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Wilson

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[45] Aug. 13, 1974

[54] **OVEN DOOR CONSTRUCTION WITH FRONT GLASS PANEL**

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[73] Assignee: **General Electric Company**, Louisville, Ky.

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[52] **U.S. Cl.** **126/200**, 52/456, 52/616

[51] **Int. Cl.** **F24c 15/04**

[58] **Field of Search** 126/200; 52/616, 656, 455, 52/456, 400

[56] **References Cited**

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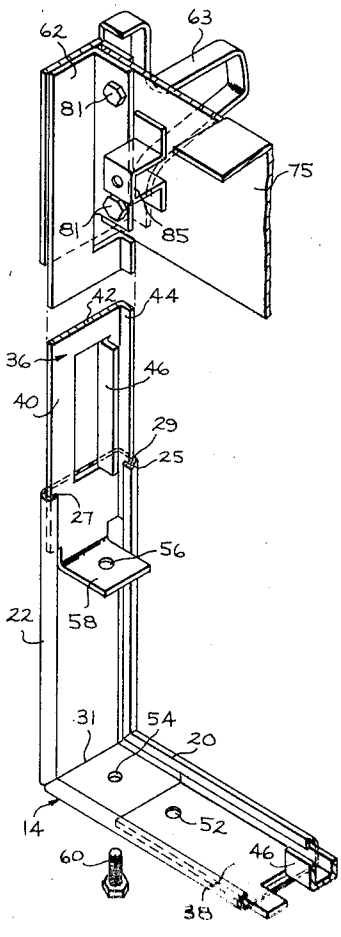
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Primary Examiner—Carroll B. Dority, Jr.
Assistant Examiner—Larry T. Schwartz
Attorney, Agent, or Firm—Richard L. Caslin; Francis H. Boos, Jr.

[57] **ABSTRACT**

A windowed door construction for use as an insulated oven door for an electric or gas domestic oven. The door has a large front glass panel and a metal inner door liner with a small window opening and a multiple glazed window assembly and thermal insulation combined in the door. A sheet metal decorative trim frame encircles the front glass panel along the bottom edge and up the two opposite sides of the glass panel. An inner support strip is attached to the decorative trim frame for engaging the adjacent edges of the front glass panel. An elongated handle assembly joins the free ends of the inner support strip and comprises the top portion of the door construction. All fastening screws are hidden from view when the oven door is in its closed position.

