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(54) **A variable area window heating device**

(57) A window heating device is divided into a plurality of interconnectible window heating units, each selectively heating a partial area of the rear window of a motor vehicle. The window heating device

may comprise collectors 2, 2' and 3, 3' adjacent two opposite window margins, the collectors being connected with each other by groups of heating resistors R1, R2, R3 and being variously connectible with the electrical power source of the motor vehicle to heat selected areas of the rear window.

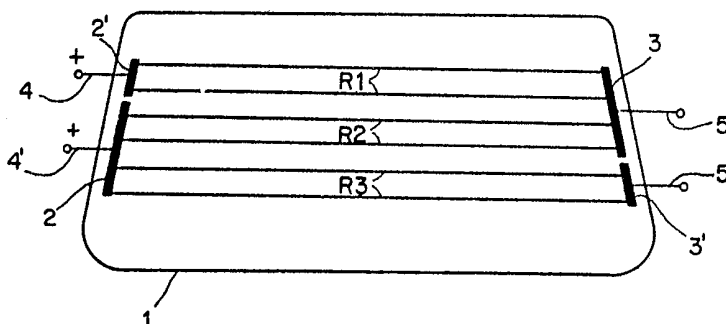


FIG.1

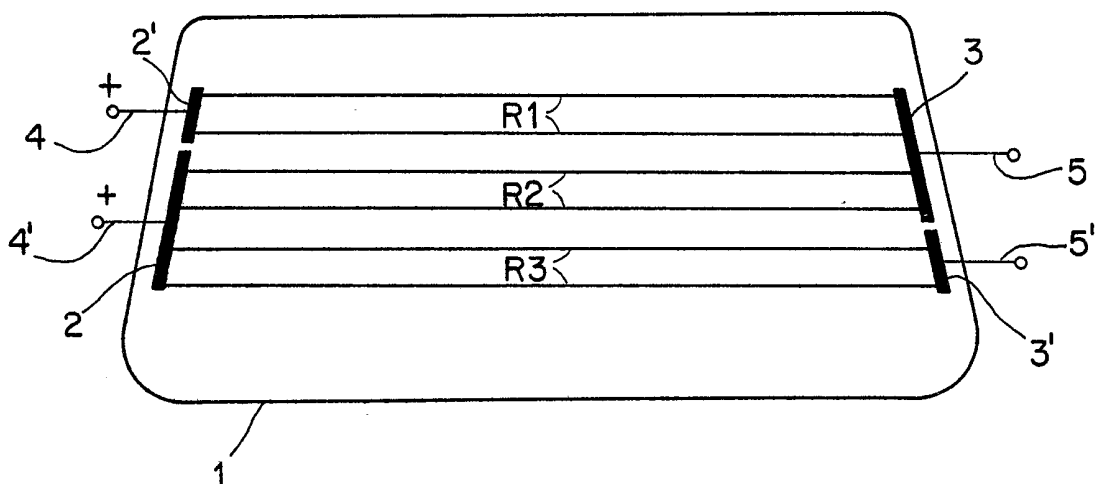
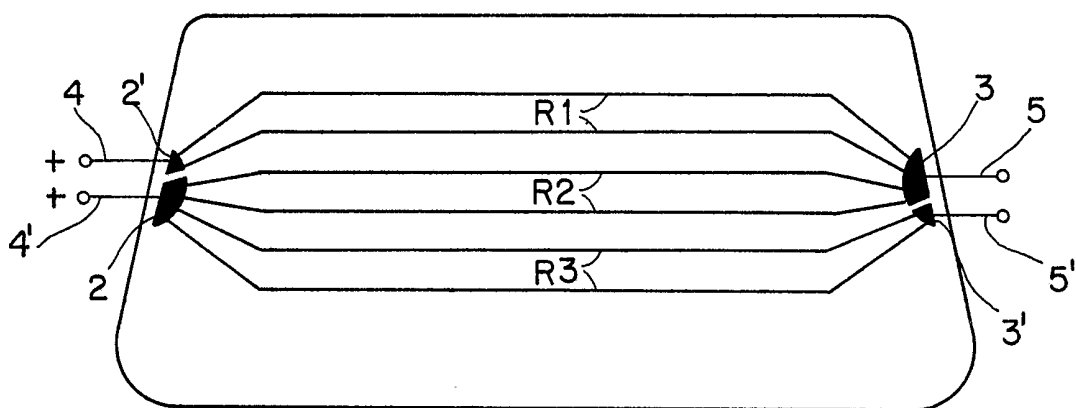
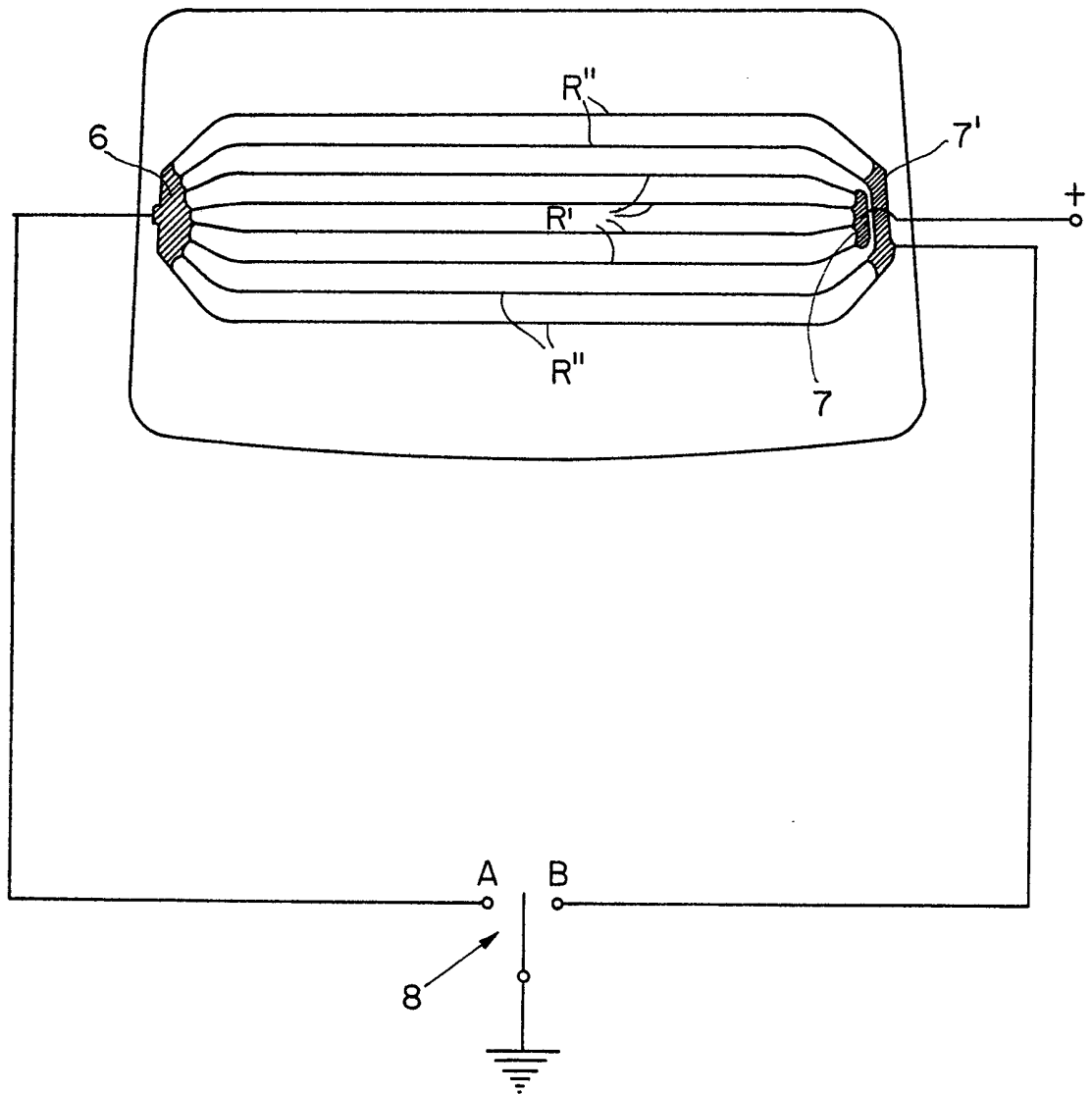
FIG. 1FIG. 2

FIG.3

SPECIFICATION

A variable area window heating device

This invention relates to a variable area window heating device for a motor vehicle.

