

[54] **DOOR LATCH ASSEMBLY FOR A MICROWAVE COOKING OVEN**

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[51] Int. Cl. **H05b 9/06**

[58] Field of Search..... 219/10.55; 292/209, 292/249, 303, DIG. 68

[56] **References Cited**

UNITED STATES PATENTS

3,480,753	11/1969	Wilson et al.	219/10.55
2,188,703	1/1940	Burke	292/DIG. 68
2,498,508	2/1950	Rudolph	292/DIG. 68

FOREIGN PATENTS OR APPLICATIONS

1,073,350	1/1960	Germany	292/DIG. 68
1,198,237	8/1965	Germany	292/DIG. 68

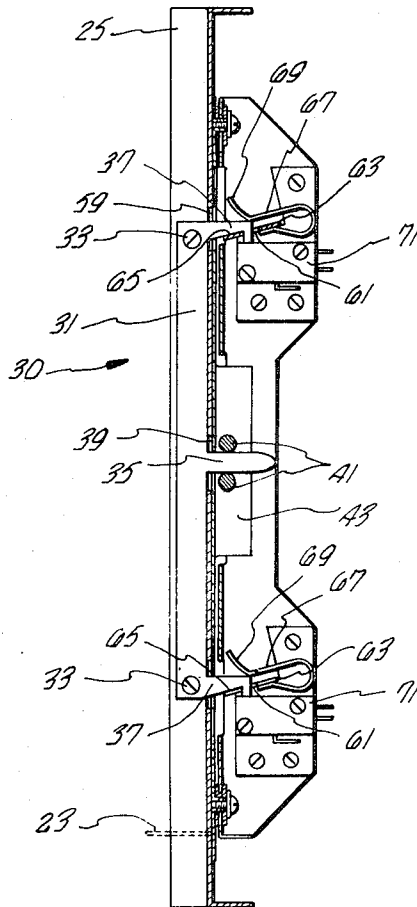
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[57] **ABSTRACT**

A door latch assembly for a microwave cooking oven

is disclosed having a latch element mounted on the cantilevered end of the oven door and a latch receiving element mounted on the front face of the oven. The latch element includes a base member having a first aligning projection extending outwardly from the mid-length thereof, and a pair of hooked latches extending outwardly from the opposite ends thereof. The latch receiving element comprises a first fixed aperture formed adjacent the oven face for receiving the aligning projection of the latch element. The latch receiving element further includes a movable body having a pair of apertures for receiving the hooked latches of the latch element. The movable body also includes a pair of ported plates fixedly attached thereto. The plates include bearing surfaces adapted to engage and be moved downwardly by the latches. Upon further inward movement of the latches, the latches are adapted to extend into the plate ports and be secured therein by a pair of leaf springs, which function to move the plates and body upwardly in a secured position. To disengage the latches, the movable body is moved downwardly until the plate ports move out of engagement with the hook portions of the latches. The springs then function to urge the latches against the bearing surfaces of the plates to force the latches and the door away from the front face of the oven. A safety switch is connected to each port plate to be controlled by the hooked portions of the latches.

13 Claims, 5 Drawing Figures



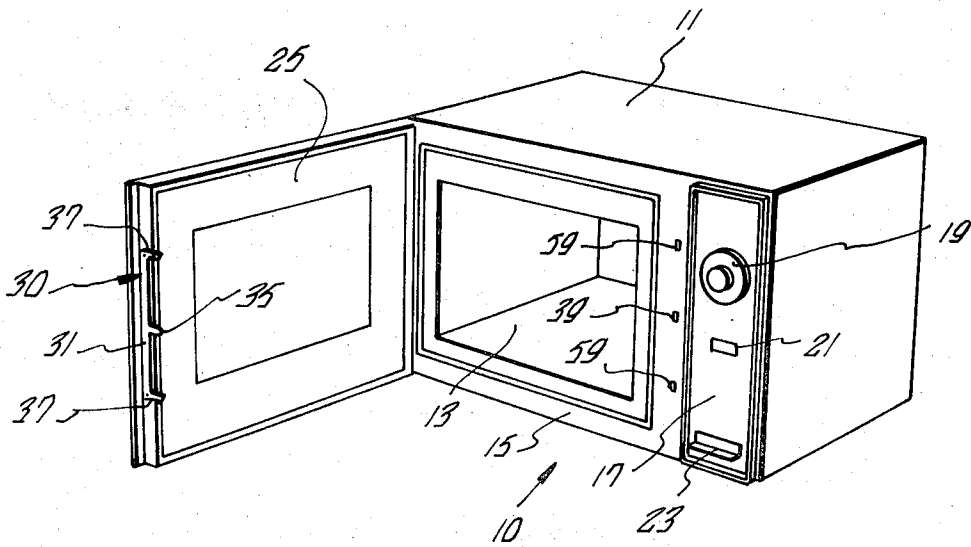


FIG. 1.