9 Claims, 4 Drawing Figures



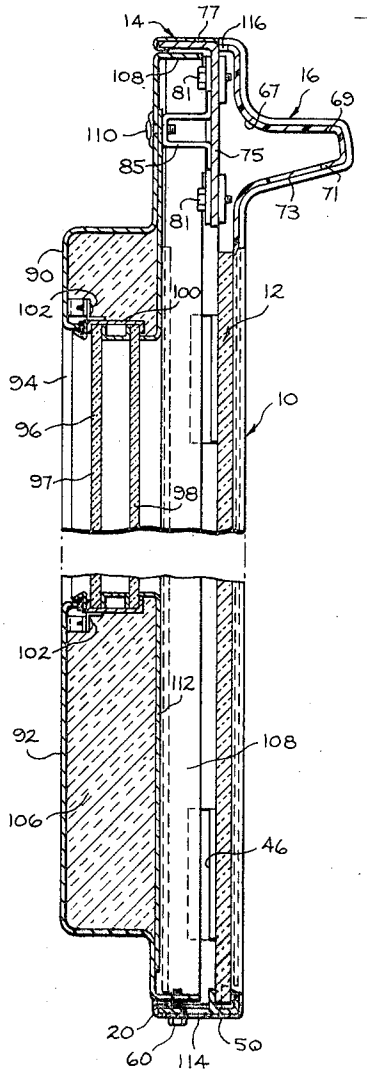


FIG. 1

