Oct. 6, 1970 H. D. PEETZ 3,532,858

THERMAL WINDOW

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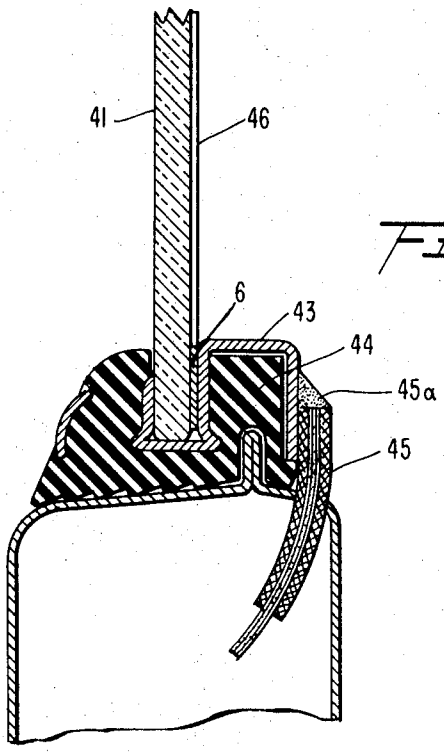


Fig. 1

PRIOR ART

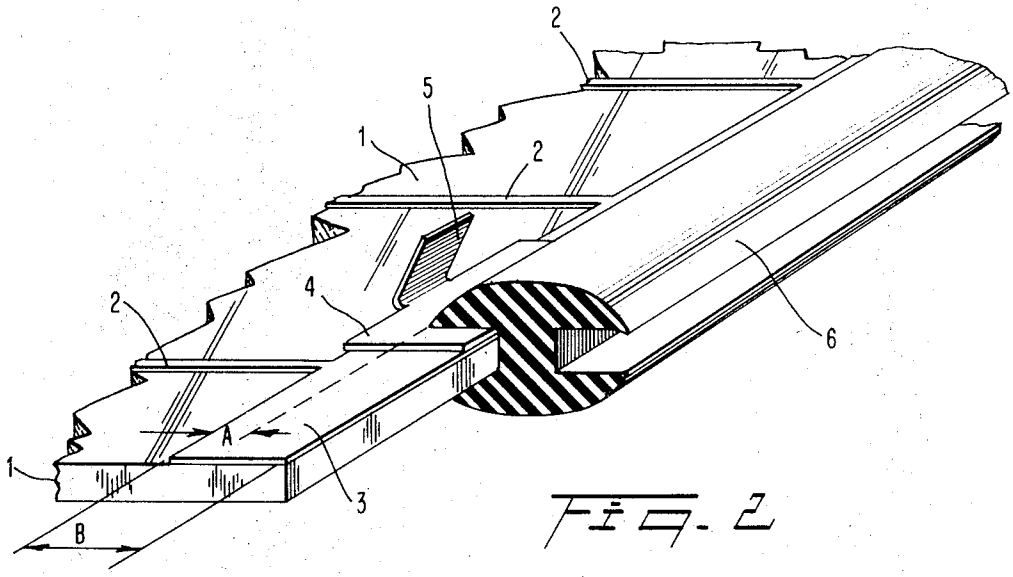


Fig. 2

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THERMAL WINDOW

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Int. Cl. H05b 3/06
U.S. Cl. 219—522 4 Claims

ABSTRACT OF THE DISCLOSURE

A thermal window is provided with a thermal grid of which the current-carrying bus is out of contact with the gasket which mounts the pane.

This invention relates to thermal windows the general nature of which is set forth in French Pat. 1,464,585. In such windows a thermal grid is provided which has linear thermal strips extending between current-carrying buses. The buses are usually of one piece with the strips. The grids are frequently made by forming thin resistor filaments and bus bands in the plastic layer between two sheets of glass, of the type normally used for automobile windshields in the United States, or by deposition on the surface of tempered glass windows. The general construction of such windows, as viewed in section, is shown in FIG. 6 of the French patent, which is reproduced herein as our FIG. 1. In that figure a pane 41 of tempered glass bears on its surface a thermal grid which is composed of spaced parallel strips or filaments 46 connected at their ends to bus bands 6, which extend along opposite edges of the pane. A contact 43 brings current from a lead 45 to the bus band, which distributes it to the strips, it passes through the strips to the other bus and returns to its source. The pane is set in a rubber gasket 44, which covers the bus bands.

Although this construction has great merit it has been discovered that, after a certain time, the efficiency of the thermal grid decreases to the point that the fogging or icing of the window, which it is designed to prevent, still occurs. It also appears that the resistance of the grid increases with time so that the bands most remote from the input contact no longer function properly. There have also been instances of disengagement between the buses and the strips for which the conditions of use do not offer an explanation.