5 Window heating devices, especially for defogging or defrosting motor vehicle rear windows, are known per se. They generally comprise two collectors or bus bars, each at an opposite window margin, said collectors being
10 interconnected by a number of heating wires or resistors, which cover the whole or at least the main area of said window and are heated by the electric power supply of the vehicle to the collectors, the heat of said resistors having the
15 effect of clearing the fogged or frosted window. Both the collectors and the resistors can be made from metal strips or wires or applied to the window by the silk screen process.

There are also known window heating devices,
20 which cover not the whole, but merely a portion of the window area. In this case the rear window is provided with a plurality of such window heating devices, each covering a respective portion of the window area, said devices being connectible
25 generally in series, with each other. The construction of each device is similar to that initially described, with the obvious differences that their collectors are shorter, there are fewer resistors since the devices cover only an
30 approximately rectangular strip of the window area, and the devices are connectible in series. Such partial window heating devices prove particularly useful when, under severe weather
35 conditions, it is desired to acquire visibility rapidly through one portion of the window. This is effected by supplying all available current to only one partial heater, whereby its resistors are heated to a much higher temperature than if the current
40 had to pass also through the other partial heaters and consequently the defrosting action upon the adjacent portions of the window will be considerably accelerated. Once this window portion has been cleared, the other partial heaters can be switched in, to defrost more slowly the
45 remaining window area.

The application of partial heaters also proves advantageous when the vehicle engine has just been started and is idling, while the vehicle battery is still cold and other, more essential electric loads
50 of the vehicle, such as headlights, have to be fed. In such cases the current may be available to feed just one partial heating device, for instance that which clears the region of the window which is level with the driver's eyes, while the remaining
55 ones may be switched in when the vehicle engine is running normally.

Of course, where weather conditions are such that not frost, but just dew or fog, deposits on the window, it is convenient that not merely a narrow
60 strip, but rather a large portion of the whole window is quickly cleared by simultaneously connecting all partial heaters.

It is therefore an object of the present invention to provide partial window heaters which can be,

65 according to necessity or will, connected singly or together in parallel or in series, or in series/parallel with the power source of the vehicle, so as to adapt them to various weather conditions and/or to the conditions of the electric power generating
70 and storage units of the vehicle.

Accordingly, the invention resides in a variable area window heating device for a motor vehicle, comprising a plurality of partial window heaters, each heater covering a portion of the area of said
75 window, and the collectors of said heaters being connectible individually or in combination with the electrical power source of said motor vehicle.

Preferably the device includes two pairs of collectors, each pair being located at one of the two opposite margins of the vehicle window and comprising an upper and a lower collector, the collectors of each pair being connectible to a respective supply terminal of the vehicle power source. The heating resistors are divided into a
85 number of groups, each group comprising a plurality of resistors. The first group connects the upper collector of the first pair with the upper collector of the opposite pair. The second group of resistors connects said upper collector of said first pair with the lower collector of said opposite pair.
90 The third group of resistors connects said lower collector of said opposite pair with the lower collector of said first pair. This arrangement of the three resistor groups permits connection of the heater devices of the window either singly or
95 jointly, in parallel, in series or in series/parallel.

In the accompanying drawings,

Figure 1 illustrates a device according to a first example of the invention;

100 Figure 2 illustrates a device according to a modification of the first example having differently shaped collectors; and

Figure 3 illustrates a device according to a second example of the invention.

105 The device of Figure 2 differs only in the segmental shape of its collectors from that of Figure 1, in which the collectors are rectilinear. Therefore the description of Figure 1 also applies to the device of Figure 2.

110 Referring to Figures 1 and 2, the device includes two pair of collectors located adjacent the left and right hand margins respectively of a vehicle window. The left hand collector pair is divided into an upper, shorter collector 2' and a lower, longer collector 2. Collector 2' is
115 connectible by a lead 4 to the positive terminal of the vehicle battery, and similarly collector 2 is connectible by a lead 4' to the same or to the opposite terminal. The right hand pair of collectors comprises an upper collector 3 connectible by a
120 lead 5 to the negative battery terminal or to earth, and analogously the lower collector 3° is connectible to earth by a lead 5'.