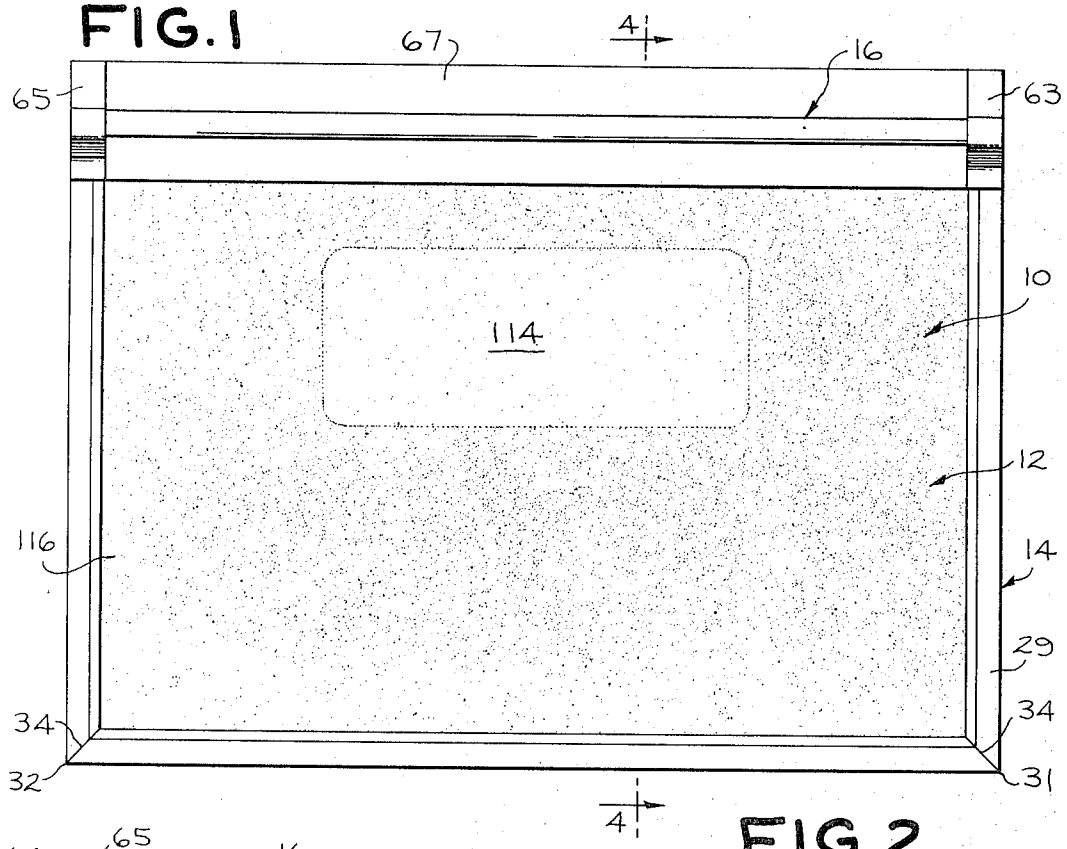
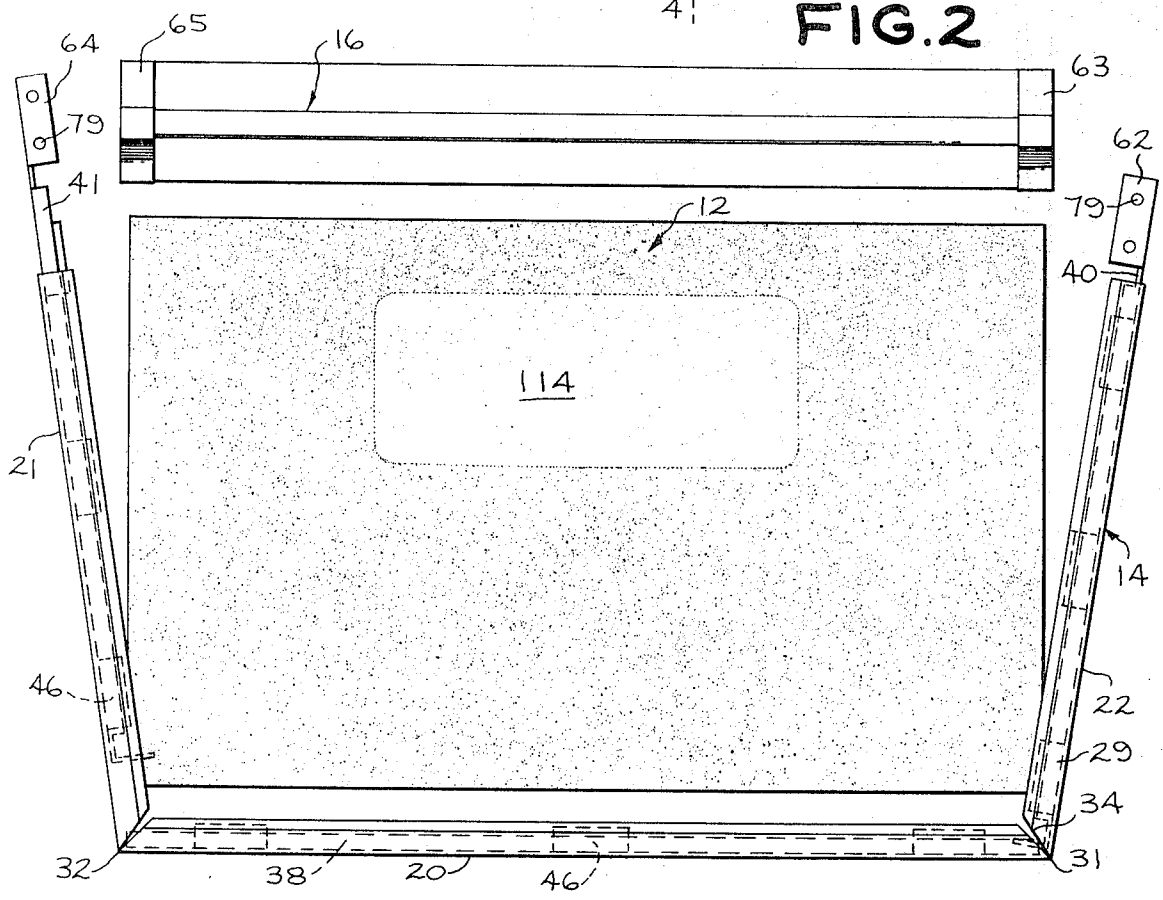

