

May 10, 1966

P. J. MORE ETAL

3,250,268

COMPOSITE DOOR STRUCTURE

Filed Jan. 25, 1965

2 Sheets-Sheet 1

FIG. 1

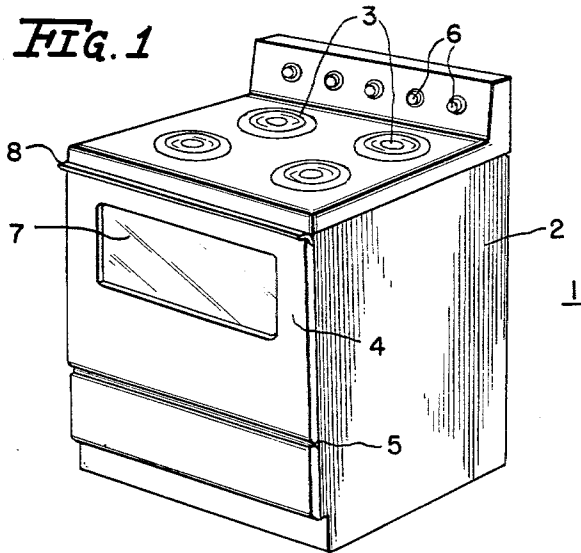


FIG. 2

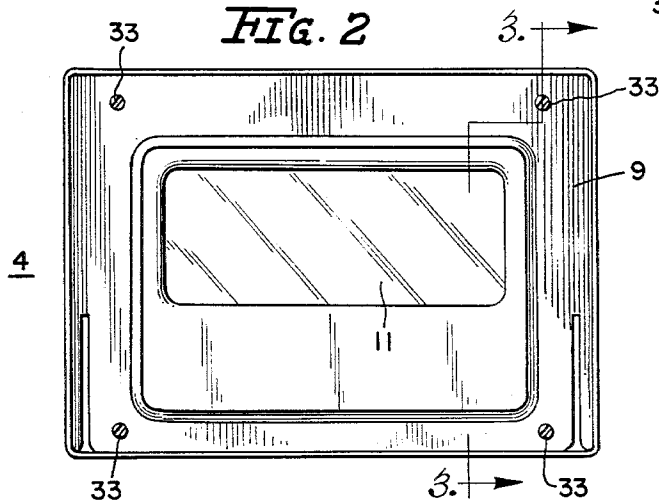
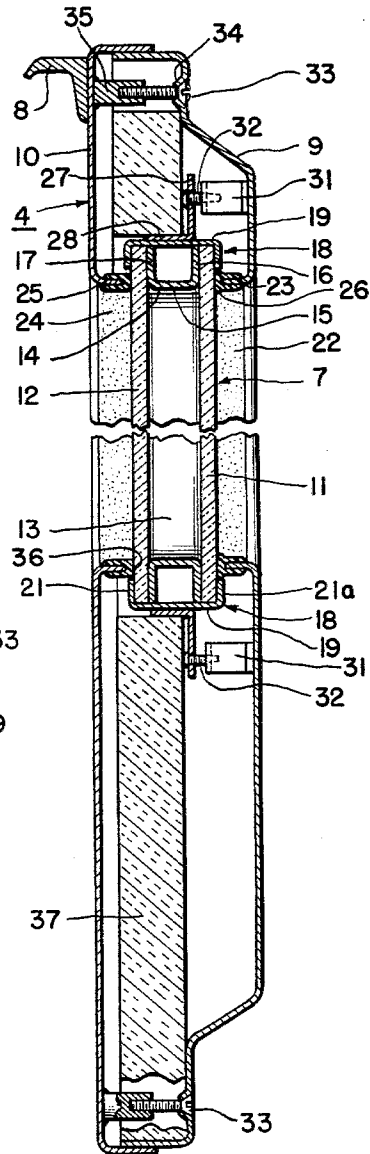


