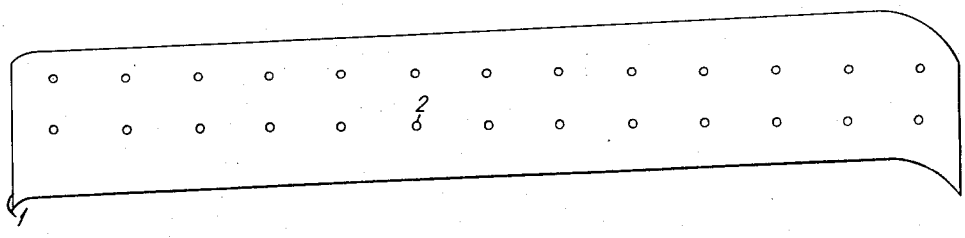
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[57] **ABSTRACT**

A window ventilator for a vehicle such as an automobile, comprises a sheet of transparent material such as glass or a plastics material, said sheet having formed therein a plurality of ventilation holes preferably by a moulding operation. The axes of the holes rise from the outside to the inside of the sheet relative to the fitment of the sheet in a window frame, the angle of inclination of said axes preferably being of the order of 45° to 55°.

1 Claim, 2 Drawing Figures



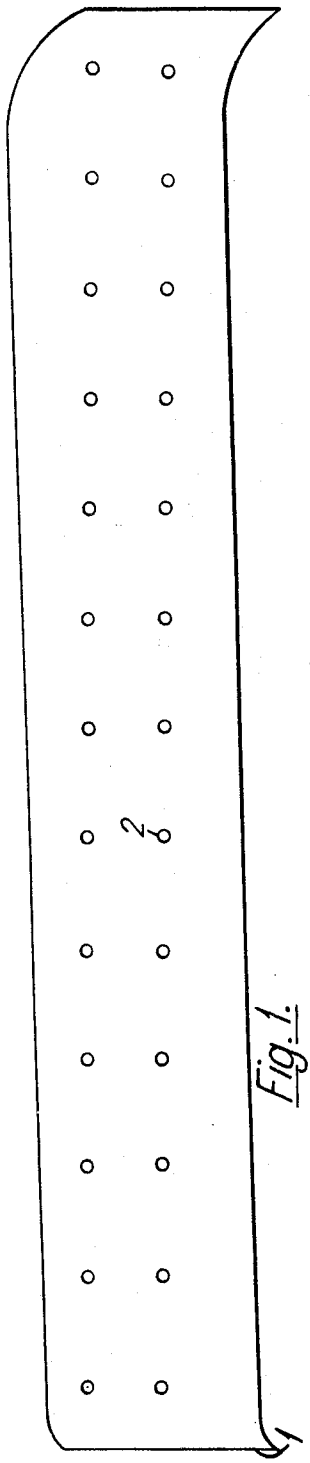


Fig. 1.

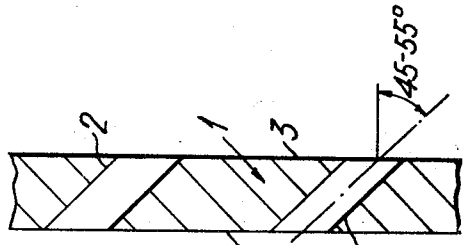


Fig. 2.

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WINDOW VENTILATORS

This invention relates to improvements in window ventilators.

More particularly, the invention relates to a window ventilator for a mobile vehicle such as a motor car, lorry or railway carriage, said ventilator also serving as a demister.

There has previously been proposed a window ventilator consisting of a single sheet of transparent material of shape and dimensions such that it can be fitted within the frame of a particular window to be ventilated and formed with a plurality of downwardly and outwardly inclined ventilating holes. In this prior proposal the inclination of the holes relative both to the hole cross-sections and to the sheet thickness has been insufficient to preclude unimpeded flow of air through the holes in the sheet from the direction of the exterior and normal to the plane of the sheet. As a result an unpleasant whistling noise is produced when a vehicle fitted with the ventilator is in rapid motion.

The present invention is characterized in that the lower edge of each hole at the inner surface of the sheet is on at least as high a level as the upper edge of the same hole at the outer surface of the sheet when the sheet is in place within the window frame. Consequently, flow of air through the holes in the sheet from the direction of the exterior and normal to the plane of the sheet is precluded, and there is no unpleasant whistling noise when a vehicle fitted with the ventilator is in motion.

Preferably the angle of inclination of said holes is 45 to 55° to the normal to the sheet.

Further preferably, the holes are located in two or more lines, one above the other.

In a preferred embodiment the holes are of constant diameter throughout their length.

In another embodiment the holes are venturi-shaped.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawing, in which:

FIG. 1 is a front elevation of a window ventilator according to the invention; and

FIG. 2 is a vertical, transverse section through a major part of the ventilator on an enlarged scale.

Referring to the drawings, a window ventilator and demister consists of a sheet 1 of a thermosetting transparent plastics material shaped for removable fitment within the top portion of a car window frame (not shown). The sheet is produced by an injection moulding process and the mould shape is tailored to the shape of the upper part of the window of the particular make and model of car for which the sheet is intended. The sheet 1 is provided with two horizontal lines of inclined holes 2. Said holes 2 are of constant diameter throughout and extend through the sheet 1 at an angle of 45° to 55° to the normal, rising from the outside 3 to the inside 4 of the sheet 1.