From collector 3 a first group of heating
125 resistors R1 is led to collector 2' and a second group of resistors R2 to collector 2. Collector 3' is connected to collector 2 by a third group R3 of resistors.

It is clear that this arrangement permits various

combinations. By connecting lead 4 to the positive terminal and lead 5 to earth, only the resistor group R1 will be heated by the whole available current supply and will quickly defrost the uppermost window area. By connecting the lead 4' to the positive terminal and earthing lead 5, the current will heat only the wire group R2 and clear the central window area. Finally, by connecting lead 4' to the positive terminal and lead 5' to earth, only the lower window area will be quickly heated by the resistor group R3.

By connecting both leads 4 and 4' to the positive terminal and lead 5 to earth, resistors groups R1 and R2 will be parallel connected to clear the central and upper window areas.

Similarly by connecting lead 4' to the positive terminal and leads 5 and 5' to earth, the central and lower window areas will be cleared. By connecting lead 4 to the positive terminal and lead 5' to earth, all three resistor groups R1, R2 and R3 will be series connected to defog practically the whole window area. To quote another possibility, by connecting lead 4 to the positive terminal and lead 4' to earth in lieu of the positive terminal, resistors group R1 and R2 will be series connected.

Thus, the embodiments of Figures 1 and 2 offer a number of combinations which are adaptable to practically any requirements imposed by weather, road and power supply conditions.

The window heating device shown in Figure 3 is simpler and comprises only two heating wire or resistor groups R' and R'', a single left hand collector 6 and a pair of right hand collectors 7 and 7'.

Resistor group R' interconnects the left collector 6, which is earthed by placing a switching lever 8 upon contact A, with the right hand collector 7, which is connected to the positive supply terminal of the power source of the vehicle. The negative terminal of the power source is earthed and hence in this position of the lever 8, the resistor group R' is quickly heated to clear the window area covered by it, since the whole available electric power encounters the relatively low ohmic resistance offered by this group. Collector 6 is also connected by the two resistor groups connected to contact B. Here, the resistor wires of this group pass partly over and partly under the central group R'. By switching the earthed lever 8 to contact B, the resistor groups R' and R'' will be series connected, with the current flowing from collector 7' through collector 6 to collector 7.

Thus, the ohmic resistance of the heating device will be increased, and its defrosting or defogging action will be slower, although

involving a wider window area.

CLAIMS

1. A variable area window heating device for a motor vehicle, comprising a plurality of partial window heaters, each heater covering a portion of the area of said window, and the collectors of said heaters being connectible individually or in combination with the electrical power source of said motor vehicle.

2. A device as claimed in Claim 1, wherein a respective pair of collectors is located adjacent each of two opposite margins of the window, each pair of collectors comprising an upper and a lower collector, and being connectible to a respective supply terminal of said power source, and wherein a first group of resistors interconnects the upper collector of one pair of collectors to the upper collector of the oppositely located pair of collectors, a second group of resistors interconnects said upper collector of said one pair to the lower collector of said opposite pair, and a third group of resistors interconnects the lower collector of said one pair to the lower collector of said opposite pair.

3. A device as claimed in Claim 1, including a single undivided collector provided adjacent one margin of the vehicle window and a pair of collectors provided adjacent the opposite window margin; a lever switchable from a first position in which said undivided collector is connected to a first supply terminal of the power source to a second position in which one collector of the pair of collectors is connected to said first terminal, the other collector of said pair being permanently connected to a second supply terminal of the power source of opposite polarity to said first terminal; a first group of central resistors interconnecting said undivided collector with the other collector of said pair; and a second group of resistors interconnecting said undivided collector with the one collector of said pair, whereby by switching said lever to said first position the first group of resistors is heated, and by switching said lever to said second position, said first group of resistors is connected in series with said second group of resistors.

4. A device as claimed in Claim 3, wherein one part of said second group of resistors runs above, and the remaining part of said second group of resistors runs below said central group of resistors.

5. A variable area window heating device as claimed in Claim 1, substantially as hereinbefore described with reference to Figure 1, or Figure 2, or Figure 3 of the accompanying drawings.