The present invention relates to the design of a viewing window for an oven and particularly an oven in a domestic range. It is frequently necessary for the housewife to examine food being cooked in the oven so that the food will not be overcooked. Preferably, the oven should be provided with a window so that the housewife would not have to open the oven door in order to observe the condition of the food; for the open door would allow heat to escape and the temperature to drop within the oven, and it also might do damage to certain foods, such as cakes, being baked. Moreover, the sudden heat exposure might be uncomfortable to the housewife and there might be objectionable odors or vapors let into the kitchen. For many years now windows have been built into the doors of the oven, but special precautions must be taken to prevent moisture and vapors from escaping from the oven and becoming lodged in the space between the double thickness of glass such windows. Moreover, the oven door windows were mostly small in size, because a large amount of heat would otherwise be lost through the window assembly thereby making the front portion of the oven cavity relatively cool and causing uneven cooking results.

In recent years there has been a trend to recess the top cooking surface of domestic ranges and, of course, this results in the lowering of the oven so that a window mounted in the oven door would be quite low to the housewife requiring her to step back from the range and bend over or stoop down where her eyes would be adjacent the level of the window so as to be able to peer at the food within the oven. This operation is made more difficult by the fact that the oven door window is relatively small as compared with the overall size of the door.

The principal object of the present invention is to provide a viewing window for an oven that is conveniently located above the oven and such window has means for thermally isolating the outer window pane from the high temperatures of the oven cavity.

A further object of the present invention is to provide a viewing window of the class described where the window panes may be easily manipulated for cleaning both sides of the panes.

A further object of the present invention is to provide a viewing window of the class described with window means for preventing convection currents from emanating from the oven liner, as well as the conduction of heat outwardly of the oven liner, and for utilizing currents of room air for dissipating the heat in the outer window means so as to avoid excessive operating temperatures therein.

The present invention, in accordance with one form thereof, relates to a viewing window for a domestic oven where the window is located along the front of the oven above the oven door. A second window is mounted in the top wall of the oven liner and there is a chute member located between the first and second windows for thermally isolating the two windows from each other, the top portion of the chute member is covered with a third window so as to form a dead air space between the second and third windows and prevent convection currents from being set up by the second window. The first and third windows are easily removable to permit the cleaning of both sides of all three windows. Moreover, it is well to restrict the maximum operating temperature of the first window and this may be accomplished by directing the current of room air between the first and third windows where the air is discharged back into the room.

This invention is related to a copending application entitled "Brol Unit for Top Viewing Oven," of Maurice T. Rose, Jr., and Robert A. Kinkle, Serial No. 234,140, now Patent No. 3,128,363, which is likewise assigned to the General Electric Company, assignee of the present invention.

Our 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.

FIGURE 1 is a perspective view of a free-standing electric range embodying the top viewing oven window of the present invention;

FIGURE 2 is a fragmentary vertical cross-sectional view looking from right to left through the top viewing window of FIGURE 1;

FIGURE 3 is a view similar to that of FIGURE 2 showing the first or outer window of the oven raised to an open position so that the third or intermediate window may be removed for ease in cleaning both sides of all three windows;

FIGURE 4 is a fragmentary view taken on the line 4-4 of FIGURE 2 showing the manner in which the intermediate window covers the top portion of the chute member; and

FIGURE 5 is a fragmentary top plan view in cross-section taken on line 5-5 of FIGURE 2 showing the nature of the air channel built into the side wall of the range for bringing relatively cool room air toward the top of the range where the air may pass between the outer window and the intermediate window for restricting the operating temperature of the outer window.

Turning to a consideration of the drawing and in particular to FIGURE 1, there is shown a free-standing electric range comprising a cabinet structure or range body 19 that includes a recessed top cooking surface 11 and an oven cavity 12 shown in FIGURE 2 as being located beneath the top cooking surface as in most standard ranges. The cooking surface 11 is shown with a plurality of surface heating units 13, it being understood that each heating unit has a separate selector switch 14 cooperating therewith for governing the various heating levels of the unit.

Turning attention to FIGURE 2, it should be appreciated that the oven cavity 12 is formed by a cooperation between a box-like oven liner 16 and a front-opening hinged door 17 for gaining access to the oven. Heating means must be provided for the oven to perform the various cooking operations. Usually, there is a lower bake unit (not shown) and an upper broil unit which is identified as element 19 and which is of special configuration because of the top viewing window 20 which constitutes the invention being claimed herein. This special broil unit 19 forms the subject matter of the copending application of Rose and Kinkle, Serial No. 234,140, which was mentioned previously. For this reason the broil unit has not been fully illustrated nor its features described in detail. As in standard range design practice, heat insulating means such as fiberglass material 22 is applied around and outside of the oven liner 16 for retaining as much as possible of the heat within the oven during the cooking operations.

Rather than having the oven window in the front door 17, a window 20 is located along the front edge 23 of the cooktop 11 as is generally taught in the Pellegrin Patent No. 2,428,986. Important improvements have been
incorporated in the present design in order to make this design acceptable for production and desirable to the housewife as will be completely explained hereafter.

