

[54] **DOORS FOR ELECTRONIC OVENS**  
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[56]

**References Cited**

**UNITED STATES PATENTS**

3,177,334	4/1965	Kinkle.....	219/10.55
3,617,698	11/1971	Duncanson.....	219/273
3,430,023	2/1969	Tingley.....	219/10.55
3,329,795	7/1967	Long.....	219/10.55

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[57]

**ABSTRACT**

A door for use in an electronic oven comprises a metal frame having an opening therein, a metal plate having a plurality of small perforations and secured to the frame to close its opening, and a transparent cover plate secured to the frame to cover at least a major portion of the outer surface of the perforated metal plate so as to define a vent passage for exhausting the steam generated from the foodstuff being cooked.

**9 Claims, 8 Drawing Figures**

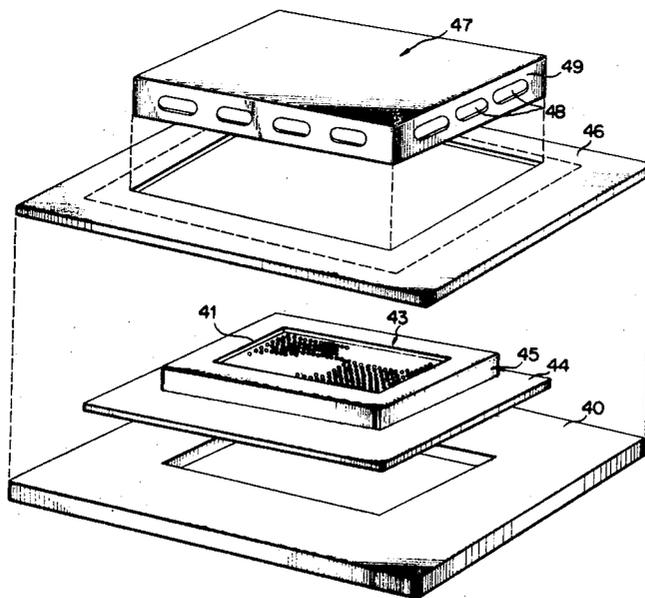


FIG. 1

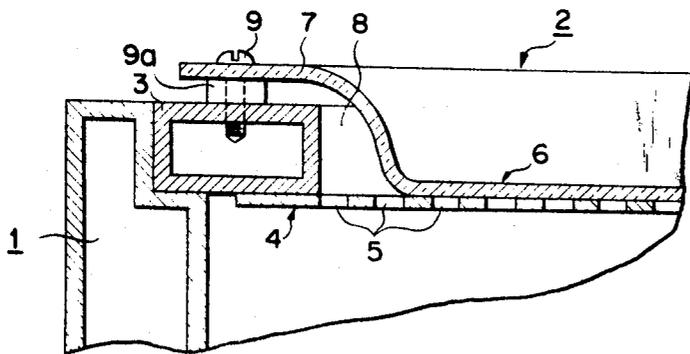
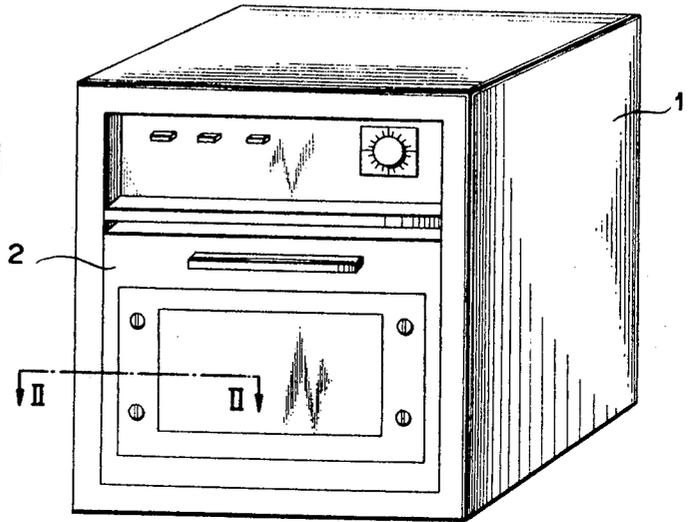
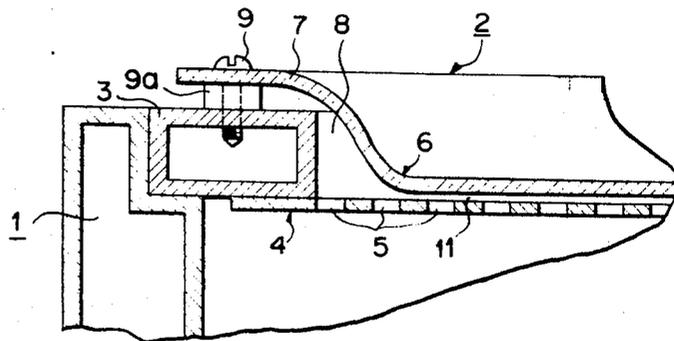


