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McKelvey

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[54] **OVEN DOORS**

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[73] Assignee: **Shatterproof Glass Corporation**, Detroit, Mich.

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[52] **U.S. Cl.** **126/200**; 52/306; 52/616; 165/133
[51] **Int. Cl.**[2] **F23M 7/00**
[58] **Field of Search** .... 126/190, 200; 350/299, 350/288; 117/40, 43, 124 A, 94, 97, 129; 165/133, 202, 616

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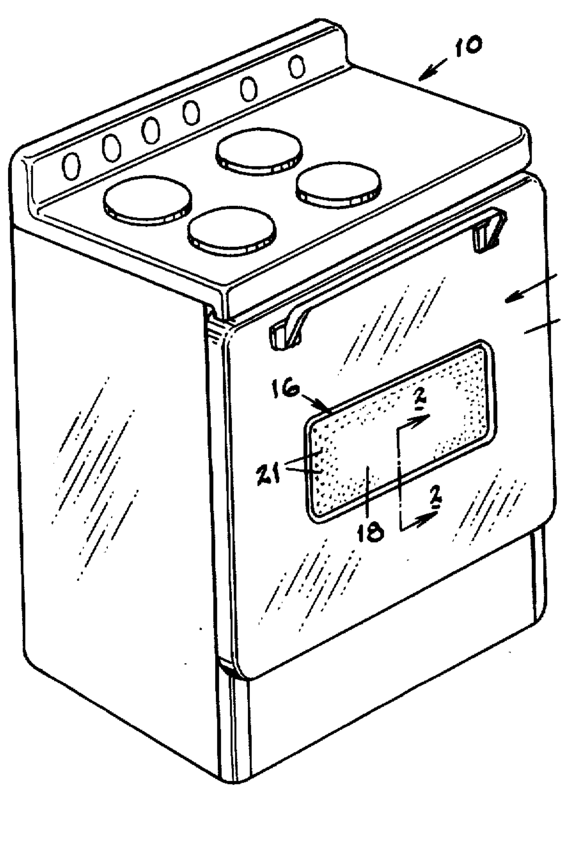
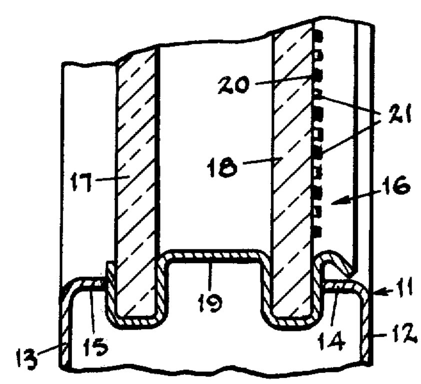
[57] **ABSTRACT**

An oven door comprising front and back metal door panels having a central opening therein to provide a window for seethrough into the oven compartment. A window unit is mounted in the window opening and comprises inner and outer transparent glass panels, with the inner panel being adjacent the oven and the outer panel exposed to the ambient atmosphere. The outer surface of the outer glass panel is provided with a siliceous or frit material in the form of a large number of discrete relatively small dots arranged in a plurality of horizontal rows, with the dots in adjacent rows being preferably staggered and substantially uniformly spaced from one another to provide unobstructed viewing areas through which the interior of the oven can be readily observed. Each dot is siliceous or frit material is composed of a plurality of finely divided glass particles, preferably beads, adhered to the glass panel by a ceramic paint. The clusters of glass particles collectively present a myriad of exposed minute surfaces which radiate heat emanating from the oven to the surrounding atmosphere.

12 Claims, 6 Drawing Figures





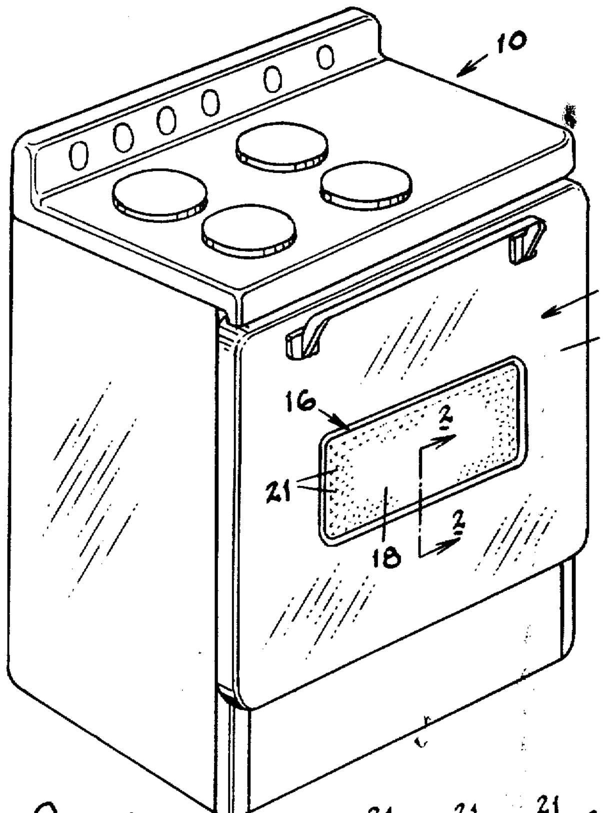


Fig.1.