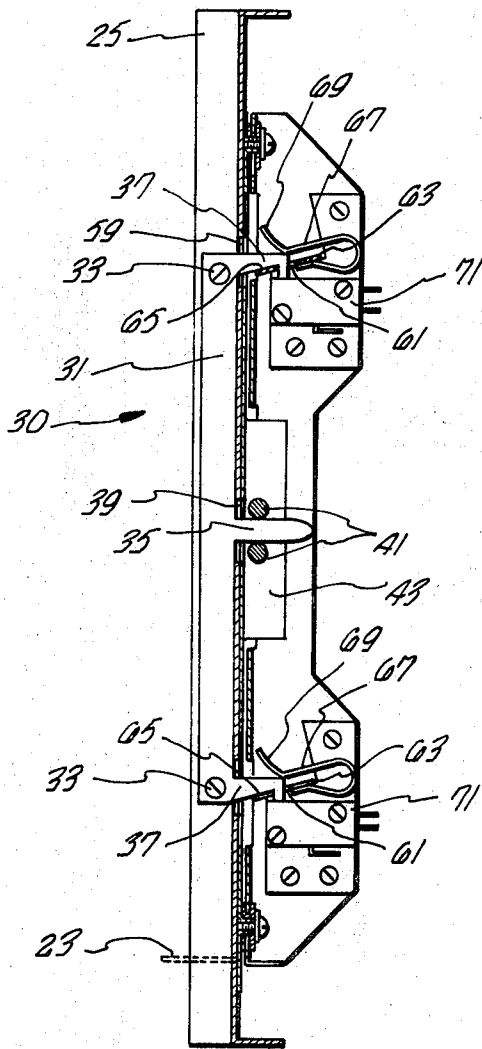
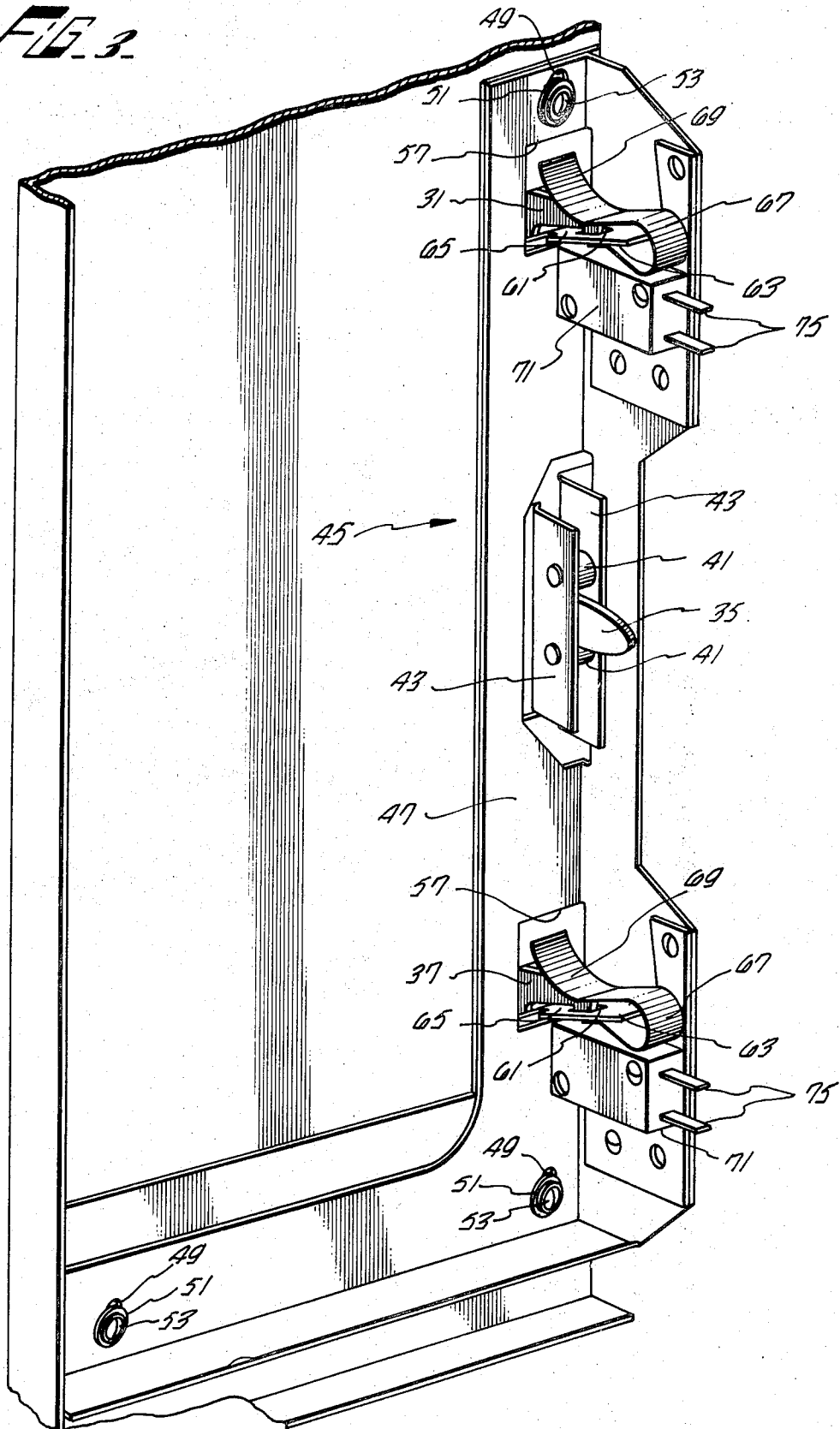