FIG. 3



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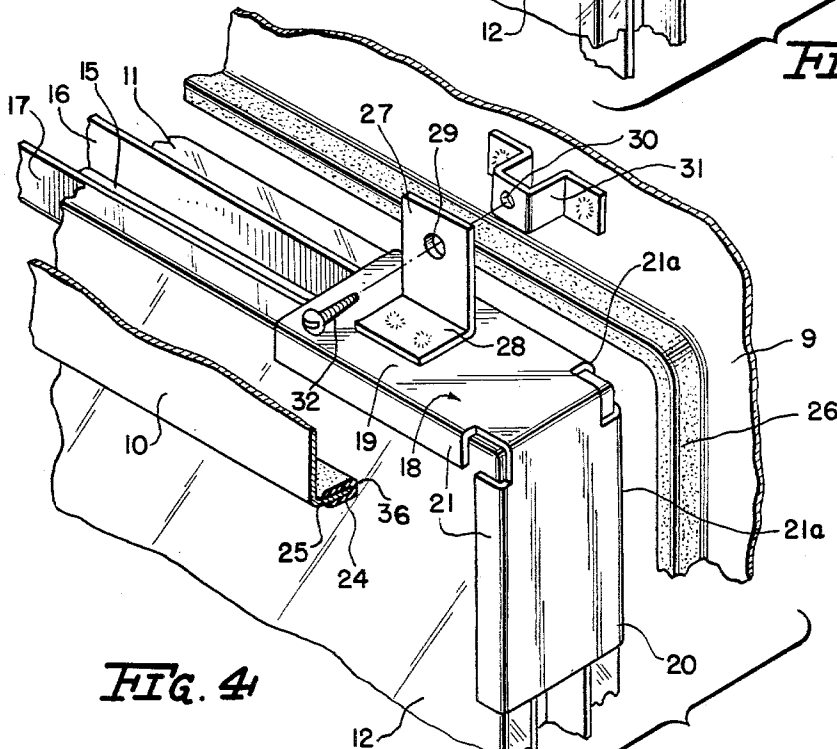
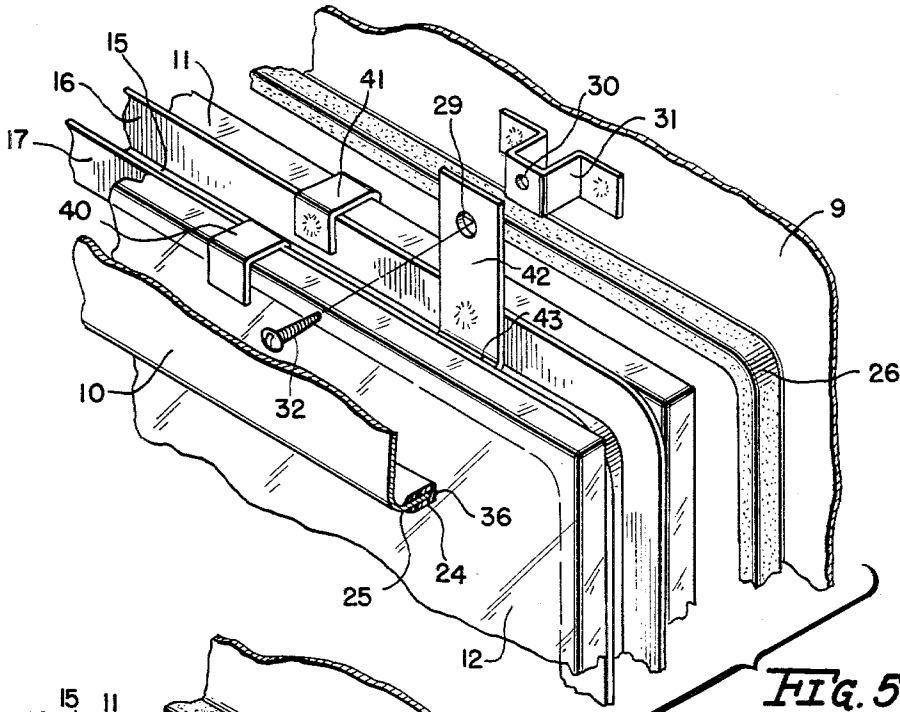
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COMPOSITE DOOR STRUCTURE

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9 Claims. (Cl. 126-200)

This invention relates to a composite door structure, and more particularly to such a structure wherein a viewing window is included.

While not limited thereto, this invention is particularly applicable to oven doors. In recent years, the use of transparent windows—generally of glass—in doors for ovens, clothes dryers, and the like, has substantially increased. In the case of ovens it is important to have at least two panes of glass in spaced relation so as to limit the temperature of the outer pane.

With this two-pane type of structure, the sealing of the space between the panes from the inside of the oven becomes of major importance. If an adequate seal is not provided, then greases and condensation may get between the panes.

Generally, the efforts to obtain improved seals have resulted in increased difficulty in taking apart the window assembly of the door. In addition, the degree of sealing has not, in most cases, proved sufficient to preclude, under all circumstances, entry of grease and condensation into the space between the panes.