67
4
16
65
63
10
114
12
116
14
29
34
34
32
31
4

FIG. 2


64
65
16
63
79
62
41
12
79
40
114
21
14
46
22
29
34
32
38
20
46
31

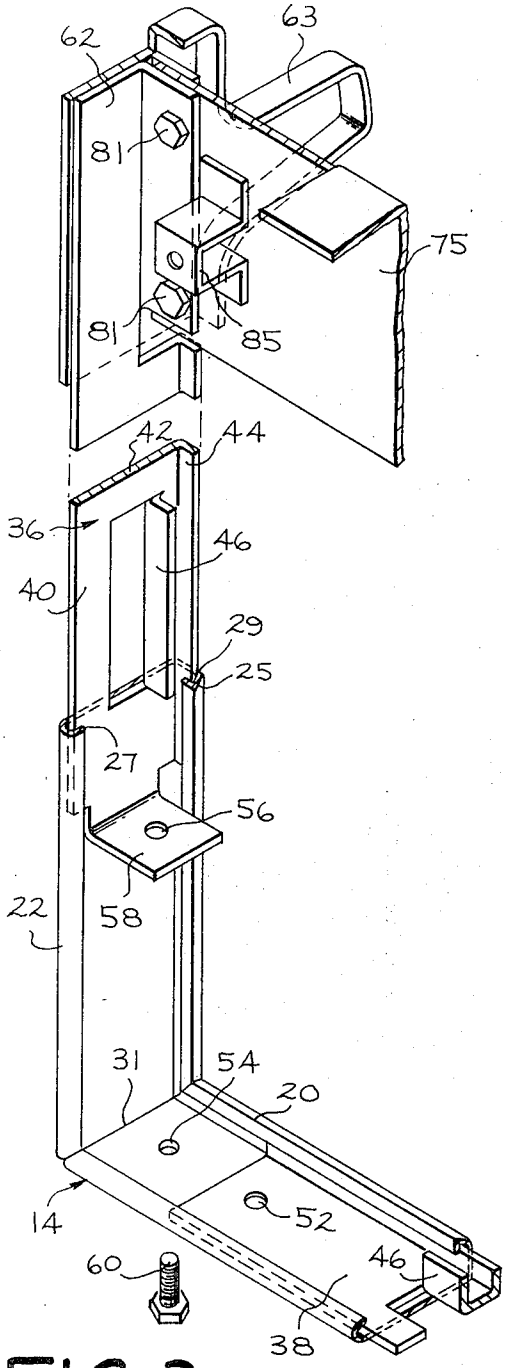

62
63
81
75
81
85
42
44
36
46
40
29
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58
22
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20
14
52
60
46
38

FIG. 3

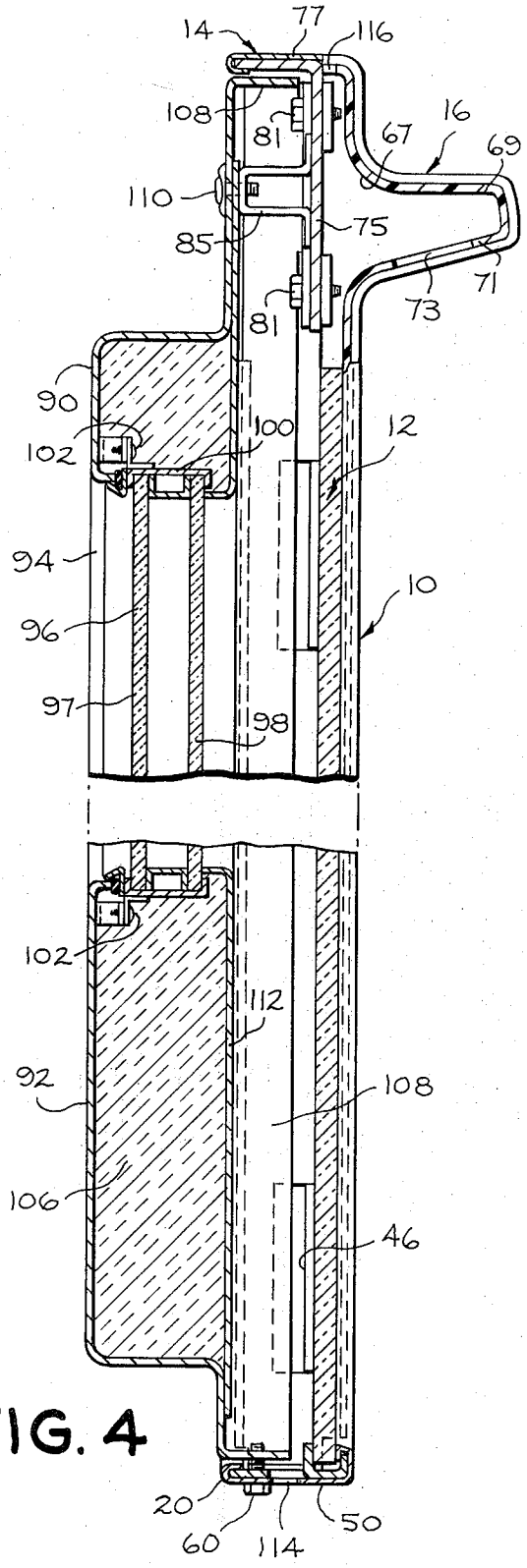

14
77
116
108
81
67
16
69
110
75
85
71
73
81
90
100
12
102
94
10
96
97
98
102
112
92
108
106
46
20
60
114
50

FIG. 4

OVEN DOOR CONSTRUCTION WITH FRONT GLASS PANEL

BACKGROUND OF THE INVENTION

One of the first oven door designs with an all-glass front glass panel is illustrated in the Design U.S. Pat. No. 195,610 of Robert W. Blee and Renor S. Faidy, which is assigned to the General Electric Company, the assignee of the present invention. These early all-glass oven door designs had decorative trim frames of heavy die castings or extrusions which were relatively heavy in weight and expensive to manufacture. In recent years range manufacturers have worked toward improved oven door designs using multiple frame members that are attached together to form the whole, with a principal objective to hide all of the fastening screws from view when the oven door is in its closed position. It is considered detracting from the pleasing appearance of the door if any of the fastening screws are exposed at the front of the oven and also along the sides and top edge of the door. It is considered acceptable to have fastening screws along the bottom or underside of the door as well as on the inner side of the door, but even here the numbers of such fastening screws should be held to a minimum.