FIG. 2.

FIG. 3



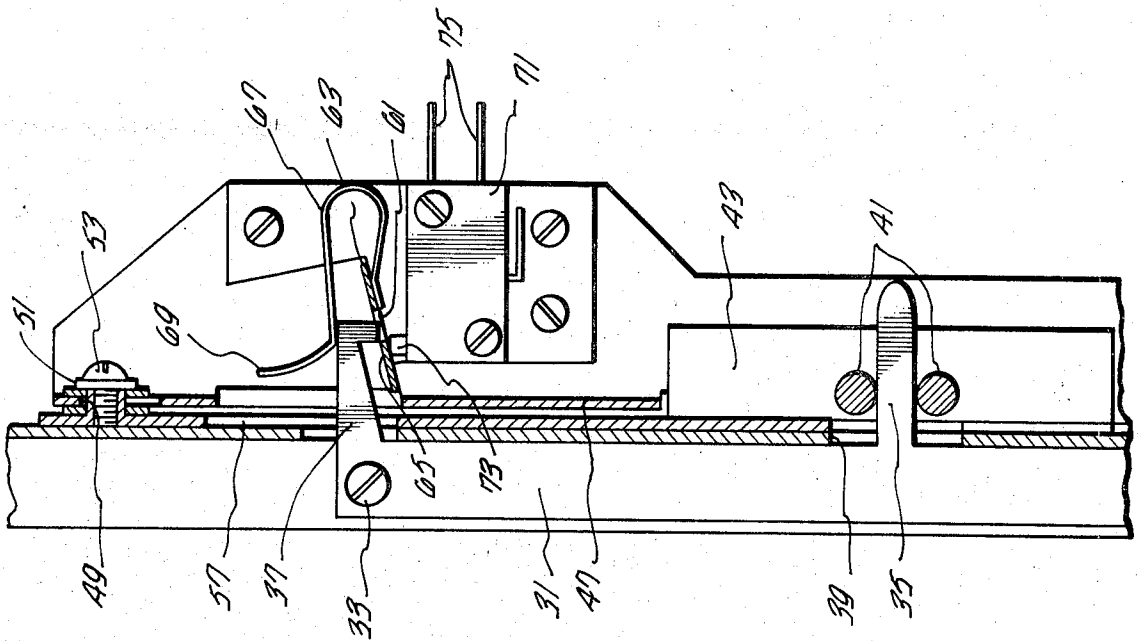


FIG. 4-

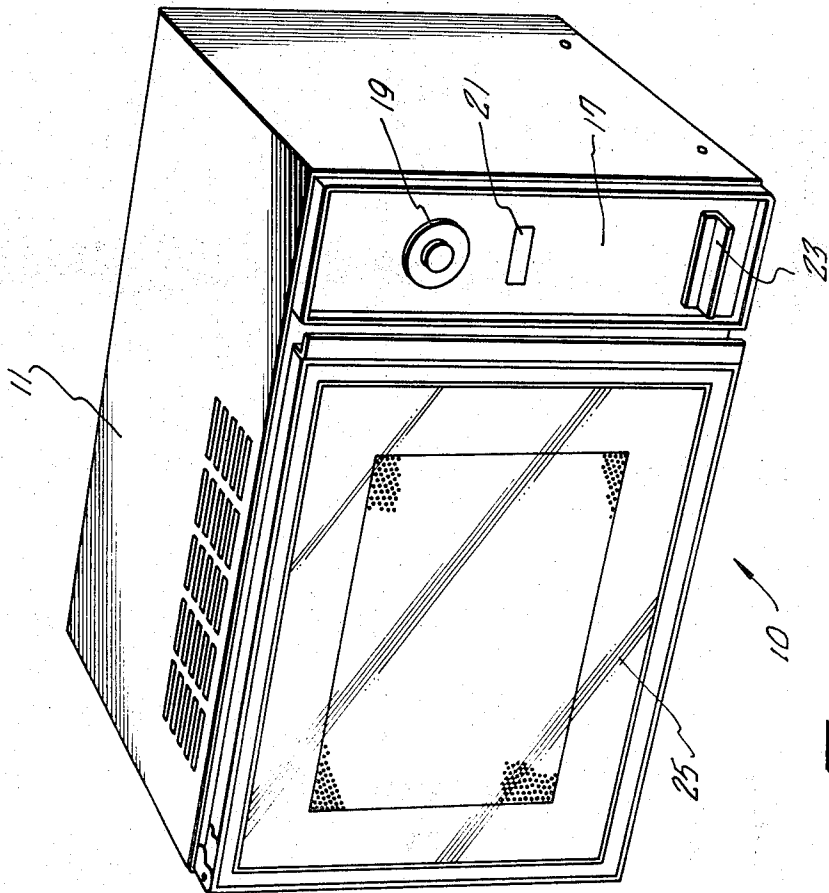


FIG. 5-

DOOR LATCH ASSEMBLY FOR A MICROWAVE COOKING OVEN

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to doors for microwave cooking ovens and more particularly to latch mechanisms for securing such doors.

2. Description of the Prior Art

Because of the problem of radiation leakage occurring about the periphery of a microwave oven door, it is imperative that the door be securely locked against the face of the oven cavity during operation.

Although all prior microwave oven doors accomplish this function in a fashion, they all suffer from various shortcomings in the latching structures that secure the doors to the oven faces.

Generally speaking, most prior oven doors have a serious misalignment problem which tends to worsen after utilization for an extended period of time.

Another shortcoming with prior oven doors is that each door utilizes only one latch. This means that the cantilevered end of the door is unsupported over a large area. These unsupported areas could cause the door to warp after an extended period of time.

Another more serious problem with prior doors is that the latch mechanisms are usually biased by springs which deteriorate rapidly because of the high tension load placed on them. Spring replacement is always a problem, particularly because the integrated door construction makes it difficult to get to the springs located in the interior thereof.

In the prior microwave oven doors, only one switch is connected to the latch mechanism for each door to secure the latch during oven operation and to ensure against the door being opened during the cooking cycle. Although not required by government safety standards, it would be preferable to have redundant safety devices to protect against switching failures.

Another serious problem with prior oven doors is that the door handles associated with latch mechanisms are an attraction to children and as such can be hung on and mishandled to the point of destruction.

SUMMARY OF THE INVENTION

The present invention obviates the above-mentioned shortcomings by providing an oven door latch mechanism that is totally novel in construction and operation.

In its broadest aspect, the present invention comprises a latch assembly which includes a latch element fixedly attached to the oven door. The latch element includes the combination of a centering projection for aligning the first element with respect to the oven face and hooked latches for securing the latch element to the oven face. A primary advantage of the centering projection is that it ensures that the oven door will always mate properly with the oven face.