It is consequently an object of our invention to provide an improved and simplified structure wherein sealing of the space between the two panes from the inside of the oven is achieved.

A further object of the invention is to provide the improved sealing effect while at the same time maintaining the window assembly including the two panes of glass relatively easy to disassemble.

A more specific object of our invention is to achieve this goal by causing the window assembly to be secured to the oven door in such a way that the pane of glass which is exposed to condensation, grease, etc., is held tightly against a strip of sealing elastomeric material.

In one aspect of our invention we provide a composite door in which two panes of transparent sheet material, usually glass, are positioned in alignment with each other and are spaced a predetermined distance apart by suitable spacer means positioned between the panes. A plurality of clamps is spaced around the edges of the panes, and cooperates with the spacer means so as to hold the panes stationary relative to each other in a unitary window assembly.

This assembly is associated with front and back door sections, formed with aligned window openings, and which are spaced apart so that the assembly may fit between them. Secured to the back door sections around its opening, on the side which faces the front door section, is a sealing strip of elastomeric material.

The window assembly has a plurality of fastening means secured around its edge, and these cooperate with a plurality of fastening means secured to the back door section. Thus, the window assembly is securely fastened to the back door section with one of the panes snug against the sealing strip. The assembly of the composite door is completed by cooperating fastening means on the front and back door sections which hold them together with the window assembly secured to the back door section, as previously described. This provides visibility within the oven from outside the door, and affords complete sealing of the space between the panes insofar as the interior of an oven is concerned.

The subject matter which we regard as our invention is particularly pointed out and distinctly claimed in the con-

cluding portion of this specification. Our invention, however, both as to organization and method of operation, together with further objects and advantages thereof, may best be understood by reference to the following description taken in conjunction with the accompanying drawings.

In the drawings, FIGURE 1 is a view in perspective of a typical appliance, specifically an oven in this case, in which our improved composite door may advantageously be used;

FIGURE 2 is a rear elevational view of the oven door of the appliance shown in FIGURE 1;

FIGURE 3 is a cross sectional view along line 3-3 of FIGURE 2;

FIGURE 4 is an enlarged fragmentary exploded view in perspective of a portion of the composite door of our invention; and

FIGURE 5 is a view similar to FIGURE 4 showing a second embodiment of our invention.

Referring first to FIGURE 1, there is shown a typical domestic range 1 having an outer cabinet 2. Suitable surface burners 3 are provided in the upper surface of cabinet 2, while within the cabinet there is normally provided a cooking oven accessible through a door hinged at its bottom part 5 by any suitable means (not shown) to the cabinet. The cooking operations on the surface units 3 and within the oven are generally controlled by conventional control members such as those shown by the numeral 6.

It will readily be observed that it is a great convenience for a person carrying on a cooking operation within the oven to be able to view the condition of the food without having to open door 4. For this purpose, the door 4 is provided with a suitable viewing window 7. In this way, without opening the oven door, the food within the oven may be viewed on a continuous basis until the cooking operation is complete. At that time, the oven door may be opened by handle 8 to remove the food from the oven compartment.

Referring now to FIGURES 2, 3, and 4, and more particularly to FIGURE 3, door 4 includes an inner or back section 9 and an outer or front section 10, it being understood that the back forms part of the oven compartment during cooking operations, and therefore is directly in contact with the high temperatures, smoke, grease, etc., which may be present within the oven. A viewing operation is, as previously described, effected through window 7. Window 7 is made up of a back pane 11 and a front pane 12 which are in spaced, and preferably parallel, planes, so that there exists a dead air space 13 between them. It is contemplated that the material used for panes 11 and 12 will usually be glass, with the inner pane at least being of a heat resistant type; the main point is that the panes be transparent, and able to withstand the temperatures and atmospheric conditions which prevail during cooking operations.

Panes 11 and 12 are maintained in their spaced relationship by a suitable spacer member 14 which in the present case is provided by a continuous frame-type structure having a U-shaped cross section as shown. Right 15 of the U forms the spacing means, and legs 16 and 17 of the U abut the inner surfaces of panes 11 and 12, respectively. It will be understood that the main function of this structure is to provide the desired spacing, and not sealing. Consequently, it is within the purview of this invention that the member 14 be discontinuous rather than being in the form of a single frame member extending entirely in a closed loop, as it has been provided in the present case.