FIG. 2

FIG. 3



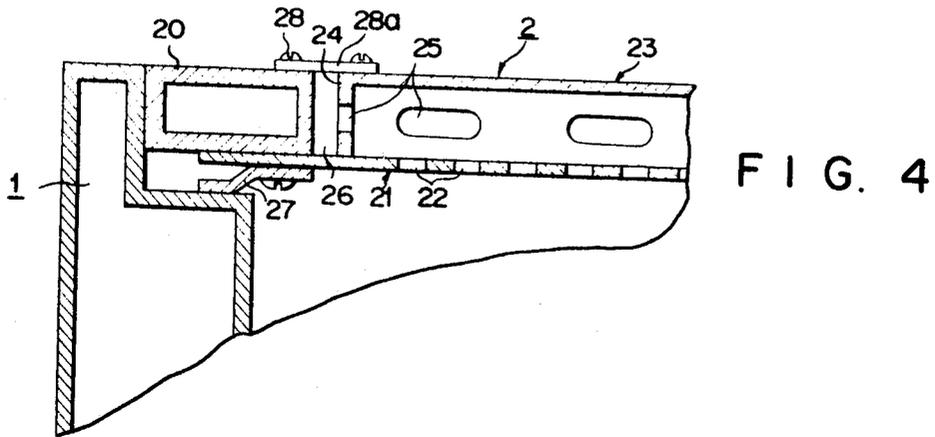
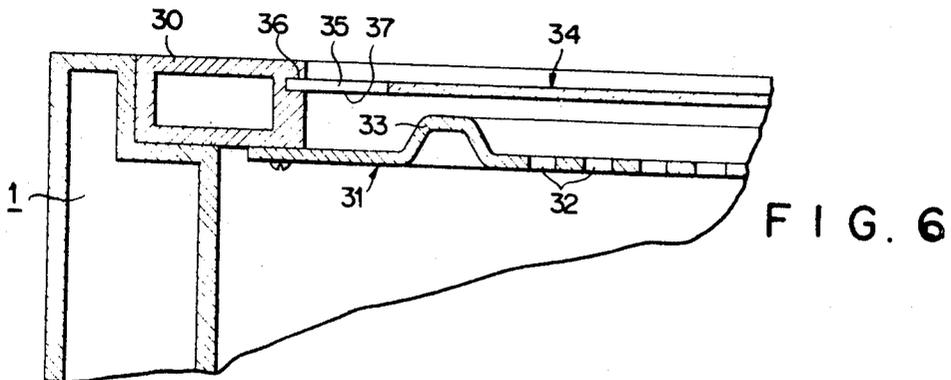
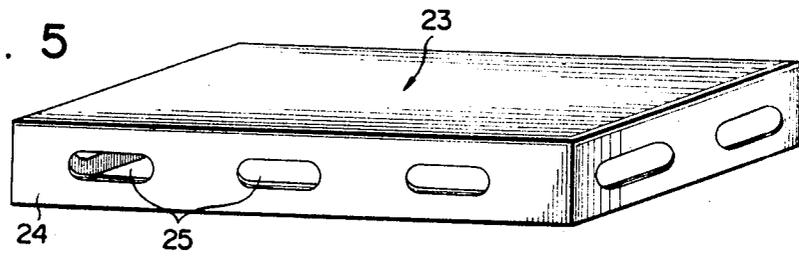
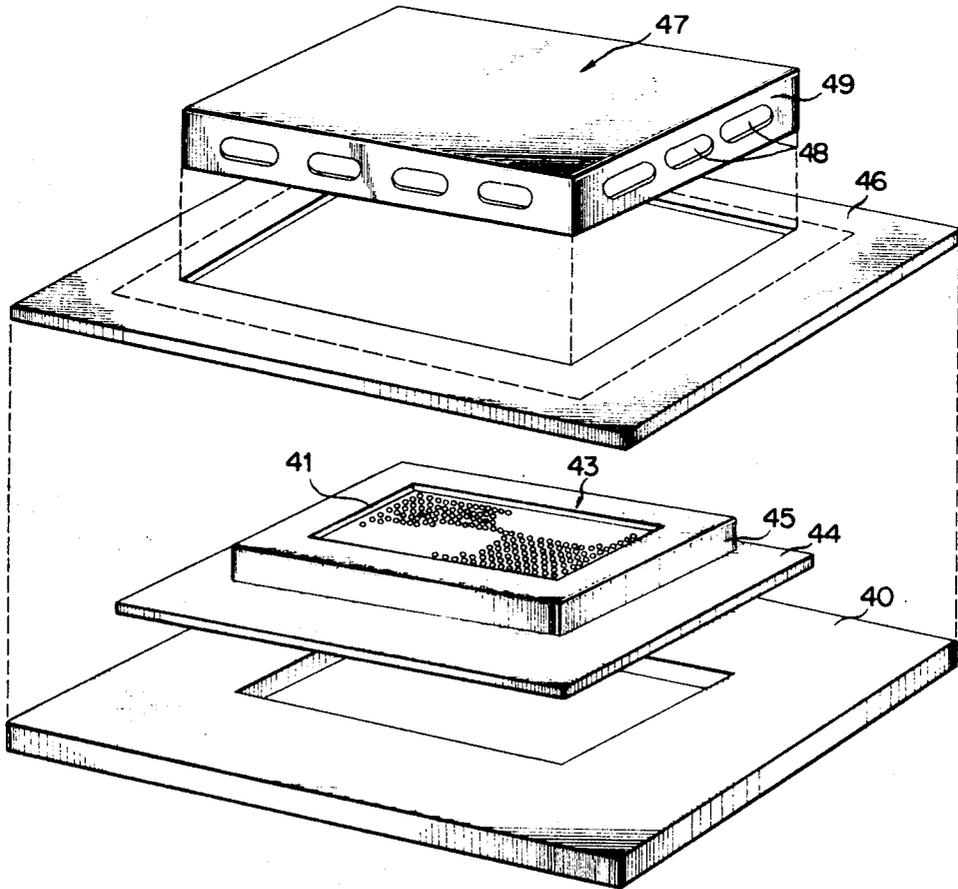