Another aspect of the present invention is that two latches are provided to create a more secure support for the cantilevered end of the oven door.

The present invention also provides dual safety switches attached to the latches for controlling the operation of the microwave power supply. The advantage of this feature is that a redundant safety system is provided to ensure the safe operation of the oven.

Another aspect of the present invention is that springs are provided to act only on the latches and not

on the movable element mounted on the oven face. The springs also function to urge the oven door outwardly upon release. This eliminates the need for a door handle which can be mishandled by children.

The features of the present invention which are believed to be novel are set forth with particularity in the appended claims. The present invention, both as to its organization and manner of operation, together with the further advantages thereof, may best be understood by reference to the following description, taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a microwave oven utilizing a latch assembly of the present invention;

FIG. 2 is a sectional view of the latch assembly taken along line 2—2 of FIG. 1;

FIG. 3 is a perspective view of the slider assembly;

FIG. 4 is a fragmentary sectional view of one of the locking projections just prior to being released from its locked position; and

FIG. 5 is a perspective view of the microwave oven with the door in its closed position.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, FIG. 1 shows a microwave cooking oven generally indicated by arrow 10, having a main housing assembly 11 having an oven cavity 13 formed therein. The oven cavity 13 opens into a front face 15 which also includes the control panel 17. The control panel 17 has a timing dial 19, a cooking cycle switch 21, and a door release lever 23 mounted thereon. Other control switches, as may be necessary, can also be mounted thereon.

An oven door 25 is pivotally mounted on the side of the oven front face 15 opposite the control panel 17. The oven door 25 is dimensioned to completely extend over the opening of the oven cavity 13 and is adapted to be secured in a closed position by a latch assembly 30.

Referring now to FIG. 2, the latch assembly 30 includes a fixed plate 31 integrally connected to the one side of the oven door 25 by means of a pair of screws 33. The fixed plate 31 includes a guide projection 35 extending rearwardly from the mid-portion thereof. The plate 31 further includes a pair of hooked latches 37 extending rearwardly from the upper and lower extremities thereof. The guide projection 35 is adapted to extend through an aperture 39 of the front face 15. The pair of guide rollers 41 are rotatably mounted at the upper and lower sides of the aperture 39 onto a pair of flanges 43 which in turn are integrally connected to the control panel structure 17.

Referring now to FIG. 3, a slider assembly 45 is adapted to be movably mounted on the interior side of the control panel 17. The slider assembly comprises an L-shaped slider 47 having three elongated slots 49 for receiving three bushings 51 which are connected to the interior side of the control panel 17 by three screws 53. The slider 47 is adapted to easily slide along the bushing 51 through the entire length of the slots 49. The slider 47 also includes a first elongated opening 55 which is adapted to receive the guide roller assembly 41 and 43 and to permit the slider 47 to move up and down without being obstructed by such assembly. The slider 47 further includes a pair of elongated openings

57 which is positioned adjacent a pair of apertures 59 formed on the control panel 17 (see FIG. 2). The hooked latches 37 are adapted to extend into the apertures 59 and through the pair of elongated openings 57. The hooked latches 37 are further adapted to extend into a pair of ports 61 formed on a pair of strike plates 63. Each of the strike plates 63 further includes a bearing surface 65 formed on a forward edge thereof. A U-shaped leaf spring 67 is mounted on each strike plate 63 with each spring including a biasing surface 69 which is adapted to engage a respective hooked latch 37. Each of the biasing surfaces 69 is beveled upwardly, the reason for which will be given in greater detail hereinafter. Finally, a disconnect switch 71 is mounted on the slider adjacent each of the strike plates 63 with each switch 71 including a movable control element 73 (see FIG. 4) which is adapted to be controlled by the movement of a respective hooked projection 37. Each disconnect switch 71 further includes electrical terminals 75 for connection to the power circuit for controlling the operation of the microwave oven power supply.

