April 8, 1969 J. H. BELL ET AL 3,436,884

THERMAL-BARRIER BETWEEN INNER AND OUTER FRAMES OF DOUBLE FRAME WINDOW STRUCTURE

Filed March 2, 1967 Sheet 1 of 2

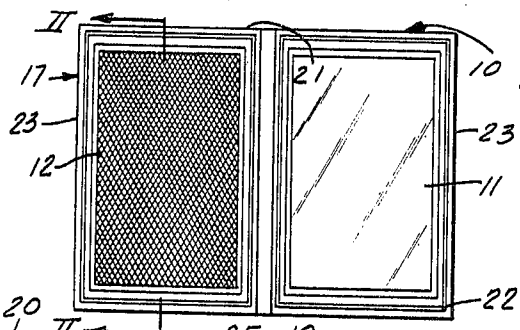


Fig-1

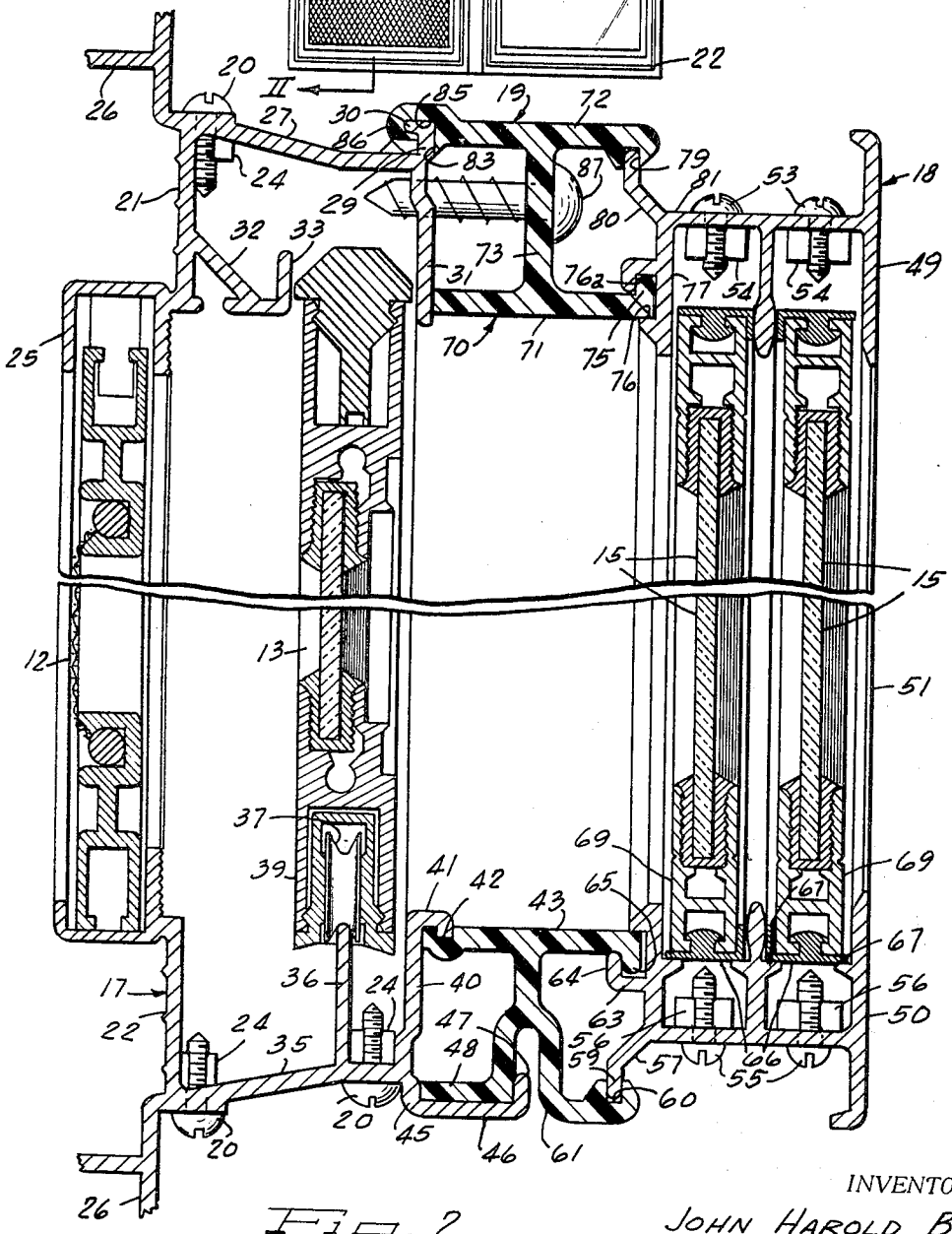


Fig-2

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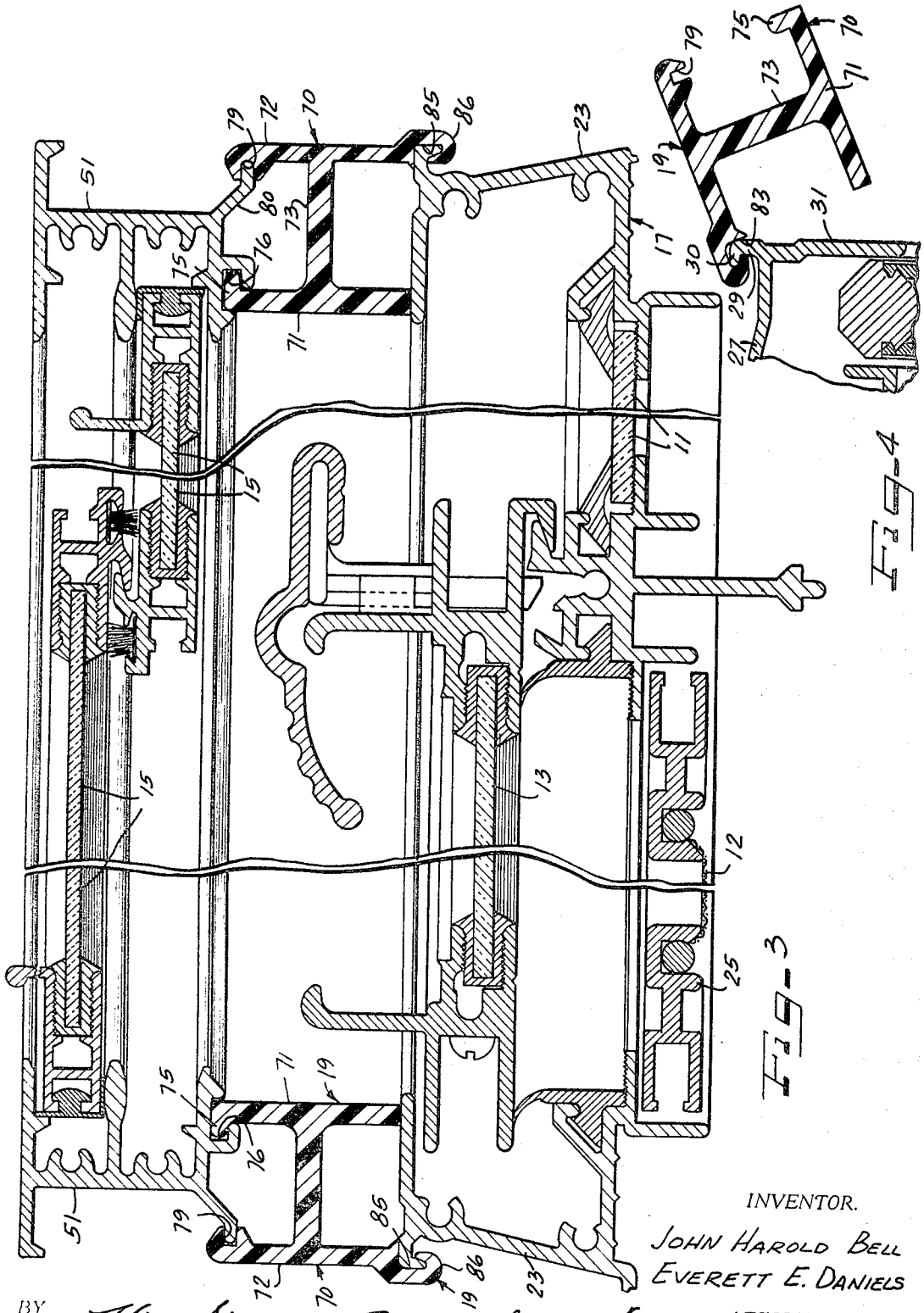


