

DOUBLE-GLAZED WINDOW STRUCTURE FOR USE
IN A REFRIGERATOR OR THE LIKE

5 This invention relates to a double-glazed window structure, and more particularly, to the structure of a spacer disposed between glass panes of a window suitable for use in defining a display chamber of a refrigerator or the like.

10 Double-glazed window structures are well known and are usually used in refrigerators or freezers to improve the refrigerating efficiency, being used in large areas to improve the display of goods within.

 As shown in Figures 1 and 2, double-glazed
15 window structures commonly comprise two parallel glass panes 2 and 3 which are separated from one another by spacers 4 disposed along their edges. The gap between the glass panes 2, 3 and the spacer 4 and outer side of the structure is filled by a seal
20 element 5 to seal off an internal space A' defined by parallel panes 2, 3 and spacers 4. Furthermore, spacer 4 contains drying material 6, for instance, silica gel for preventing condensation.

 In this structure the spacer is normally formed
25 of aluminium alloy or steel. However, if such double-glazed windows are utilized as display windows in a refrigerator or freezer which is provided with at least three glass window faces, each corner of the refrigerator has an opaque portion due to the
30 spacers. Therefore, such spacer detrimentally affects the view of merchandise stored in the refrigerator or freezer.

 In accordance with the present invention a double-glazed window suitable for use in a
35 refrigerator or freezer comprises parallel glass panes and one or more spacers disposed between the glass panes along the edges of the glass

panes, a seal element disposed on the outside of the or each spacer to seal off the space inside the glass panes, the or each spacer being formed at least partly of transparent resinous material and having an
5 outer surface covered by a reinforcing element.

This construction provides improved double-glazed structure windows which have good viewing characteristics and which may easily prevent the occurrence of condensation on the inner surfaces
10 of the glass panes.

In the drawings:-

Figure 1 is a schematic view of a prior art double-glazed window;

Figure 2 is a horizontal sectional view of a
15 double-glazed window of Figure 1;

Figure 3 is a sectional view of a double-glazed window in accordance with one embodiment of this invention;

Figure 4 is a sectional view of a double-glazed
20 window in accordance with another embodiment of this invention;

Figure 5 is a sectional view of a double-glazed window illustrating a modification of the window of Figure 4;

Figure 6 is a freezer utilizing a double-glazed
25 window of Figure 3;

Figure 7 is a schematic view of connecting elements utilizing a double-glazed window according to another embodiment of this invention;

Figure 8 is a horizontal view of a double-glazed
30 window utilized in the connecting element of Figure 7; and,

Figure 9 is a vertical sectional view of a double-glazed window utilized in the connecting
35 element of Figure 7.

Referring to Figure 3, a double-glazed window 10 comprises two parallel glass panes 101 and 102 which

are separated from one another by a spacer 11.

Spacer 11 is disposed along the edges of the parallel glass panes 101 and 102 to maintain a defined space A. A seal element 12 is disposed on the outside of the spacer 11 to fully fill the gap defined between the glass panes 101 and 102. Therefore, the space A is sealed off by the seal element 12. The spacer 11, which has a hexagonal shaped cross-section and vertically extended seam gap 13 at its inner side surface, is formed of a transparent resinous material. The outer surface of the spacer 11 which faces the seal element 12 is covered by a reinforcement element, for example, a stainless steel element 14. Also, the reinforcement element 14 functions to prevent the penetration of moisture from outside air.

A drying element, for example silica gel 15, is disposed within the spacer 11. The air in space A is allowed to circulate between the interior of spacer 11 through gap 13, so that it is dried by the drying element 15 thereby preventing condensation occurring on the inner surface of the glass panes 101 and 102. Furthermore, the heat transfer rate of the resinous spacer 11 is lower than that of a steel spacer so that the air in space A is not influenced by changes of outside temperature to the same extent.