The principle object of the present invention is to provide a windowed oven door construction with a front all-glass panel that is supported by a simple three-sided wrap-around decorative trim frame in combination with a top handle assembly that constitutes the top edge of the door.

A further object of the present invention is to provide a windowed oven door of the class described wherein the decorative trim frame is supplied with an inner support strip for engaging and clamping the front glass panel.

A further object of the present invention is to provide a windowed oven door of the class described wherein the decorative trim frame is of sheet metal construction having bendable sections adjacent the two ends of the bottom portion of the frame so that the two side portions may be folded up into engagement with the side edges of the front glass panel.

SUMMARY OF THE INVENTION

The present invention, in accordance with one form thereof, relates to a windowed oven door construction comprising a front all-glass panel and a metal inner door liner having a smaller window opening in cooperation with a multi-glazed window assembly and thermal insulation assembled within the door. The front glass panel is confined within a three-sided decorative trim frame that extends along the bottom and up the two sides of the glass panel. The trim frame includes an inner support means that is attached in the frame and capable of engaging the adjacent edges of the glass panel so as to hold it in place. An elongated handle assembly comprises the fourth side of the trim frame and is fastened to the frame to comprise the top edge of the door. The inner door liner is fastened to the front glass panel and trim frame assembly.

BRIEF DESCRIPTION OF THE DRAWINGS

This invention will be better understood from the following description taken in conjunction with the accompanying drawings and its scope will be pointed out in the appended claims.

FIG. 1 is a front elevational view of a windowed oven door construction embodying the present invention.

FIG. 2 is a somewhat exploded front elevational view of the oven door construction of FIG. 1 showing the elongated handle assembly at the top edge of the door slightly removed from the trim frame and the two side portions of the trim frame pivoted outwardly from the front glass panel at the top to illustrate the flexible nature of the trim frame, while the left side portion of the frame shows the inner support strip partially raised therefrom to illustrate the telescopic nature of assembly.

FIG. 3 is a fragmentary perspective view of the sheet metal decorative trim frame showing only a segment of the bottom portion and one side portion, with the inner support strip supported within the trim frame for engaging the adjacent edge of the front glass panel. Also shown is the nature of the means for fastening the elongated handle assembly to the combined decorative trim frame and inner support strip. It should be understood that this FIG. 3 is not an exact illustration of the oven door design in its assembled position in that the inner support strips have been shifted slightly in position so as to enable a better understanding of the construction.

FIG. 4 is a cross-sectional elevational view taken on the line 4—4 of FIG. 1 and showing the door in its fully assembled condition so as to enable the complete understanding of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Turning now to a consideration of the drawings and in particular to FIG. 1, there is shown an oven door 10 embodying the present invention which has a large front glass panel 12 that is enclosed by a three-sided, wrap-around decorative trim frame 14 and an elongated handle assembly 16 that constitutes the top portion of the oven door 10. As is best seen in FIG. 2, the decorative trim frame 14 is a one-piece, three-sided, wrap-around design having a bottom portion 20 and two opposite side portions 21 and 22.

The detailed nature of the decorative trim frame 14 can best be understood with relation to the fragmentary view of FIG. 3 wherein the trim frame 14 is shown as a single sheet metal member wherein the side edges are rolled on themselves as at 25 at the front of the frame and as at 27 at the rear edge of the frame. The front edge 25 is somewhat wider than the rear edge 27 so to give more of a decorative trim width to the frame as at 29 in FIG. 1. In other words, the front edge of the trim frame has a folded perpendicular flange 29 of narrow width and its free edge is rolled over as at 25 to form a re-entrant fold or channel. The rear edge has a simple folded re-entrant channel 27.