FIG-4

FIG-3

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THERMAL-BARRIER BETWEEN INNER AND OUTER FRAMES OF DOUBLE FRAME WINDOW STRUCTURE

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U.S. Cl. 52—202 7 Claims

ABSTRACT OF THE DISCLOSURE

Window structure for sliding windows having an exterior master frame adapted to be mounted in a window opening in a building and an interior frame spaced from the master frame in the window opening of the building and facing the inside of the room. The spacer for the frames is in the form of a thermal barrier having sealing engagement with the frames and forming an insulating barrier with air pockets between the frames, to eliminate moisture and frosting on the inside window surfaces and sill.

Summary of invention objects

This invention relates to improvements in thermal barriers between the exterior and interior frames of double frame window structures.

The invention generally relates to an improved form of thermal barrier between the inside and outside frames of a double frame sliding window, in which the barrier is of an improved construction and spaces the frames apart and effectively insulates the frames to prevent the condensation of moisture on the inner window and sill. A principal feature of the thermal barrier is its form in which two parallel spaced legs connected together, intermediate their ends, have sealing engagement with the inner and outer frames and are adapted to be hooked to one frame and to slidably receive the other frame and are sealed to the two frames to provide dead air pockets, between the inner and outer frames.

A principal object of the present invention, therefore, is to provide a novel and improved thermal barrier between the exterior and interior frames of a double frame window in which the effectiveness of the thermal barrier is increased by the provision of generally parallel connected legs having sealing engagement with the exterior and interior frames at their ends and forming a generally hollow insulator between the frames.

Another object of the invention is to provide a simple and improved form of thermal barrier between the exterior and interior frames of a window in which the thermal effectiveness of the barrier is increased by forming the barrier in the form of two generally parallel spaced connected legs forming in effect hollow dead air pockets as the legs are sealed to the exterior and interior frames of the window.

Still another object of the invention is to provide a simplified and improved form of thermal barrier between the exterior and interior frames of a double frame window structure in which the barrier is of a generally H-shaped form hooked at the end of one leg to one frame, and in which the opposite ends of the legs are formed in the form of slides, accommodating the other frame to be slidably moved into position therealong, into sealing engagement with the thermal barrier.

These and other objects of the invention will appear from time to time as the following specification proceeds and with reference to the accompanying drawings.

Description of the drawings

FIGURE 1 is a front elevational view of a double frame sliding window assembly constructed in accordance with the principles of the present invention.

FIGURE 2 is a vertical sectional view taken substantially along line II—II of FIGURE 1.

FIGURE 3 is a horizontal sectional view taken substantially along line III—III of FIGURE 1; and

FIGURE 4 is a fragmentary detail vertical sectional view taken along a portion of the outside master frame and showing the thermal barrier in the process of being hooked to the outside master frame.

Description of the preferred embodiment of the invention

In the embodiment of the invention illustrated in the drawings, we have generally shown in FIGURE 1 a window frame **10** for an exterior stationary window **11**, an exterior screen **12** and an inwardly spaced exterior sliding window **13** and inwardly spaced interior sliding windows **15—15**. It should here be understood that while we have herein shown the thermal barrier applied to a sliding window structure, that the window structure need not be a double sliding window structure and may effectively be applied to any double frame window structure.

The window frame **10**, as generally shown in FIGURE 1 and partially shown in FIGURES 2 and 3, includes an exterior master frame **17** and an inwardly spaced interior frame **18** separated from the exterior frame **17** by a thermal barrier **19**, forming in effect a hollow insulator with dead air spaces between the exterior and interior frames, to eliminate the forming of moisture and frost on the interior frame and sash.