As shown in Figure 6, if this double-glazed window is used in a freezer, each corner or edge which is defined by the outer edge of a window is covered by only the reinforce element 14 attached to the outer surface of spacer 11. The freezer 20 comprises an upper compartment, such as a merchandise storage/display compartment 21 and a lower compartment 22 for a refrigerating unit. Storage/display compartment 21 is defined by both side panels 211, 212, upper panel 213, front panel 214 and rear door panel 215, and each panel consists

of a double-glazed window structure of the Figure 3 type. One embodiment of a connecting structure between the panels is disclosed in our copending application No. 8516475 filed on 28th June 1985. The
5 corners or edges of connecting portions are defined by the spacer of the window, to thereby improve the good viewing of goods in the storage/display compartment.

In this embodiment of the window, even if the
10 spacer is formed of transparent material, drying elements 15 are contained within the interior of the space 11. Thus, these drying elements 15 may hinder the improvement of good viewing. One solution to this problem is shown in Figure 4, including a
15 dividing plate 16 is disposed within the interior of spacer 11 divide the spacer into two chambers 11a, 11b, the plate 16 having a vertically extending gap 161 for enabling the circulation of air between divided chambers 11a, 11b. Drying elements 15 are
20 disposed within the outside chamber 11a defined by the dividing plate 16 and the outside portion of the spacer 11 which is covered by the reinforcement element 14. Therefore a clear portion 11b(6) of spacer 11 which is not blocked by any materials is
25 provided so that good viewing of the storage/display compartment is provided.

Referring to Figure 5, a modified structure of the spacer shown in Figure 4 is disclosed. The
dividing plate 16 has flange portions 161 and 162 at
30 both its end portion to form fitting portions against the inner surface of the spacer 11. Therefore, the divided plate 16 is fixedly fitted in the interior of spacer 11 by the closely fitted structure as an easy operation.

35 Referring to Figure 7 to 9, another embodiment of this invention to modify the placement of drying elements is shown. The corners of the window 10 are

provided with connecting elements 17 which are formed of transparent material and which comprise a receiving section 171 and connecting sections 172, as shown in Figure 7. Receiving section 171 is an L-shaped closed section and has a hollow portion 17a to contain drying elements 15. Each connecting section 172 projects from one end surface of receiving section 171 to extend within the internal space of a spacer 11. The interior of connect section 172 is hollow space 17b which is connecting with the hollow portion 17a of receiving section 171 and also connected with space A of window 10 through gap 172a formed on one end surface thereof of face gap 13 of spacer 11. Each end of connecting section 172 is open and covered by closed plate 173 to enable the loading of drying elements 15. Therefore, the good viewing of the storage/display compartment is further improved.

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CLAIMS

1. A double-glazed window suitable for use in a refrigerator or freezer, comprising parallel glass panes and one or more spacers disposed between the glass panes along the edges of the glass panes, a seal element disposed on the outside of the or each spacer to seal off the space inside the glass panes, the spacer being formed at least partly of transparent resinous material and having an outer surface covered by a reinforcing element.
2. A double-glazed window according to claim 1, wherein the or each spacer has an elongate gap along its inner surface and drying elements contained within the interior of the spacer.
3. A double-glazed window according to claim 2, wherein the interior of the or each spacer is divided into two chambers by a plate element which extends along the spacer and which has a gap connecting the two chambers, the drying element being disposed in the outer chamber of the spacer.
4. A double-glazed window according to claim 3, wherein the plate element has flange portions at its end portions to form a fitting portion for fitting the plate element to the inner surface of the or each spacer.
5. A double-glazed window according to any of claims 1 to 4, further comprising a connecting element, which contains a drying element, disposed at each corner of the window to connect the adjacent spacers in the window.
6. A double-glazed window according to claim 5,



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wherein the connecting element comprises a receiving section having a hollow space to contain the drying element and connecting portions projecting from end surfaces of the receiving section for extending into
5 the interior of the or each spacer.

7. A double-glazed window substantially as described with reference to any of the examples shown in the accompanying drawings.

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