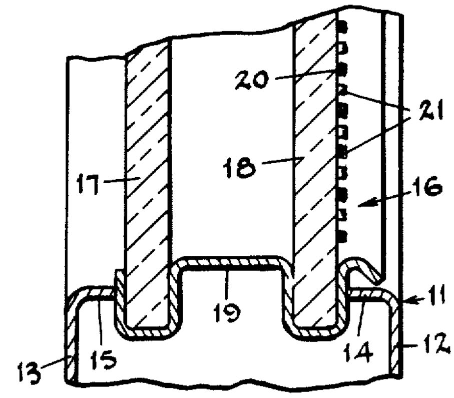


Fig.2.

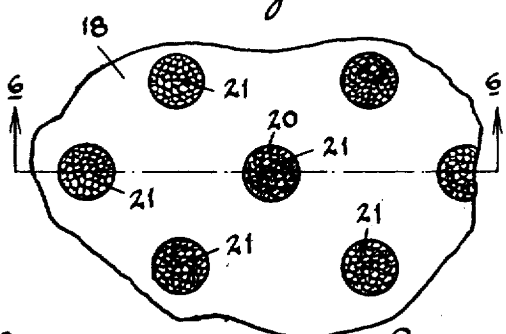


Fig.5.

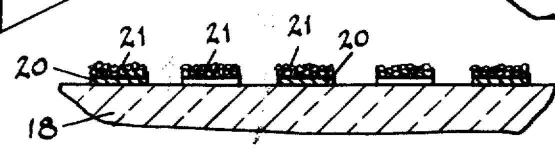


Fig.6.

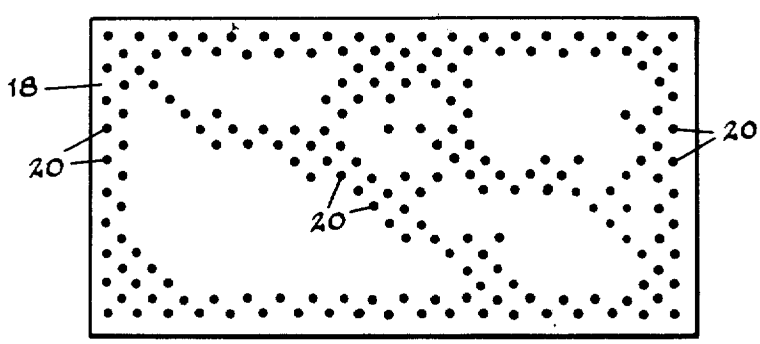


Fig.3

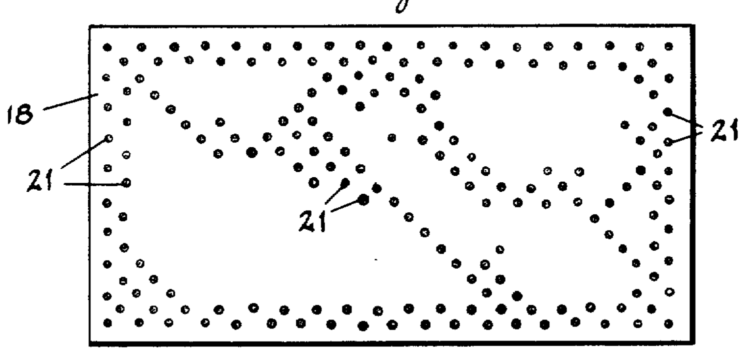


Fig.4.

OVEN DOORS

BACKGROUND OF THE INVENTION

This invention relates to an oven door of the type incorporating a window means for viewing the oven interior when the door in closed to observe the advance of the cooking process.

In the past, it has been common practice to provide a unitary double-glazed glass panel for a windowed oven door with a substantially dead air space between the two panels. Although double-glazed oven doors of this character were designed to prevent transmission of oven heat, they did not function satisfactorily to maintain the outer exposed glass panel at the desired low temperature, particularly after the oven had been on for some period of time. To overcome this objection, a thin, transparent reflective metal coating has been applied to the inner surface of the outer glass panel to reduce the transmittance of oven heat through the window. While these coatings have materially reduced the problem of excessive window temperature, they have not proven entirely successful in meeting the increasingly stringent standards required of the industry for lower window temperatures.