The exterior frame **17** includes a top rail **21**, a bottom exterior sill **22** and opposite styles **23—23**. The exterior frame may be formed from aluminum extrusions, which have an outwardly extending channel-like frame structure **25** for the screen **12**, and integrally formed angle brackets **26** extending along the top rail and bottom sill of the frame, to form a securing means for securing the exterior frame to a window opening in a building in a conventional manner. The styles **23—23** may be secured to the frame of a building in a similar manner. Screws **20** threaded in screw receptacles **24** may be provided to connect the styles **23** to the rail **21** and sill **22**.

The top rail **21** of the exterior frame has a rail **27** extending inwardly beyond the sliding window **13** and having a leg **29** extending upwardly therefrom having a gib **30** extending outwardly of the upper end portion of the leg **29**. The rail **27** also has a depending leg **31** extending along the inside of the sliding window **13**, which may be suitably sealed thereto.

The top rail **21** also has a downwardly spaced angularly inwardly extending leg **32** terminating in an upright flange **33** extending parallel to the leg **31**, and with the outside of the leg **31** forming an upper guide for the sliding window **13**.

The sill **22** has an inwardly extending leg portion **35** having a rail **36** extending vertically therefrom and engaged by grooved rollers **37** suitably journalled in a bottom rail **39** of the sash for the sliding window **13**. The legs and rollers support the window for slidable movement into a closed position in front of the screen **12** and into an open position along the inside of the stationary window **11** (FIGURE 3).

The sliding window **13** may be suitably sealed to the exterior frame **17** and to the inside of the flange **33** and outside of the leg **31**, forming a slide for the window, in a manner which need not be shown or described herein, since it forms no part of the present invention. The inwardly extending leg portion **35** of the sill **22** terminates

in an upright leg 40 spaced inwardly of the rail 36 and extending generally parallel thereto. The leg 40 has an inwardly extending upper end seating portion 41 terminating into a depending gib 42, forming a guide for a lower insulator 43 of the thermal barrier. The inwardly extending rail portion 35 also has a downwardly turned inner end portion 45 having a support leg 46 extending horizontally therefrom, terminating into an upright gib 47 spaced inwardly of the downturned portion 45 and forming a support channel for a lower leg portion 48 of the insulator 43.

The interior frame 18 has a top rail 49, a bottom rail or sill 50 and styles 51, 51 connecting the top and bottom rails together. The top rail is secured to the styles 51, 51 as by screws 53 extending therethrough and threaded in inwardly opening screw receptacles 54 extending inwardly of the styles 51. In a like manner, the styles 51 are secured to the bottom rail or sill 50 as by screws 55, 55 threaded in inwardly opening screw receptacles 56, 56 extending inwardly of the styles 51, 51.

As shown in FIGURE 2, the sill or bottom rail 50 has an inner angularly inwardly and downwardly extending leg 57, terminating into a vertical downwardly facing rib 59 slidably engageable with an upwardly opening channelled guide 60 in a lower leg 61 of the lower insulator 43 of the thermal barrier 19. Spaced above the downwardly extending leg 57 and extending inwardly of the bottom sill 50, is a horizontally inwardly extending ledge 63 terminating into a upright gib 64 and cooperating with the inner side of the sill 50 to form a channelled guide for a depending gib 65 depending from the inner end of the leg of the insulator 43.

The sashes 15, 15 have slides 66, 66 extending along the bottoms thereof, slidable along spaced ledges 67, 67 spaced above the bottom wall of the bottom rail 50 of the interior frame. The slides 66 extend beyond opposite sides of sashes 69 for the sliding window and upwardly along the inner sides thereof and may be made from a plastic material having lubricating qualities, such as Teflon, or any other suitable material which will support the windows for free sliding movement along the ledges 67. The window structure and its support is no part of the present invention so need not herein be shown or described further.

