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COLD DISPLAY CABINET

This invention relates to a cold display cabinet, such as a refrigerator or deep freezer, having a double glazed window structure to provide a good viewing characteristics.

In the distribution of merchandise, it is widespread practice to store, transport and sell foodstuffs and beverages in the frozen or refrigerated state, and these products are offered for sale in display cabinets in supermarkets or other food stores. Each display cabinet normally has insulating windows which are interposed between a cold inside storage region and the warmer ambient air outside to enable a saving in power consumption by the refrigeration unit and to prevent condensation.

Figures 1a and 1b of the accompanying drawings show a basic construction of display cabinet 1 with a double glazed window structure. A food storage and display chamber S of the display cabinet 1 is located on a refrigeration unit casing 2 and cooled by the unit. The chamber S is defined by a front window 3a, right and left side windows 3b, 3c, a top window 3d and a rear door 4, which is rotatably supported to open and close a rear opening of the chamber S. Each of the front, side and top windows 3a, 3b, 3c, 3d consist of an outer glass pane 5a facing the warmer region, an inner glass pane 5b facing the colder chamber S, and a spacer 5c between the outer edge portions of the outer and inner panes 5a, 5b. Adjacent side and top edges of the windows are connected by fastening means 6, each of which comprises a plastics element 6a, which is formed integrally with a plurality of supporting projections 8 for shelves 7, a metallic reinforcing element 6b

and a shroud 6c, which improves the outer appearance of the fastening means 6 and prevents the customer from injury.

In this double glazed window construction, the fastening means consists of a plurality of parts, and therefore the assembly is complicated and time-consuming. Also, each corner of the display case is covered by a metallic shroud so that a good view of the displayed merchandise is prevented.

It is a primary object of this invention to provide a cabinet with double glazed windows, which is easily assembled by simple fastening means.

According to the invention, in a cold display cabinet comprising a refrigeration chamber containing a refrigeration unit, and a storage chamber for the storage and display of merchandise, the storage chamber being cooled, in use, by the refrigeration unit and being defined by a front window, right and left side windows, a top, and a rear door, the door being swingable on a frame, which is fixed to the rear edges of the right and left side windows and of the top and forms a rear opening that is opened and closed by the door for discharging and loading merchandise from and into the storage chamber; at least the front, and left and right side, windows are double glazed and each comprises an inner glass pane facing the storage chamber, an outer glass pane and a spacer disposed between the outer peripheral edge portions of the inner and outer panes to form a gap between the panes; the adjacent edges of each adjacent pair of windows, consisting of the front window and one of the right and left side windows, being interconnected by providing the outer pane of one of the windows of the pair with an extension which projects beyond the corresponding inner pane, the extension overlapping, and being secured by fastening means to the edge of the other window of

the pair.

Viewing of the stored merchandise is improved still further if the spacer is formed of a transparent material.

Some examples of cabinets constructed in accordance with the invention, and by comparison with the prior art, are illustrated in the accompanying drawings, in which:-

Figure 1a is a perspective view of a prior refrigerator;

Figure 1b is a section taken on the line A-A in Figure 1a;

Figure 2 is a perspective view of one example of a refrigerator in accordance with the invention;

Figure 3 is a section taken on the line B-B in Figure 2;

Figure 4 is an exploded perspective view illustrating the connecting structure of windows of the refrigerator shown in Figure 2;

Figure 5 is an exploded view illustrating a modified connecting structure of windows;

Figure 6 is a perspective view of another example of a refrigerator in accordance with the invention;

Figure 7 is a section taken on the line C-C in Figure 6; and,

Figure 8 is an exploded perspective view illustrating the connecting structure of windows of the refrigerator shown in Figure 6.

As shown in Figures 2 and 3, a refrigerator 10 includes a mechanical chamber 11 within which a refrigeration unit is disposed, and a merchandise storage and display chamber 12, which is located above the mechanical chamber 11 and cooled by the refrigeration unit.

The chamber 12 is defined by a front window 13, right and left side windows 14, 15, a top window 16

and a door arrangement 17, which comprises a frame element 171 and a clear window element 172. The frame element 171 is attached to rear side edges of the top, and right and left side windows 14, 15 and 16 to define a rear opening, and the clear window element 172 is hinged to open and close the rear opening for discharging and loading merchandise. The sealing of the rear opening is accomplished by a seal element disposed between the frame element 171 and the clear window element 172, as in prior techniques. As clearly shown in Figure 3, at least the front, and right and left side, windows 13, 14 and 15 are double glazed with a multi-pane window structure 20 which comprises an outer glass pane 201 facing the ambient warmer region, an inner glass pane 202 facing the chamber 12, and a spacer 203, which is formed of a transparent material and is disposed between the outer peripheral edge of the inner and outer panes 201, 202 to form a gap 22 therebetween. The gap 22 is sealed off by a seal element 23 also formed of transparent material, whereby the cooling efficiency of the refrigeration unit is greatly improved and condensation is prevented.

A plurality of shelves 24 are disposed within the chamber 12 to divide it into spaces for merchandise. These shelves 24 may be supported on respective ones of a plurality of supporting elements 25 attached to the inner surfaces of the inner panes of the windows.