Panes 11 and 12 are held together, in the spaced relation provided by spacer 14, by a number of suitable clamping members 18, one of which is shown in detail in

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FIGURE 4. It will be observed that each clamping member, in its preferred form, is L-shaped so as to fit around a corner of the assembly of the two panes of glass, with one part 19 of the L overlying the edges in one direction and the other part 20 of the L overlying the edges in the other direction. Clamp 18 is U shaped in cross section, so that the legs 21 and 21a of the U engage the surfaces of the panes 11 and 12 and clamp them together. Thus, the panes are, in effect, held between the spacer member 14—which is between them—and the clamping legs 21 and 21a.

It will readily be seen that when four clamps of the type shown by the numeral 18 in FIGURE 4 are provided, there is, in effect, a unitary window assembly. Panes 11 and 12 are held in a predetermined relation to each other, but, nonetheless, the assembly may be readily taken apart and reassembled without any adverse effects.

Returning now to FIGURE 3, it will be observed that the back door section 9 has an opening 22 formed therein, the edge of the opening being defined by a flange 23 which is turned in so as to extend toward the front door section 10. Similarly, an opening 24 is provided in the front door section in alignment with opening 22, and this opening 24 may also be defined by a similar flange 25 which is formed so as to extend toward the back section 9.

Flange 23 provides convenient means for mounting a continuous sealing member 26. Sealing member 26 is made of a suitable elastomeric material; when it is to be used in connection with an oven, as contemplated, it must also have suitable heat and grease-resistant properties as well. Several types of silicone rubber have been found to be suitable for this type of use.

In order to fasten the window assembly to the back door section 9, a plurality of suitable fastening means on the window assembly and the door section are mounted in cooperative relationship to each other. In its preferred form, each fastening means for the window assembly may be a simple upstanding lug 27 having a bottom flange 28 secured by any suitable means, such as welding, to part 19 of clamp 18. A hole 29 is formed in lug 27 so that, when the window assembly is in substantially the desired position, hole 29 will be aligned with a hole 30 formed in a rigid metal receiving member 31, secured as by welding to the interior surface of back section 9.

Hole 30 may be made smaller than hole 29 so that a screw member 32 will be self-threading within hole 30, after having passed freely through hole 29. One of these cooperating arrangements may be provided adjacent each of the four brackets 18.

When the window assembly, as described thus far, is mounted in alignment with the opening 22 of back door section 9, screws 32 may be passed through openings 29 and threaded into holes 30 to effect the securing of the window assembly to the back door section 9. The screws may be tightened until the sealing strip 26 is in continuous sealing engagement with the back surface of pane 11. This relationship is shown in FIGURE 3, where it can be seen that the screws 32 have been tightened sufficiently to cause deformation of the part of strip 26 which abuts the pane 11.

It can thus be seen that there is a highly effective sealing relationship of the elastomeric material of seal 26 against the glass pane 11 and that consequently there can be no access, from the oven in cabinet 2, to the space between the panes 11 and 12 for grease, smoke and the like. In addition, this is achieved without making the disassembly of the window construction difficult.

The construction of door 4 is completed by securing the front and back door sections 10 and 9 together. This may readily be achieved by providing suitable cooperative fastening means on the two doors. For instance, threaded members 33 may be caused to extend through openings 34 provided in the back section 9, and complementary internally-threaded receiving members 35 may be rigidly

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secured to the front door section 10. Then, when screws 33 are threaded into members 35, the two door sections 9 and 10 are rigidly held together.

Where a front sealing member 36 is provided on flange 24 of front door section 10, this tightening of the threaded members 33 and receiving members 35 may be continued until the seal 36 abuts against the front pane 12, as shown in FIGURE 3, in the same way that the back seal 26 abuts the back pane 11. Alternatively, for the sake of economy, since there is rarely any adverse effect from leaving the outer window unsealed, it will readily be understood that the seal 36 may be left out, and the screws may be tightened until flange 24 abuts pane 11. In fact, the stop means may be actually incorporated in the cooperative relationship of screws 33 and receiving members 35, and the front door section 10 left in slightly spaced relation to the front pane 11, if so desired.

Referring once more to FIGURE 3, the assembly of the door may be completed, if so desired, by the inclusion between the two door sections—before they are secured together—of appropriate insulating material 37.

It will be seen from the foregoing that the composite door of our invention provides an improved arrangement for effecting sealing of at least the rear one of a pair of spaced panes of glass, while at the same time leaving the assembly such that disassembly can be effected without damage or major difficulty.