Referring now in particular to the thermal barrier 19, spacing the interior frame from the exterior frame, and forming a hollow insulator between said frames, said thermal barrier 19 includes top and side insulators 70, 70 and the bottom insulator 43. The insulators 70 and 43 are all constructed on similar principles, the principal difference being that the insulators 70 are hooked to the top rail and the styles of the exterior frame and the interior rails and styles are then slid along the insulators, when assembling the window structure, while the bottom insulator 43 is slid onto the bottom rail of the exterior sash and the interior assembly is then slid into place along the bottom insulator.

As shown in FIGURES 2, 3 and 4 the insulators 70 are generally H-shaped in form and have parallel legs 71 and 72 connected together by a cross member 73. The structure of the insulators 70 and of the exterior and interior styles and rails, spaced apart by the insulators 70, are similar, so the top insulator and top rails 21 and 18 need only be described in detail herein, and like reference characters will be applied to like parts of the insulators and rails and styles.

The inner leg 71 of the insulator has a plane outer end abutting the inner end of the leg 31 of the top exterior rail 21. The opposite end of the inner leg 71 has a gib 75 extending therealong in a direction, which is shown in FIGURE 2 as being an upward direction. The leg 71 rests on a ledge 76 extending along the inside of an inner frame member 77 of the inner top rail 18. The gib 75 extends upwardly into a downwardly opening retainer channel 76*a*, extending along the inside of the leg 77, toward the exterior rail 21, and forming a retainer and sealing slide for the insulator 70. The top leg 72 has a downwardly opening channelled guide 79 depending from its inner end and extending therealong, and engageable with the top surface of a leg 80 extending angularly upwardly and vertically of a top face 81 of the top rail 18, and spaced inwardly of said top face. The leg 80 is sealed to the top leg 72 by its sliding fit within the channelled guide 79.

The outer side of the top leg 72 has a plane abutment face 83, abutted by the leg or flange 29, when the insulator is in place on the stationary rail. The abutment face 83 terminates into a recess 85, formed by a hook-like end 86 of the leg 72.

In assembling the insulator to the top rail 21, the recess 85, formed by the hook-like end 86 of the top leg 72, is engaged with the gib 30, as shown in FIGURE 4. The leg 72 being hooked to the gib 30, the insulator is rotated in a clockwise direction to position the outer end of the leg 71 into engagement with the leg 31 of the top rail. A series of screws 87, which may be self-tapping screws, may then be installed by placing through the web or cross member 73 of the insulator, and threading the screws in the inner leg 31 of the top rail 21.

When the insulator 70 is in position on the top rail 21, the interior top rail 18 may be slidably moved into position from the end of the insulator 70 by registering the gib 75 with the end of the downwardly opening gibbed guide 76, and registering the leg 80 within the downwardly opening channelled guide 79, and then sliding the interior frame along the guides 76 and 79 into position, and evening up the end of the interior top rail 18 with the end of the exterior top rail 21. When the top rail 18 is in position along the insulator 70 the insulator 43 may then be slidably moved onto the bottom rail or interior sill 50, with the leg 59 engaging the channelled guide 60, and the gib 64 extending along the inside of the depending gib 65 of the top leg of the insulator.

The bottom rail 50 together with the insulator 43 may then be slidably moved along the support leg 46 and gib 42 of the exterior sill 22 of the master frame. The ends of the interior and exterior sills may then be evened up.

The style insulators 70 may then be hooked to the interior legs 31 of the exterior styles 51 and secured thereto as by self-tapping screws 87 in the same manner the insulator 70 is hooked to the interior leg of the top rail 21.

The top and bottom rails may then be attached to the interior and exterior styles by the screws 20, connecting the top rail 21 to the top of the exterior styles 27 and connecting the bottom exterior rail or sill 22 to the bottom of the exterior styles, and by the screws 53 and 55, connecting the top and bottom rails to the top and bottom ends of the interior styles 51.

The frame is then assembled for placing in a window opening, with the interior frame completely insulated from the exterior frame by the hollow thermal barrier 19, formed by the insulators 70, 70 and 43.

The insulators 70 and 43 may preferably be made from a relatively rigid plastic material and may be made from nylon, Teflon, or various other plastic materials providing good insulating qualities and the rigidity to accommodate sliding of the rails and styles along the insulator, to form seals with the rails and styles, forming in effect hollow thermal barriers between the rails and styles with dead air spaces between the interior and exterior frames to thereby increase the insulating effectiveness thereof.