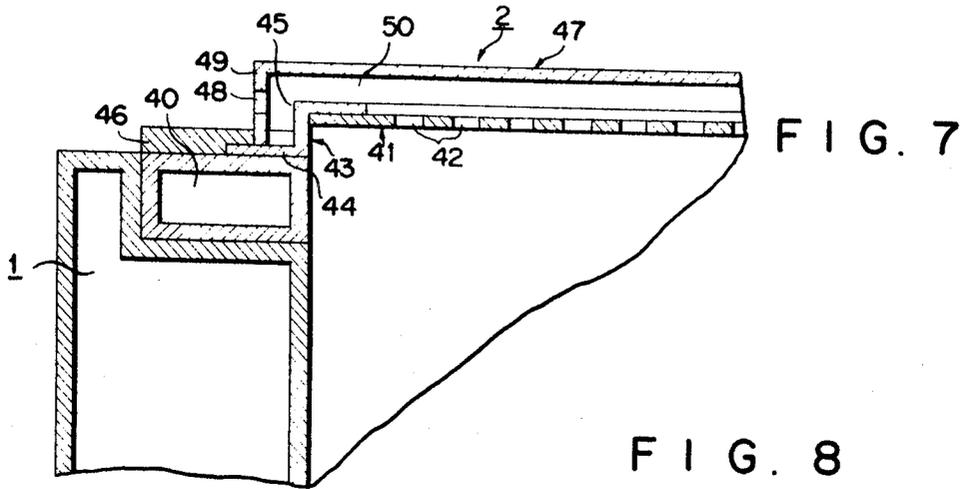


FIG. 5





## DOORS FOR ELECTRONIC OVENS

## BACKGROUND OF THE INVENTION

This invention relates to a door for use in a high frequency electronic oven.