Referring now briefly to FIGURE 5, there is shown a second embodiment of our invention wherein, rather than a single large clamp 18 at each corner, smaller fastening members are used in cooperative relationship with spacer 15 in order to effect the window assembly. Specifically, using the same numerals for like parts, a U-shaped member 40 may be used to clamp the outer pane 12 to leg 17 of spacer 14, and a similar U shaped member 41 may be used to clamp the inner pane 11 to leg 16 of the spacer member. It will readily be observed that a plurality of members 40, possibly one on each side of pane 12, and a plurality of members 41 similarly arranged, will provide the desired holding power.

Where this type of structure is used, the fastening means for the window assembly is secured to the spacer member 14 rather than to the clamping means. Specifically, instead of the structure of FIGURE 4 wherein lug 27 is secured to clamp 18, a lug 42 may have a base portion 43 resting on the bight of the spacer member 14. Lug 42 may be secured to spacer 14 by welding, either against leg 16, as shown, or by welding to the bight. The upper portion of lug 42 is identical to the upper portion of lug 27; a relatively large hole 29 is provided, and is intended to be put into alignment with a smaller hole 30, with screw 32 passing through both of them.

The remainder of the structure of FIGURE 5 is identical to that of FIGURE 4.

It will be understood that, while in accordance with the patent statutes we have described what at present are considered to be the preferred embodiments of our invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention. It is therefore intended in the appended claims to cover all such equivalent variations that fall within the true spirit and scope of our invention.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. A composite door comprising:
 - (a) a pair of panes of transparent sheet material positioned to alignment with each other;
 - (b) spacer means between said panes maintaining them a predetermined distance apart;
 - (c) a plurality of clamps spaced around the edges of said panes and cooperating with said spacer means to hold said panes stationary relative to each other as a unitary window assembly;
 - (d) a front door section having a window opening;

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- (e) a back door section having a window opening, said window openings being in alignment with each other, said sections being spaced apart;
- (f) a sealing strip of elastomeric material secured to said back door section around the opening thereof on the side facing said front door section;
- (g) first fastening means secured to said window assembly at a plurality of locations around the edges thereof;
- (h) second fastening means secured to the back door section in cooperative relation to said first fastening means to securely fasten said window assembly to said back door section at said locations with one of said panes snug against said sealing strip; and
- (i) cooperating third and fourth fastening means on said front and back door sections holding them together with said window assembly secured to said back door section between said sections.
2. The door defined in claim 1 wherein said plurality of clamps includes four L-shaped clamps, each of said clamps being in clamping relation to said panes at a corner thereof.
3. The door defined in claim 1 wherein said clamps are substantially U-shaped in cross-section, with the bight of said U extending across the space between said panes and the legs of said U extending respectively against the surfaces of said panes.
4. The door defined in claim 1 wherein said clamps are substantially U-shaped, each U-shaped clamp having its bight extending across the edge of one of said panes, and its legs extending respectively into engagement with said spacer on one side of said pane and with the surface of said pane on the other side thereof.
5. The door defined in claim 1 wherein a flange is formed on said back section around said opening extending toward said front section, and said sealing strip is secured to said flange.
6. A composite door comprising:
- (a) a pair of panes of transparent sheet material positioned in alignment with each other;
- (b) spacer means between said panes maintaining them a predetermined distance apart;

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- (c) clamping means cooperating with said spacer means to hold said panes stationary relative to each other as a unitary window assembly;
- (d) a front door section having a window opening;
- (e) a back door section having a window opening, said window openings being in alignment with each other, said sections being spaced apart;
- (f) a front flange formed on said front section around said opening extending toward said back section;
- (g) a back flange formed on said back section around said opening extending toward said front section;
- (h) a sealing strip of elastomeric material secured about said back flange;
- (i) first fastening means secured to said window assembly in a plurality of locations around the edge thereof;
- (j) second fastening means secured to the back door section in cooperative relation to said first fastening means to securely fasten said window assembly to said back door section at said locations with one of said panes snug against said sealing strip; and
- (k) cooperating third and fourth fastening means on said front and back door sections holding them together with said window assembly secured to said back door section between said sections.
7. The door defined in claim 6 wherein a sealing strip is secured about said front flange, said third and fourth fastening means drawing said door sections together until the sealing strip of said front door section is snug against the other of said panes.
8. The door defined in claim 6 wherein said first and second fastening means include threaded means and means for receiving said threaded means.
9. The door defined in claim 6 wherein said third and fourth fastening means include threaded means and means for receiving said threaded means.

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