In this structure, as shown in Figures 3 and 4, the outer glass panes 201 of both side windows 14, 15 have extensions 201a projecting outwardly from the edges thereof to overlap and cover the side edges of the front window 14. Also, an outer edge 161 of the top window 16 covers and overlaps the top edges of the three windows 13, 14 and 15. Alternatively, the top window may also be provided with a multi-pane

double glazed window structure 20. In that case, the outer glass pane of the top window 16 is formed with an extending portion for overlapping and covering the top edge of the three windows 13, 14 and 15.

A coupling element 18, which has L-shaped cross-section, is disposed in each corners of the front, and right and left side, windows 13, 14 and 15 between the inner and outer panes 201, 202. A moisture-absorbing element 21 may be inserted in the coupling element 18 to dry the air enclosed within the gap 22 of the window. Alternatively, and as shown in Figures 3 and 7, the element 21 can be enclosed in both terminal ends of the spacer 203. One or more pins 181 are formed on the sides of the coupling element 18 which face the extensions 201a or top window 16. Each extension 201a has a plurality of holes 201b which oppose the respective pins 181 of the coupling elements 18. During the assembly operation of the chamber 12, each pin 181 is received in its hole 201b and secured by a fastening element 19. The fastening element 19 comprises a cylindrical portion 191 in which the pin 181 is closely fitted, and a head portion 192 fitted against the outer surface of the extension 201a. The windows 13, 14, 15 and 16 are thus connected with one another through the coupling elements 18 and fastening elements 19. The connection between the pin 181 of the coupling element 18 and the cylindrical portion 191 of the fastening element 19 may be accomplished by close fitting or by use of a bonding material or by a screw connection.

As shown in Figure 5, if the top window 16 is of the multi-pane construction 20, the outer glass pane 201 of the three windows 13, 14 and 15 may have further extensions 201a to cover the side edges of the top window 16, and the coupling elements 18 should then be disposed at the corners of the top

window 16. The connection of the windows is then the same as mentioned above with reference to Figures 2-4.

Figure 6, 7 and 8 illustrate a modification of the connecting structure shown in Figure 2, and, therefore, similar parts to those shown in Figures 2-4 are indicated by the same numbers. The outer glass pane 201 of either the front window 13, or each side window 14, 15 has an extension 201a to overlap and cover the side edge of the adjacent window. A connecting member 25 which has a generally L-shaped cross section is interposed between the adjacent edges of the right or left side window 14, 15 and front window 13. Therefore, each edge surface of the windows 13, 14 and 15 is covered by one plate portion of the connecting member 25. Each connecting member 25 may be fixed to the windows by the coupling elements 18 and fastening element 19, i.e., the connecting member 25 is formed with a hole 251 for penetration of the pin 181 and the cylindrical portion 191 of the fastening element 19.

A plurality of shelf-supporting elements 26, which support the shelves 24 disposed in the chamber 12 are integrally formed on the inner side edges of the connecting member 25. A shroud portion 27 is also integrally formed with the outer edge of the connecting member 25 and has a flange 271 to cover the outer edge of the extension 201a, thus preventing the outer edges of the windows from damage and reinforcing the interconnection of the windows.

CLAIMS

1. A cold display cabinet comprising a refrigeration chamber containing a refrigeration unit, and a storage chamber for the storage and display of merchandise, the storage chamber being cooled, in use, by the refrigeration unit and being defined by a front window, right and left side windows, a top, and a rear door, the door being swingable on a frame, which is fixed to the rear edges of the right and left side windows and of the top and forms a rear opening that is opened and closed by the door for discharging and loading merchandise from and into the storage chamber, wherein at least the front, and left and right side, windows are double glazed and each comprises an inner glass pane facing the storage chamber, an outer glass pane and a spacer disposed between the outer peripheral edge portions of the inner and outer panes to form a gap between the panes; the adjacent edges of each adjacent pair of windows, consisting of the front window and one of the right and left side windows, being interconnected by providing the outer pane of one of the windows of the pair with an extension which projects beyond the corresponding inner pane, the extension overlapping, and being secured by fastening means to the edge of the other window of the pair.

2. A cabinet according to claim 1, wherein the spacer is formed of a transparent material.

3. A cabinet according to claim 1 or claim 2, wherein the door comprises a window element.

4. A cabinet according to any one of the preceding claims, wherein the top comprises a window.

5. A cabinet according to claim 4, wherein the top window is double glazed with outer and inner panes.

6. A cabinet according to claim 5, wherein, at the upper edges of the front, and right and left side, windows, the respective outer panes are provided with extensions, which project beyond the corresponding inner panes, the extensions overlapping, and being secured by fastening means to, the respective adjacent side edges of the top window.

7. A cabinet according to claim 5, wherein, at the front, and the right and left side, edges of the top window, the outer pane of the top window is provided with extensions, which project beyond the corresponding edges of the corresponding inner pane, the extensions overlying, and being secured by fastening means to, the respective adjacent upper edges of the front, and right and left side, windows.

8. A cabinet according to any one of the preceding claims, wherein a profiled strip covering the adjacent edges of both windows of the pair and is held in position by the fastening means.

9. A cabinet according to any one of the preceding claims, wherein at least some of the fastening means comprises a coupling member disposed at the end of a window edge which is overlapped and having a projecting pin, the pin being received in a hole in the overlapping extension, and a fastening element fixed on an end portion of the pin.

10. A cabinet according to claim 9, wherein the coupling member has an L-shaped cross-section and encloses material for absorbing moisture between the window panes.

11. A cold display cabinet, substantially as described with reference to any one of the examples illustrated in Figures 2 to 8 of the accompanying drawings.