Significant improvement in this area has been attained by the present invention, which contemplates a novel and improved double-glazed window unit which effectively reduces the temperature of the outer glass panel, as well as the exterior surface of the metal door, by producing a more rapid and efficient radiation or dispersion of the oven heat to the surrounding atmosphere.

In carrying out the invention, there is adhered to the outer surface of the outer window glass panel a plurality of discrete relatively small dots of a siliceous or frit material which are arranged in spaced horizontal rows over substantially the entire area of the glass panel. The dots in adjacent rows are preferably staggered and are substantially uniformily spaced from one another, with the open spaces therebetween providing unobstructed viewing areas through which the interior of the oven can be readily observed. The siliceous or frit material comprises finely divided glass particles, such as beads, which are applied to the glass panel in the form of clusters and which present a myriad of exposed minute surfaces that collectively provide a large radiating surface from which a maximum amount of heat emanating from the oven will be dispersed to the surrounding atmosphere. The air currents within the room, flowing or wiping across the glass panel, will act to accelerate dissipation of the oven heat and thereby further reduce the temperature of the said panel to, and maintain it, within acceptable limits.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of an oven employing a door constructed in accordance with the invention;

FIG. 2 is a vertical transverse section of the double-glazed window unit of the invention taken substantially on line 2—2 of FIG. 1;

FIG. 3 is a plan view of the outer glass panel showing the small areas or dots of ceramic paint applied thereto;

FIG. 4 is a similar view showing the heat radiating glass particles applied to the ceramic paint;

FIG. 5 is an enlarged fragmentary plan view of the glass panel showing the arrangement of the clusters of glass particles, and

FIG. 6 is a sectional view taken substantially on line 6—6 of FIG. 5.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In FIG. 1, there is illustrated a floor standing range 10 employing an oven door 11 constructed in accordance with the present invention. The oven door 11 includes front and back metal door panels 12 and 13 which are provided with aligned substantially rectangular openings therein defined by inwardly turned flanges 14 and 15 respectively, and adapted to receive therein the novel window unit 16 of this invention. The window unit 16 comprises inner and outer transparent, tempered glass panels 17 and 18 mounted in spaced, parallel relation in a metal frame 19.

In order for an oven range to be acceptable for domestic use, it is required that the outer surface of the outer glass panel not exceed a specified temperature, the purpose being, of course, to prevent persons and especially children, from being burned should they accidentally come in contact with the panel. The requirements as to maximum permissible temperature are becoming increasingly stringent, presenting a serious problem for the range manufacturer. The latest requirement of Underwriters Laboratories for maximum acceptable surface temperature of the outer glass panel is 172° F. based on an ambient temperature of 77° F.

It is the primary purpose of this invention to effect reduction of the temperature of the outer glass panel to an acceptable degree during normal operation of the oven while, at the same time, providing for easy viewing of the oven interior without opening the door. This is achieved by the provision of novel means applied to the outer surface of the glass panel for causing the heat from the oven to be rapidly radiated or dispersed into the ambient atmosphere.

In practicing the invention, there is first applied to the outer surface of the glass panel 18 a plurality of small discrete spots or dots 20 (FIGS. 3 and 6) of a ceramic paint. While the paint is still wet, a plurality of finely divided particles 21 of a glassy siliceous material, such as glass beads, are sprinkled, or otherwise deposited, on the painted areas 20 in sufficient quantity to form a layer or particle cluster of the desired density and thickness. Some of the glass particles will become embedded in the ceramic paint, while others will project thereabove to form protrusions which collectively provide a large number of minute exposed surfaces which combine to receive oven heat and radiate it to the surrounding atmosphere. Significant improvement has been experienced with this arrangement in the transfer of oven heat to the ambient atmosphere, thereby maintaining the outer surface of the glass panel at a lower temperature than has heretofore been obtained.

The dotted areas 20 of ceramic paint are arranged in a plurality of spaced horizontal rows over substantially the entire area of the glass panel, with the painted areas in adjacent rows being staggered and substantially uniformly spaced from one another, as best shown in FIGS. 3 and 5. Although the size of the painted areas of dots 20 may be varied to suit different conditions, painted dots of about 0.040 inch in diameter have been found satisfactory. Of course, the painted areas **20** need not necessarily be circular but may also be rectangular or of any other desired shape. The spacing between the painted dots **20** may also vary as desired but, by way of example, can be spaced from one another, both horizontally and vertically, about **0.050** inch. and diagonally about **0.025** inch. It has been found that these relative sizes of painted dots and open spaces result in excellent heat transfer while, at the same time, afford adequate viewing of the oven interior.