It is an object of this invention to discover the reason for these difficulties and to overcome them. Although the reason for the decrease in efficiency of such grids is not yet fully understood, the objections have been overcome by the present invention, so that thermal windows constructed as herein provided have a lifetime of full efficiency.

The objects of the invention have been accomplished generally speaking by a thermal window having a pane of glass, a thermal grid mounted in contact therewith, the thermal grid having thermal strips extending between current-carrying bus means, the pane being mounted in gasket means, and the bus means having current carrying portions out of contact with the gasket means.

A preferred form of the invention is illustrated in the drawing, of which:

FIG. 1 is a substantial copy of FIG. 6 of the aforesaid French patent; and

FIG. 2 is a perspective view, partly in section, of a preferred form of the invention illustrating a thermal window carrying a thermal grid constructed in accordance with the principles of the invention.

In FIG. 2 the numeral 1 indicates a pane of tempered glass; numerals 2, 3 indicate a thermal grid of some useful type, for instance of the type described in the French patent, which is in contact with the pane, part 3 being one of the bus bands or bars between which the parallel resistance strips 2 extend. Affixed to the band 3 is an input contact 4, 5 which is to be connected to a current-carrying lead, not shown. A channeled gasket 6, usually rubber, or rubbery material, that is to say some form of non-conductive plastic, seals the border of the pane and makes it weatherproof. The type of thermal window shown is of the sort used as automobile rear windows. The distance B is the total width of the current-carrying bus, and the width A indicates an extension of the bus beyond the limits of the gasket.

According to a characteristic of the invention each bus band has a width greater than the part of it which is covered by the rubber gasket, which is, in effect, to say that each bus band has a part out of contact with the gasket, the part being adequate in itself to carry the current to and from the resistor strips which connect the two bands. In accordance with this principle it is desirable that the connection between the source of current and the bus band should furnish a conductive line free of the gasket.

In this novel construction the strips do not break away from the bands, substantially equal current is delivered to all bands by the buses regardless of their distances from the contacts, the increase of resistance with age does not occur, and a lifetime of uniform service is assured. As the ordinary gasket is non-conductive by test and by material, it is apparent that an unusual phenomenon is present, the precise nature of which is unknown. However, it may be assumed that, although the gasket is non-conductive, it in some way inhibits the flow of current in the part of the bus with which it is in contact, but that this inhibition does not extend to parts of the bus which it does not touch, even though the two parts of the bus are unitary.

The advantages of the invention have been in part stated hereinabove and in part reside in the accomplishment of the objects of the invention.

The term "strip" in the claims is to be interpreted as including wires, ribbons, filaments and rods.

As many apparently widely different embodiments of the present invention may be made without departing from the spirit and scope thereof, it is to be understood that the invention is not limited to the specific embodiments.

What is claimed is:

1. In a thermal window, a mounting gasket of resilient rubbery dielectric material having a channel therein extending along its longitudinal dimension, to define spaced side walls, a pane of glass having an edge fitting said channel, a thermal grid comprising a plurality of electrical conductor strips extending in spaced relation permitting visibility through the pane over and in contact with said pane, in a direction generally transverse of said channel, and a bus bar electrically connecting the ends of said strips and interposed between said pane and one side wall of said channel, said bus bar having an edge portion exposed to the atmosphere extending longitudinally along said gasket out of contact therewith, said edge portion being adequate in itself to carry the electrical current passing through the thermal grid, the glass pane, the bus bar and the mounting gasket being in direct and tight contact with each other.

2. The thermal window of claim 1, said bus bar being a flat ribbon of metal, said exposed portion thereof having a longitudinal edge generally parallel with said gasket, the ends of said strips merging into said edge.

3. The thermal window of claim 2, and an electrical input contact fixed with said bus bar over at least a portion of said exposed portion thereof.

4. In a thermal window, a mounting gasket of resilient rubbery dielectric material having a channel therein extending along its longitudinal dimension, to define spaced side walls, a pane of glass having an edge fitting said channel, a thermal grid comprising a plurality of electrical conductor strips extending in spaced relation over and in contact with said pane, in a direction generally transverse of said channel, and a bus bar electrically connecting the ends of said strips and interposed between said pane and one side wall of said channel, said bus bar having a free exposed surface area extending longitudinally along said gasket, out of contact therewith, said bus bar being a flat ribbon of metal, said exposed area thereof defining a longitudinal edge generally parallel with said gasket, the ends of said strips merging into said edge, and an electrical input contact fixed with said bus bar over at least a portion of said exposed area thereof, said contact being flat and extending into said channel between said one side wall thereof and said bus bar, the pane, the bus band, the flat contact, and the mounting gasket being in direct and tight contact with each other.

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U.S. Cl. X.R.

219—203, 543; 338—328