The inclined front edge 33 of the cooktop is provided with a suggested opening in which is fastened a thin stationary frame member 25 which follows around the edge of the opening as is best seen in FIGURE 1. Control means for the oven heating elements are provided at each side of the frame member 25; for example, an oven selector switch 26 and an accurate thermostat 27. The main purpose of the stationary frame 25 is to support an outer window or window pane 29 which is fastened in a pivoted frame member 30 that is pivoted to the stationary frame member 25 as by hinge pins or trunnions 31 located at the opposite sides of the pivoted frame 30. FIGURE 3 gives a better showing of the frame members 25 and 30 since the pivoted frame 30 has been raised to its fully open position. The window 29 fits into the pivoted frame 30 in the same manner that a glass fits into a picture frame, that is, from the back side thereof. One or more clip members 32 are fastened to the bottom portion of the window frame 30 and are looped around to exert a pinching action against the window pane 29 when the window is slipped behind the clips. Pivoted clip members 33 are located at the top of the window frame 30 and are fastened thereto by screw means 34 for confining the top edge of the window in the frame 30 after the clip edge has been slipped in behind the spring clips 32. The lowermost edge of the pivoted frame 30 is provided with an annular portion 36 which extends horizontally as at 37 beyond the narrow frame 25 and then downwardly as at 38 to provide a grip for the hand. This treatment provides an attractive appearance as well as a hand grip for placement of a thumb thereunder and raising the pivoted frame 30 thereby.

A second window or window pane 40 is mounted in an opening in the top wall 41 of the oven liner 56 adjacent the front door opening as is best illustrated in FIGURE 2. This window is fastened into a double-frame assembly 42 and 43 having opposing surfaces 44 and 45 respectively between which the window 40 is confined. Extending around the periphery of the window is a suitable thermal and moisture resistant gasket 46 to insure a proper seal so as to discourage the escape of heat and vapors from the oven cavity 12. The double frame members 42 and 43 are assembled together as a subassembly by having overlapping flanges 48 and 49 respectively which are welded together, and the entire sub-assembly is fastened in the opening of the top wall 41 of the oven liner by screws 50 which hold the window subassembly in place against a resilient gasket 51.

The broil unit 19 is of special design in that it circumvents the window 49 so that the broil unit cannot be seen easily through the window 29. This can only be done by extending the broil unit 19 closer to the oven door 17 which of course would present a safety hazard because the surface temperature of the broil unit approaches 1500° F. Accordingly, a removable shield 53 is fastened by suitable means to the top front edge of the oven liner beneath the subassembly of the window 40 to re-radiate the heat energy toward the center of the oven cavity and away from the door 17 to provide a more even oven heat distribution as is completely explained in the Rose et al. application mentioned above.

Some means must be provided for confining the view through the first window 29 so that the housewife's attention is directed through the second window 40 of the oven. A viewing means is represented by a chute member 55 which is supported from the cabinet 10 on the angular door frame member 56 as at 57 as is best shown in FIGURE 2. The chute member 55 is fabricated of thin sheet metal material and it has an inner reflective surface both for presenting a pleasing appearance as well as to provide a viewing window with a double image. By this is meant the housewife may stand directly in front of the range and peer straight through the first window 29 and the second window 49 at the food being cooked within the oven cavity 12. There is the added advantage of being able to move away from the range, for instance, across the kitchen from the range. It would still be possible to peer at the food where the line of sight would be approximately horizontal through the first window 29 and would reflect off the back wall 58 of the chute member and then to the cooked food. Accordingly, the food may be seen either directly through the windows or indirectly by means of the reflective inner surfaces of the chute member 55.

The lower portion of the chute 55 is provided with outwardly flared flanges 60 which provide a shroud or cover over the peripheral edges of the subassembly of the second window 40 so that the fiberglass insulation 22 between the top wall 41 of the oven liner and the cooktop 11 will not be deposited on the window 40 and obscure the view. These flared flanges 60 are out of contact with the oven liner and the window 40, but there is one or more pointed tabs 61 located at the innermost end of the chute to serve as a foot member that bears against the top wall 41 of the oven liner so as to steady the chute against vibratory forces while at the same time restricting the amount of conduction of heat from the oven liner toward the outer wall of the flanges 60. The tab 61 is provided in order to prevent convection currents from rising from this second window 40, a third window 63 is positioned over the top portion of the chute 55 to cover the chute and establish a dead air space therein. Looking at FIGURE 4, the opposite side walls of the chute 55 are provided with insulating members 64 in which the side edges of the window 63 are rested. The lower portion of the window 63 is seated on the front flange 57 of the chute and it bears against a tab 65 which prevents the window from sliding away from the chute. The top edge of the window 63 is spring-biased into a closed position by a spring 66 that is fastened to the central wall 67 of the back wall 58 of the chute and has a free end 68 that over-lies the window as is best seen in FIGURE 3.