Turning back to FIG. 2, it is clear that the two ends of the bottom portion 20 of the decorative trim frame 14 are furnished with resilient sections 31 and 32 which act in the manner of a simple bendable hinge so that the two side portions 21 and 22 of the trim frame may be flexed upwardly and against the adjacent edges of the front glass panel 12. Corner 31 is illustrated in FIG. 3 as comprising a portion of the decorative trim frame 14 wherein the front flange 29 and the re-entrant channel 25 as well as the rear re-entrant channel 27 are notched out so as to leave the trim frame in that area as just a simple planar section which may flex or bend when an

upward force is exerted against the side portions **21** and **22** of the trim frame **14.** Notice in FIG. **2** that the front flange **29** is provided with a V-notch **34** such that when the side portions are pivoted into a perpendicular or vertical position the V-notch will close in the manner of a mitered joint so as to give a closed joint appearance and substantially eliminate any cracks or crevices in the corners of the frame.

Some means must be provided between the trim frame **14** and the front glass panel **12** for supporting the glass panel in the frame against movement. This need is satisfied by an inner support means **36** which is shown as comprising three separate pieces, a bottom piece **38** and two identical side pieces **40** and **41.** It should be understood, however, that this inner support strip **36** could be formed as one piece rather than being divided into three separate pieces as is illustrated. This inner support strip **36** is also of sheet metal construction that is substantially coextensive with the trim frame **14** and has a transverse configuration of generally L-shape with a wide flat portion **42** and a narrow front flange **44.** The inner support strip **36** is adapted to telescope into the trim frame **14** and be held in place by the folded-over edges **25** and **27,** as is best seen in FIG. **3.** Each piece **38, 40** and **41** of the inner support strip **36** is provided with lanced tabs **46** which are adapted to be folded into a perpendicular position with respect to the flat portion **42** of the inner support strip and cooperate with the opposing edge of the folded-over edge **25** of the trim frame for establishing a close fitting channel which is adapted to receive and clamp the adjacent edge of the front glass panel **12** as is illustrated at the bottom front edge of the door as is seen in the cross-sectional elevational view of FIG. **4.**

It should be understood that the inner support strip **40** as illustrated in FIG. **3** is not in its final assembled position since it is raised out of engagement with the lower portion **20** of the trim frame **14,** and this is not a typical situation. This view was made to illustrate the telescopic nature of inserting the inner support strip **40** into the decorative trim frame **14.** Somewhat the same situation is true of the inner support strip **38** is seen in FIG. **3** in that it is moved off to the right from its final assembled position. This is clear because the inner support strip **38** is provided with a screw hole **52** which is adapted to match with a similar screw hole **54** in the bottom portion **20** of the trim frame. These two screw holes are adapted to be aligned with a screw hole **56** in a foot or horizontal flange **58** that is formed at the lower end of the inner support strip **40.** It should be understood that a similar arrangement would be found at the opposite corner of the trim frame. A fastening screw **60** is illustrated for threading into the openings **52, 54** and **56** and holding the parts together.

Thus, in order to assemble the front segment of the door **10** the front glass panel **12** is first moved into the narrow channel formation in the bottom portion **20** of the trim frame **14** created by the lanced tabs **46** of the bottom most inner support strip **38** in cooperation with the folded-over edge **25** of the front flange **29** of the trim frame. Then the two opposite side portions **21** and **22** of the trim frame are pivotal about the resilient corners **31** and **32** until the inner support strips **40** and **41** engage the adjacent edges of the front glass panel **12.** Then it is necessary to assemble the elongated handle assembly **16** across the top portion of the door. Notice that the inner support strips **40** and **41** extend up above the top edge of the side portions **21** and **22** of the trim frame **14,** as at **62** and **64.** The top handle assembly **16** is furnished with die cast end caps **63** and **65** respectively which fit over the ends of an elongated plastic or metal hollow housing **67** which has a transverse elevational cross-section of an overhang as is best seen in FIG. **4** formed by a continuous top surface **69** and an undercut bottom surface **71** having an elongated slot **73** for receiving a person's fingers to obtain a firm grip on the top portion of the oven door **10** so that it may be pivoted into either an open or a closed position by hinging the door along an imaginary horizontal axis adjacent the bottom edge of the door, as will be well understood by those skilled in this art. Connected between the two end caps **63** and **65** across the back side of the top handle assembly **16** is a strong mounting plate **75** which has at the top edge a rear-turned decorative flange **77** which aligns with the top portion of each end cap **63** and **65.** The inner support strips **40** and **41** have an upper flange **62** and **64** respectively that is provided with screw openings **79** that are adapted to be aligned with similar openings in the mounting plate **75** for receiving fastening screws **81** thereby joining the top handle assembly **16** with the trim frame **14** and front glass panel **12** through the medium of the inner support strips **40** and **41.**