The door for a high frequency electronic oven generally comprises a metal frame, and a metal plate provided with a plurality of perforations and secured to the door frame so as to close the opening or window thereof in order to prevent leakage of the electromagnetic waves from the cabinet, to vent steam or gas generated from the foodstuff being cooked and to observe the foodstuff while it is cooked. If an operator, especially a child, inadvertently inserts a metallic article such as a fork through a perforation, an electric spark will occur between the metal plate and the article or the metal article will act as an antenna thus leaking the electromagnetic waves to the outside of the cabinet.

It is an object of this invention to provide an improved door for use in an electronic oven which can exhaust the steam generated from the foodstuff being cooked in the oven, can prevent clouding of the transparent cover plate and hence can permit observing the foodstuff in the oven and can prevent access to the perforated metal plate.

## SUMMARY OF THE INVENTION

According to the invention there is provided a door for use in an electronic oven comprising a metal frame having an opening therein, a metal plate having a plurality of perforations and secured to the frame to close the opening, and a transparent cover plate secured to the frame to cover at least a major portion of the outer surface of the metal plate so as to define a vent passage for exhausting the steam generated from the foodstuff being cooked through the perforations of the metal plate and the vent passage.

The transparent cover plate may take various forms, for example, a shallow dish, an inverted box or a flat plate. In any case, it may be secured to the frame to cover the perforated metal plate such that the steam can be exhausted and that insertion of a metal article into the perforations of the metal plate can be precluded.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of an electronic oven utilizing a door embodying the invention;

FIG. 2 is a partial sectional view of the door and cabinet taken along a line II—II in FIG. 1;

FIG. 3 is a view similar to FIG. 2 showing a modification thereof;

FIG. 4 shows a partial sectional view of a modified embodiment of this invention;

FIG. 5 is a perspective view of a transparent plate utilized in the embodiment shown in FIG. 4;

FIG. 6 shows a partial sectional view of another modification of this invention;

FIG. 7 shows a partial sectional view of still further modification of the invention; and

FIG. 8 shows an exploded view of the embodiment shown in FIG. 7.

Throughout the drawings, like parts are designated by the same reference numerals.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS:

In the embodiment shown in FIGS. 1 and 2, a door 2 embodying the invention is mounted on a cabinet 1 of an electronic oven of a well known construction to close a door opening on the front side of the cabinet. Door 2 comprises a rectangular metal frame 3 and a metal plate 4 having a plurality of perforations, and secured on the inner side of frame 3 to close the window thereof. A shallow dish shaped transparent cover plate 6 made of a synthetic resin, for example, is secured to the frame 3 by means of screws 9 and spacers 9a. The periphery 7 of the cover plate 6 flares outwardly to cover the frame. The periphery of the cover plate and the frame cooperate to define a vent passage 8 so that steam and the like generated from the foodstuff is exhausted to the outside through those of perforations 5 which are arranged along the periphery of the metal plate 4 and the vent passage 8. As the transparent cover plate is directly heated by the perforated metal plate to a temperature above the dew point, it is not clouded by the steam condensed thereon.

Instead of closely attaching the cover plate 6 to the perforated metal plate 4, the bottom of the cover plate may be slightly spaced apart from the perforated metal plate as shown in FIG. 3, thus leaving a small air gap 11 therebetween. Again the cover plate is adequately heated by the steam flowing through the air gap 11 and the heat radiated from the perforated metal plate.

With the construction described above, the transparent cover plate permits inspection of the foodstuff loaded in the cabinet and effectively prevents inadvertent insertion of a metal article through the perforation of the metal plate. Moreover, as the cover plate can be adequately heated to a temperature above the dew point, clouding thereof can be prevented.

In a modified embodiment of this invention illustrated in FIGS. 4 and 5, the door 2 comprises a rectangular frame 20, a metal plate 21 having a plurality of perforations 22 and secured to the inner side of the frame 20 to close its window and a shallow inverted box type transparent cover plate 23 made of a synthetic resin, for example, and mounted to substantially cover the outer surface of the metal plate. The cover plate is secured to the frame by means of screws 28 and fixture 28a. As shown in FIG. 5, a plurality of elongated perforations 25 are formed through the side walls of the cover plate 23. The cover plate is spaced apart from frame 20 a small distance not to permit insertion of a metal article, thus defining a vent passage 26. The fixture 28a is also provided with suitable vent openings, not shown, so that the steam generated from the foodstuff being cooked can escape through perforations 23 of the metal plate and vent passage 26. A metal shield 27 is secured to the periphery of the metal plate 21 to engage the door opening of the cabinet so as to prevent the leakage of the electromagnetic wave when the door is closed.