While we have herein shown and described one form in which the invention may be embodied, it may readily be understood that various variations and modifications in the invention may be attained without departing from the spirit and scope of the novel concepts thereof.

We claim as our invention:

1. In a window structure and in combination with a window frame having spaced exterior and interior frames, each frame having

a top rail,

styles connected to opposite ends of said top rail,

a sill connected between said styles at the lower ends thereof, the improvements comprising:

means maintaining said exterior and interior frames in predetermined spaced relation with respect to each other and insulating the interior frame from the exterior frame, comprising a thermal barrier between said frames and extending about the perimeter thereof and including relatively rigid plastic insulators having parallel spaced legs and a connecting member connecting said legs together intermediate their ends, said legs being sealed to said exterior and interior frames at their ends to provide a plurality of dead air pockets in the space between said legs, said pockets each being on opposite sides of said connecting members and extending about the marginal portions of said exterior and interior frames.

2. The structure of claim 1,

wherein at least one insulator has an outer leg having a hooked end portion, hooked to one of said frames and pivoted about its region of hooked engagement with said frame to engage an inwardly spaced leg of said insulator with said frame, to form an air pocket between said frame and said connecting member, and

wherein the opposite ends of said legs have guide portions extending therealong having slidable guiding engagement with the other of said frames and sealed thereto, to provide an air pocket on the opposite side of the connecting member and the other of said frames.

3. The structure of claim 1,

wherein the insulator is generally H-shaped in form and has an outer leg having an abutment adapted to abut a corresponding face of one of said frames and has an inwardly hooked end portion extending from said abutment adapted to be hooked onto one of said frames and pivoted inwardly to abuttingly engage an inner leg of said insulator with said frame, and

wherein the ends of said legs opposite said hooked end portion have retaining slides formed integrally therewith to slidably receive another of said frames in assembling the window frame structure.

4. The structure of claim 3,

wherein screws extend through the connecting member of said insulator and are threaded in an associated frame to seal the insulator to said frame and provide a plurality of dead air pockets in the space between said frame and connecting member.

5. In a window structure and in combination with a window frame having spaced exterior and interior frames including,

individual exterior and interior frame members extending about said frames and having inner faces spaced from and facing each other and extending therealong,

at least one of said inner faces having a gib extending at right angles with respect thereto along the outer

end thereof and facing away from the frame member of the next adjacent frame,

means maintaining said exterior and interior frames in predetermined spaced relation with respect to each other and forming a plurality of air pockets between said frame members comprising:

a relatively rigid plastic insulator, generally H-shaped in form and having a pair of parallel spaced legs and a connecting member connecting said legs together, intermediate the ends thereof, an outer leg of said insulator having an outer end portion having a hook-like recess therein terminating into a plain face facing said inner face of said frame member,

said insulator being adapted to be hooked onto said gib and pivoted inwardly to engage said inner face and to engage a second parallel leg of said insulator with said inner face of said frame member, to provide a seal between said vertical leg and the interior portions of said legs and connecting member, and

the opposite ends of said legs of said insulator having slidable sealing guides slidably engaged by the opposite frame member and accommodating ready assembly thereof, and having sealing engagement with the inner face of said opposite frame member to provide a second air pocket on the opposite side of said connecting member from said first air pocket.

6. The structure of claim 5, wherein screws are threaded in the connecting member of said insulator to secure said insulator to said frame member.

7. The structure of claim 5,

wherein the thermal barrier comprises at least a top insulator, side insulators extending downwardly from opposite ends thereof in parallel relation with respect to each other,

wherein said top and side insulators are hooked to the associated frame members and have sealing interengagement with the frame members of the opposite frame, and

wherein the thermal barrier also includes a bottom insulator having slidable sealing interengagement with adjacent opposite frame members of said interior and exterior frames, all of said insulators being H-shaped in form to provide dual air seals between said frame members of said interior and exterior frames.

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