The mounting plate **75** of the top handle assembly **16** also includes a pair of hat-shaped brackets **85** at each end thereof that are each provided with a screw opening over which is adapted to be assembled a Tinnerman type sheet metal nut so that the screw opening need not be threaded but will receive a fastening screw **110,** as will be well understood by those skilled in the appliance art.

The rear side of the oven door **10** is provided with a metal inner door liner **90** of generally rectangular configuration having a generally rectangular raised embossment **92** which forms a plug-like member that is adapted to fit closely within the front opening of an oven liner (not shown). The inner door liner **90** has a rectangular window opening **94** behind which is mounted a multi-glazed window pack assembly **96** which is a sealed sub-assembly comprising at least two glass panes **97** and **98** which are spaced apart by a spacer frame **100** and sealed in such a way that no water vapor, dust and grease may become lodged on the inner surface of the glass panes and reduce the visibility. Two of the fastening means **102** are present to hold the window pack **96** firmly over the inside of the window opening **94.** It should be appreciated by those skilled in this art that this invention is not limited to a particular arrangement of the window pack assembly **96** as to how many glass panes are employed, and as to what means are used to prevent the inner surfaces of the glass pane from becoming soiled. A layer of thermal insulating material **106** such as fiber glass is installed in the embossment **92** around the window pack assembly **96** so that the plug-like embossment is an insulated component for retarding the loss of heat from the oven through the door. Notice that there is a sheet metal insulation guard **112** which is fastened against the inner surface of the inner door liner **90** across the plug-like embossment **90** for supporting the thermal insulation **106** in place. Of course, this insulation guard **112** would be provided with a window opening **94** so as not to obscure the visibility therethrough.

The inner door liner **90** is provided with a front turned peripheral flange **108**, as is best seen in FIG. **4**, which is adapted to telescope within the decorative trim frame **14**. At the lower edge of the door the inner door liner **90** is fastened to the trim frame **14** by means of the fastening screws **60** that are threaded up from the bottom through the trim frame through screw openings **52**, **54** and **56** in the trim frame and the inner support strips and finally into the flange **108** of the inner door liner. At the top of the door, the inner door liner **90** is fastened to the brackets **85** on the back side of the mounting plate **77** by means of fastening screws **110**.

Looking at the front view of the door of FIG. **1** only a small rectangular window opening **114** is slightly visible. This is because an opaque mask **116** is applied on the inner surface of the front glass panel **12**, and this mask is continuous except for the window opening **114** which aligns with the window pack **96** and window opening **94** in the inner door liner **90**. Preferably, the front glass panel **112** is of tinted glass such that when the oven interior is not lighted the glass panel **12** will appear as a dark reflective or mirror surface and viewing into the oven interior would not be possible. Only when the oven interior is lighted would it be possible to view through the window opening **114** and see the condition of food being cooked within the oven.

Notice that there is an air space in FIG. **4** between the front glass panel **12** and the insulation guard **112**. This air space serves as a cooling air channel for reducing the operating temperature of the door. Air slots **114** are provided along the bottom edge **20** of the trim frame **14**, as well as similar slots **116** in the top handle assembly **16** preferably extending from one side to the other of the handle assembly so as to obtain a swift upward air movement through the door when the oven is heated.

Modifications of this invention will occur to those skilled in this art. Therefore, it is to be understood that this invention is not limited to the particular embodiments disclosed but that it is intended to cover all modifications which are within the true spirit and scope of this invention as claimed.