The modified door 2 shown in FIG. 6 comprises a rectangular frame 30, and a metal plate 31 provided with a plurality of perforations 32 excepting its peripheral portion and secured to the inner side of the frame to close the window thereof. The metal plate is provided with a raised ridge 33 at its non-perforated

peripheral portion. A transparent cover plate 34 is provided to cover the outer surface of the metal plate, the perforated edge 35 of the cover plate being received in a peripheral groove 36 of the frame 30. The cover plate 34 is slightly spaced apart from raised ridge 33 so that the steam generated from the foodstuff is exhausted through perforations 32 of the metal plate, perforations 35 and perforations 37 at the peripheral edge 35. Raised ridge 33 prevents insertion of a metal article into the perforation 32.

In another modified embodiment shown in FIGS. 7 and 8, the door 2 for closing the door opening of cabinet 1 comprises a rectangular metal frame 40, a metal plate 41 provided with a plurality of perforations 42, supporting metal frame 43 for securing the metal plate on the outer surface of the frame and rectangular frame 46 covering the horizontal flange 44 of supporting frame 43, the frame 46 being secured to the outside of door frame 40 by suitable fastening means not shown. A transparent shallow cup shaped cover plate 47 including a plurality of perforations 48 through its side walls 49 is secured in the opening of the frame 46, the cover plate being spaced apart from the outer surface of the metal plate 41 and the vertical wall 45 of the supporting frame 43 to define a vent passage 50. By providing perforations 48 through the side walls 49 of the cover plate, insertion of a metal article through the perforation 42 of metal plate 41 is rendered impossible. The steam generated from the foodstuff can escape through perforations 42, vent passage 50 and perforations 48.

As in the previous embodiments, the transparent cover plate 47 is heated to a temperature above the dew point by the steam and the heat radiated from the perforated metal plate 41.

What we claim is:

- 1. A door for use in an electronic oven comprising:
  - a door frame having an opening therein;
  - a metal plate having a plurality of perforations, said metal plate being secured to said door frame to close said opening; and
  - a transparent cover plate covering at least a major portion of the outer surface of said perforated metal plate and defining a vent passage through said door frame opening between said perforated metal plate and said transparent cover plate for exhausting the steam generated during oven operation through said perforations and then through said vent passage.
- 2. The door according to claim 1 wherein said trans-

parent cover plate is in the form of a shallow dish having a bottom portion facing the central portion of said perforated metal plate and an outwardly flaring peripheral portion which is spaced apart from said door frame to define said vent passage between said door frame and said outwardly flaring peripheral portion of said transparent cover plate.

3. The door according to claim 2 wherein said bottom portion of said transparent cover plate is in direct contact with the central portion of said perforated metal plate.

4. The door according to claim 2 wherein said bottom portion of said transparent cover plate is spaced apart from the central portion of said perforated metal plate to define an additional vent passage therebetween.

5. The door according to claim 1 wherein said transparent cover plate is in the form of an inverted box having side walls provided with perforations, said transparent cover plate being disposed in said opening of said frame with its side walls spaced from the inner peripheral walls of said frame to define said vent passage therebetween.

6. The door according to claim 1 wherein said perforated metal plate is provided with said perforations only at its central portion, the non-perforated peripheral portion of said metal plate having a raised ridge surrounding said perforated central portion, and wherein said transparent cover plate is flat and is secured at its peripheral portion to said frame, said transparent cover plate being spaced from said raised ridge to define a vent passage therebetween and having vent openings at its peripheral portion between said frame and said raised ridge.

7. The door according to claim 1 including a supporting frame securing said perforated metal plate to said door frame to close said opening of said door frame, and wherein said transparent cover plate is in the form of an inverted box and is secured to said supporting frame to cover said perforated metal plate with a vent passage therebetween, the side walls of said box shaped cover plate being provided with vent openings communicating with said vent passage.

8. The door according to claim 7 wherein said transparent cover plate completely covers said outer surface of said perforated metal plate.

9. The door according to claim 2 wherein said transparent cover plate completely covers said outer surface of said perforated metal plate.

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