In order to clean the three windows 29, 40 and 63, it is first necessary to raise the pivoted frame 30 to the open position of FIGURE 3. Next, the third window 63 is removed by applying an upward force against the window by use of the palm of the hand and fingers to deflect the spring member 68 upward so that the lower edge of the window 63 will rise above the tab 65 so that the lower edge of the window might be grasped by the other hand and removed from the range. Then it is possible to reach through the chute 55 and clean the top surface of the second window 40, it being understood that the lower surface of the window 40 would be cleaned by opening the oven door 17 and reaching into the oven cavity.

An additional means is provided for lowering the operating temperature of the first or outermost window 29. The first window 29 and third window 63 are separated from each other by a space 70 which is open at the opposite sides of the range for bringing in roof air that sweeps across the back side of the first window 29 for dissipating the heat therein. Looking at the fragmentary cross-sectional plan view of FIGURE 5, a vertical air channel 71 is illustrated on the inner side of the oven liner near the cabinet 10 near the front thereof. This air channel is formed by a channel member 72 that is separated from the oven liner by the insulation 22. The top portion (not shown) of the channel member 72 rises above the insulation 22 so that the air may rise through the air channel and pass between the first window 29 and third window 63. Rather than dissipate this air beneath
the cooktop 11, suitable vent holes 73 are formed along the top edge of the pivoted frame 30 so that this cooktop air will be returned to the room.

Having described about the window design of the present invention, it will readily be apparent to those skilled in this art that first and foremost this oven window design is practical for use in the home, and it is capable of being manufactured by mass production methods at a reasonable cost. Furthermore, this viewing window has thermal isolating properties which prevent the operating temperature of the first window 29 from rising above about 150° F. which would be the threshold of an uncomfortable range of temperatures which could not be tolerated by the housewife. Such a high temperature if located toward the back of the range or along the sides would not be a health or safety hazard, but whenever such a high temperature is present near the front working surface of a range then it would become intolerable. This design also has provided for the ease of cleaning the various window elements, and both the conduction and convection of heat from the oven cavity through the window assembly has been substantially reduced. Lastly, moisture has been sealed into the oven cavity so that it cannot escape through the window assembly.

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

1. A domestic range comprising a cabinet structure with a cooktop forming a cooking surface supporting a plurality of surface heating means and a box-like oven liner built into the cabinet beneath the top cooking surface, a front-opening door cooperating with the walls of the oven liner to form an oven cavity, heating means provided for the oven cavity, insulating means surrounding the oven liner for retaining the heat of the oven therein, a first window in the front edge of the cooktop, a second window in the top wall of the oven liner, and gasket means for sealing around the edge of the second window, a chute member positioned between the said first and second windows, the top edge of the chute being slightly spaced from the first window, and a third window covering the top of the chute and being separate from the first window to form an air channel therebetween, means for allowing room air to pass through the air channel between the first and third windows, and support means for mounting the first and third windows so they are easily removable for cleaning both sides of all three windows, the second and third windows having a relatively dead air space therebetween and serving to prevent convection air currents from rising from the second window, the room air passing through the air channel formed between the first and third windows serving to reduce the convection of heat from the third to the first window thus lowering the operating temperature of the first window.

2. A domestic range comprising a cabinet structure supporting a box-like oven liner, a front-opening door cooperating with the walls of the oven liner to form an oven cavity, heating means provided for the oven cavity, insulating means surrounding the oven liner for retaining the heat of the oven therein, a window pivotally mounted to the cabinet in the front thereof directly over the oven door, a second window mounted in the top wall of the oven liner, and gasket means for sealing around the edge of the second window to prevent heated air and moisture from escaping from the oven cavity, a chute member supported within the cabinet and extending between the first and second windows, the lower portion of the chute member having limited metal-to-metal contact with the oven liner so as to reduce the conduction of heat from the liner to the chute, a third window member covering the top opening of the chute, and support means for the third window to render it easily removable from the chute once the first window is pivoted open so that both sides of all three windows are accessible to be cleaned, the third window member being supported independently of the first window and spaced therefrom to form an air channel therebetween, means for allowing room air to pass through the air channel between the first and third windows so as to reduce the convection of heat from the third to the first window thus lowering the operating temperature of the first window.

3. A domestic range comprising a cabinet structure having a plurality of surface heating means supported on the top surface thereof and a box-like oven liner built into the cabinet beneath the heating means, a front-opening door cooperating with the walls of the oven liner to form a closed oven cavity, heating means provided for the oven cavity, insulating means surrounding the oven liner for retaining the heat of the oven therein, the front edge of the top of the cabinet being inclined backwardly, said inclined edge supporting an elongated frame member in which is pivoted a first window, a second window located in the top wall of the oven liner, and a third window covering the top portion of the chute member located between the first and second windows but being supported from the cabinet structure at the top end thereof, the lower portion of the chute having limited metal-to-metal contact with the oven liner so as to reduce the conduction of heat from the third window to the first window as well as to lower the operating temperature of the first window, and vent means cooperating with the first window for allowing the air passing between the first and the third windows to return to the room without having to pass under the surface heating means.

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