What is claimed as new and is desired to be secured by Letters Patent of the United States is:

1. A door construction comprising a large front panel of tinted glass fastened in a three-sided wrap-around decorative frame that extends along the bottom and up the two sides of the glass panel, said decorative frame being a single sheet metal member with flexible sections at the two ends of the bottom portion of the frame so that the two side portions may be folded up into position, a separate inner support means attached in the frame and provided with means to engage the adjacent edges of the glass panel and hold it in place, a top assembly located above the top edge of the glass panel and spanning the distance across the top of the frame, and rear fastening means at the opposite ends of the top assembly joining the top assembly to at least one of the decorative frame and inner support means, a metal inner door liner including a window opening provided with a multi-glazed window pack within the inner liner assembled across the window opening, and thermal insulation filling at least some of the inner door liner around the window pack, and fastening means attaching the inner liner to the door frame.

2. A windowed door construction comprising a front glass panel and a metal inner door liner, the glass panel being confined within a simple sheet metal decorative trim frame that extends along the bottom and up the opposite sides of the glass panel, the trim frame including an inner support means telescoped into the said trim frame and confined thereby, said inner support means having channel means for receiving and clamping the edges of the front glass panel, and an elongated handle assembly comprising the top edge of the door, and fastening means connecting the handle assembly to the trim frame, the said inner door liner having a window opening, a multiple glass window pack assembled within the inner door liner over the said window opening, and thermal insulation filling at least some of the inner door liner around the window pack, and an insulation guard plate assembled over the insulation to hold it in place, and fastening means for joining the inner door liner to the front glass panel assembly.

3. A windowed door construction as recited in claim **2** wherein the decorative trim frame is a single straight piece of material with flexible sections at the two ends of the bottom portion of the frame so that the two side portions may be folded up into position.

4. A windowed door construction as recited in claim **3** wherein the said inner support means is formed of at least three separate peices, a piece in the bottom portion of the frame and separate pieces in the opposite side portions of the frame.

5. A windowed oven door construction comprising an overall front glass panel and a metal inner door liner having a window opening and a multi-glazed window pack mounted within the inner door liner over the said window opening, thermal insulation held within the inner door liner around the window pack, and a sheet metal decorative trim frame encircling the front glass panel along the bottom edge and up the two opposite sides of the glass panel, an inner support means telescoped within the trim frame and substantially coextensive therewith for clamping the edge of the glass panel, and an elongated handle assembly comprising the top edge of the door and attached to the free upper ends of the inner support means from the back side of the handle assembly, and fastening means for joining the inner door liner to the front glass panel assembly.

6. A windowed oven door construction as recited in claim **5** wherein the front glass panel is a tinted glass that is provided with an opaque mask on its rear surface having a window opening substantially aligned with the window opening in the inner door liner.

7. A windowed oven door construction as recited in claim **5** wherein the decorative trim frame is formed of a straight piece of material with flexible sections at the two corners of the bottom portion of the frame so that the two side portions may be folded up into position with the inner support means engaging the edge of the front glass panel.

8. A windowed oven door construction as recited in claim **7** wherein the decorative trim frame is provided with folded-over edges along the opposite sides thereof except at the two flexible sections at the two corners of the bottom portion of the frame, and the inner support means is of generally flat configuration that is confined by the folded-over edges.

9. A windowed oven door construction comprising a large front glass panel and a metal inner door liner having a relatively small window opening, and a multi-glazed window assembly mounted within the door and sealed over the said window opening, thermal insula-

tion means combined with the door to retard the conduction of heat therethrough, a one-piece decorative trim frame encircling the front glass panel along the bottom edge and the two opposite sides of the glass panel, the said one-piece decorative trim frame being of sheet metal configuration with flexible sections at the two ends of the bottom portion of the frame so that the two opposite side portions may be folded up into position with the inner support strip clamping the edges of the front glass panel, an inner support strip attached in the trim frame for clamping the edge of the front glass panel, the trim frame having folded edges for attaching the inner support strip therein, the inner support strip including tab means for engaging the edge of the front glass panel, and an elongated handle assembly attached to the free upper ends of the inner support strip and comprising the top edge of the door, and fastening means for joining the inner door liner to the front glass panel and trim frame assembly.

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