As stated above, after the painted areas or dots **20** have been applied to the glass panel and while the paint is still wet, the finely divided glass particles or beads **21** are sprinkled thereon to form discrete clusters. The panel is then placed in a furnace and heated to a temperature of about **1250**°F. for a period of approximately **6** minutes. It is then removed and subjected to blasts of cold air to effect the tempering of the glass panel in a manner well known in the art. During heating of the glass panel, the ceramic paint will be fired on the glass and the finely divided glass particles simultaneously fused to the paint and to one another. After the glass panel has cooled, the excess loose particles can be readily removed by brushing or by simply shaking the panel. The composition of the glass particles is matched with that of the glass panel so that the coefficient of expansion will be the same, or sufficiently close, to avoid the liklihood of breakage.

While different types of ceramic paint may be used, paint obtained from the Cataphote Division of Ferro Corporation, Jackson, Mississippi, under No. **M-3115**, Black and No. **M-0133**, White, has been found satisfactory, although the use of black paint gives a more pleasing appearance. The ceramic paint is preferably applied to the glass panel by the silk screen technique, using a squeegee. For example, a **110** Monotex silk screen No. **4120** may be employed. The thickness of the painted dots **20** is preferably in the neighborhood of **0.002** to **0.003** inch., while the total thickness of the painted dots and clusters of finely divided glass particles **21** is preferably about **0.014** to **0.015** inch.

The finely divided glass particles **21** preferably consist of clear glass beads which may also be obtained from the Cataphote Division of Ferro Corporation. The size of the beads used may vary as conditions dictate but, by way of example, are ordinarily in the range of **0.006** to **0.010** inch. and preferably about **0.008** inch. It has been found that, during tempering of the glass panel, the finely divided glass particles become firmly adhered to the glass panel and to one another and will withstand vigorous brushing with a stiff wire brush.

It is to be understood that the present disclosure has been made only by way of example and that modifications and changes may be resorted to without departing from the spirit and scope of the invention as hereinafter claimed.

I claim:

1. An oven door comprising a main body portion having a substantially rectangular opening therein, a window unit mounted in said opening and comprising inner and outer transparent glass panels, with the inner panel being adjacent the oven and the outer panel exposed to the atmosphere, a plurality of discrete areas formed of heat radiating particles adhered to the outer surface of the outer glass panel, with the spaces therebetween forming unobstructed viewing areas through which the interior of the oven can be observed, said particles presenting a myriad of exposed minute surfaces which radiate heat emanating from the oven to the surrounding atmosphere to thereby reduce the temperature of the outer glass panel.

2. An oven door as claimed in claim **1**, in which the heat radiating particles comprise a glassy siliceous material.

3. An oven door as claimed in claim **2**, in which the glassy siliceous material comprises finely divided glass particles.

4. An oven door as claimed in claim **2**, in which the glassy siliceous material comprises glass beads.

5. An oven door as claimed in claim **3**, in which the finely divided glass particles are in the form of relatively small clusters.

6. An oven door as claimed in claim **5**, in which the particle clusters are arranged in a plurality of spaced horizontal rows, with the clusters in adjacent rows being staggered.

7. An oven door comprising a main body portion having a substantially rectangular opening therein, a window unit mounted in said opening and comprising inner and outer transparent glass panels, with the inner panel being adjacent the oven and the outer glass panel exposed to the atmosphere, a plurality of small areas of ceramic paint adhered to the outer surface of the outer glass panel and spaced from one another, with the spaces therebetween forming unobstructed viewing areas through which the interior of the oven can be observed, and heat radiating particles adhered to the ceramic paint and presenting a myriad of exposed minute surfaces which radiate heat emanating from the oven to the surrounding atmosphere to thereby reduce the temperature of the outer glass panel.

8. An oven door as claimed in claim **7**, in which the heat radiating particles comprise a glassy siliceous material.

9. An oven door as claimed in claim **8**, in which the glassy siliceous material comprises finely divided glass particles.

10. An oven door as claimed in claim **8**, in which the glassy siliceous material comprises glass beads.

11. An oven door as claimed in claim **7**, in which the areas of ceramic paint are in the form of discrete dots, and in which the finely divided glass particles are applied to the ceramic dots in the form of clusters.

12. An oven door as claimed in claim **11**, in which the particle clusters are arranged in a plurality of spaced horizontal rows, with the clusters in adjacent rows being staggered.

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