The positioning of the holes 2 is an important factor in achieving maximum ventilation efficiency. They should extend through the sheet in a plane normal to the upstanding sheet. If the holes are directed towards the rear of the vehicle rain water will tend to penetrate into the interior of the vehicle through the holes and if they are directed towards the front of the vehicle very little air will pass through the holes. Furthermore, if the holes are drilled straight through the sheet horizontally, with no inclination, an unpleasant whistling noise results.

Experiments have shown that no whistling occurs when the angle of inclination to the horizontal of the holes is 45° to 55°. Variations of this angle are possible without whistling occurring. The minimum angle of inclination to avoid whistling varies according to different makes of car and can be determined readily by simple testing.

The perimeter of the ventilator sheet is shaped to fit tightly into the grooving of the car window frame. The under edge of the sheet is furthermore shaped to conform exactly to the upper edge of the car window rabbetted so that the window can be raised into contact with the sheet with no gap existing between them to cause draughts. The upper edges of car windows are quite often convex in shape and thus the lower edge of the ventilator sheet would be correspondingly shaped to allow the sheet to be properly sealed and seated.

In the case of frameless windows, i.e. no channelling being provided on three sides of the window, the ventilator sheet would be provided with bracket fittings for securing the sheet to the quarter light channel.

The ventilator sheet of the invention provides for a natural flow of fresh air to the interior of the vehicle without causing any draught or noise. By virtue of the rising angle of the ventilation holes, air entering the vehicle is directed against the roof, resulting in uniform ventilation with no unpleasant draught streams.

Maximum efficiency is obtained by fitting a set of four ventilator sheets to the vehicle, but adequate ventilation is achieved by fitting a pair of sheets. The quantity of ventilating air drawn into the car through the ventilator sheet can be controlled by varying the degree of opening of the quarter light window of the car.

In a modification, the holes are formed by drilling through a pre-shaped sheet of glass or transparent plastics material.

A modified version of the ventilator sheet, suitable for us in hot climates, has venturi-shaped holes to provide forced ventilation by virtue of the venturi action. Such a sheet would be produced by a moulding process.

A particularly advantageous application of the ventilator sheet is to hovercraft, where spray presents a serious problem with regard to ventilation. It has been proposed to fit ventilating means in the wide windows near the roof of hovercraft to overcome this spray problem. Installation of the ventilator sheets of the invention would be one answer to the problem, as spray would not pass through the ventilation holes to the interior of the craft.

The principle of the vents is to provide fresh air without draughts. It is not intended to compete with any fresh air system which is a built-in fixture on the car but is ancillarly to such a fresh air system. The vents are as aforesaid most effective with the use of quarter light fittings on the front side windows. The principle is as follows:

Most systems of heating a car draw hot air from below, which rises to top or roof of the car, with the result that passengers and driver are breathing foul air, without any fresh air ventilation. To enable fresh air to enter, side windows are open, and sometimes the forward quarter lights are used, or, as often as not, the driver's window is lowered with the resultant effect of air being drawn in, in large quantities, and causing a draught which by-passes the driver, and sweeps round the back of the car to the passengers, and finally striking the person sitting beside the driver. The ventilation sheets work in the following way:

By means of opening the quarter lights, a pleasant flow of air through the sheets is projected to strike the roof of the car, and carries the foul air out through the quarter lights, thus preventing a build-up of warm foul air. The flow of air is controlled by the quarter-light fitting and maximum efficiency is attained at a point between a quarter and a third open. When the quarter lights are closed, virtually no air is allowed into the car through the ventilation sheets. An additional feature is that there is no wind whistle, due to the angle of the holes, which decreases road noise, and minimizes drumming. Furthermore, tests have shown that steaming-up of windows is very much decreased when the car is in motion.

OPERATION OF SYSTEM

Warm air can be drawn in by the car-heating system to the interior of the car, but fresh air drawn in through the ventilator sheets is circulated around the roof with the quarter lights open. To clear the rear window which has steamed up when the car is stationary, cold air is projected to the windscreen by the car's cold system. This forces the air which is drawn in through the ventilation sheets towards the rear window, which

clears quickly. After the rear window is clear, hot air may be projected into the interior of the car. It is of importance to not that during heavy rain, it is not required to drive with any windows open, only the quarter lights.

Anyone sitting smoking in the front of the car will find that, on opening the quarter light, the smoke is expelled immediately, and does not circulate throughout the car, or from side to side.

As described above, the ventilator sheets are constructed of transparent plastics material, and one fitted into the existing window rails, and once in place, the window is closed. If desired, the window may be opened while the ventilator sheets remain in position at the top of the window sash by virtue of the window channels which hold the sheets. Thus, full use of the window is still obtained. No mechanical parts are involved and moreover no electric motive power is required to operate the ventilator sheets.

I claim:

1. A window ventilator consisting of a single sheet of transparent material of shape and dimensions such that it can be fitted within the frame of a particular window to be ventilated and formed with a plurality of downwardly and outwardly inclined ventilating holes characterized in that the lower edge of each hole at the inner surface of the sheet is on at least as high a level as the upper edge of the same hole at the outer surface of the sheet when the sheet is in place in the frame, the diameters of the holes being so related to the thickness of the sheet that the angle of inclination of the holes is within the range of 45° to 55° to the plane of the sheet.

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