OPERATION

Upon closing the oven door 25 against the front face 15 of the oven cavity 13, the guide projection 35 enters the aperture 39 and contacts the guide rollers 41. The tip of the guide projection 35 is beveled in both directions to ensure that the projection 35 will contact the rollers 41 and be guided therethrough to align the entire door during such entry. As the hooked latches 37 enter the apertures 59 the top portions thereof contact the beveled surfaces 69 of the leaf springs 67. Upon contacting the upper surfaces of the hooked projections 37, the biasing surfaces 69 of the leaf springs 67 cause the slider 47 to move upwardly until the bearing surfaces 65 of the strike plates contact the lower extremities of the hooked latches 37. The hooked latches 37 continue to travel inwardly until their hooked portions are biased into the ports 61 of the strike plates 63 by the leaf springs 67. As this occurs, the slider 47 moves upwardly, thereby causing the control elements 73 of the disconnect switches 71 to contact the hooked projections 37 to be depressed thereby. These switches then function to close the power supply circuit to allow the magnetron to be operable.

The closed position of the door is shown in FIG. 5. In this position the oven door 25 includes a handle 77 which is completely recessed within an area flush with the control panel 17. This prevents children from hanging on the handle when the oven door 25 is closed.

To open the oven door 25, the door release lever 23 is depressed downwardly. Since the lever 23 is integrally connected to slider 47, the entire slider 47 is also moved downwardly. During this movement the strike plates 63 also move downwardly to cause the hooked projections 37 to withdraw from the ports 61. When this occurs, the biasing surfaces 69 of the leaf springs 67 function to apply a force on the hooked projections to cause it to move outwardly along the bearing surfaces 65 of the strike plates 63. This movement functions in a snap action movement and the hook projections 37 along with the door 25 are urged outwardly to be opened automatically. Also, during this movement the control elements 73 of the disconnect switches 71 are deactivated to open the power supply control circuit to ensure that the magnetrons cannot be turned on when the oven door 25 is in the open position.

As can be seen, a new and improved oven door latch assembly is provided that has many advantages over prior latch assemblies. It should be noted that various modifications can be made to the apparatus while still remaining within the purview of the following claims.

What is claimed is:

1. A latch assembly for securing a microwave oven door to the front face of the microwave oven comprising:

a first element having a main body fixedly attached to the cantilevered end of the oven door, said main body having means for securing said first element to the oven face;

front face having means for receiving said securing means;

said securing means comprising at least one hooked latch extending from said main body;

said means for receiving said securing means comprises at least one ported plate located adjacent a respective aperture on said oven face, each port on each said plate being positioned to receive the hooked portion of a respective latch; and

spring means mounted on each ported plate for biasingly engaging a respective latch when the hooked portion of said latch extends into said ported plate.

2. The invention of claim 1 further including centering means for aligning said first element with respect to the oven face, said centering means comprising a projection extending from approximately the middle of said main body.

3. The invention of claim 2 wherein said means for receiving said centering means comprises an aperture having a pair of roller bearings mounted on opposite sides thereof.

4. The invention of claim 1 wherein said plates are fixedly connected to said second element to be movable therewith.

5. The invention of claim 4 wherein said second element further includes a lever integrally connected thereto, said lever extending through a window formed in the oven face.

6. The invention of claim 1 wherein each of said spring means includes a bevel portion for biasing the respective latch away from said ported plate when said second element is moved with respect to said latches.

7. The invention of claim 1 further including a switch mounted on said second element adjacent each aperture, each switch being engageable with a respective latch when extending in a ported plate.

8. The invention of claim 1 wherein each of said ported plates includes a bearing surface positioned at an angle with respect to the horizontal movement of said respective latch, each bearing surface being engageable with the hooked portion of each respective latch to be vertically movable during horizontal movement of the respective latch during such engagement.

9. The invention of claim 8 wherein each of said spring means comprises a bevelled bearing surface which is opposed to the bearing surface of a respective ported plate.

10. The invention of claim 1 further including a hand lever extending through the front face of the oven, said lever being connected to said second element to enable the second element to be moved with respect to the hooked portions of said latches, against the bias of said spring means.

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11. The invention of claim 9 further including means for moving said second element with respect to the hooked portions of said latches, against the bias of said spring means.

12. A latch assembly for securing a microwave oven door to the front face of the microwave oven comprising:

said front face of the housing having at least one aperture

a first element having a main body fixedly attached to the cantilevered end of the oven door, said main body having means for securing said first element to the oven face;

a second element movably mounted on said front face having means for receiving said securing means;

said securing means comprising at least one hooked latch extending from said main body;

said means for receiving said securing means com-

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prising at least one bearing surface adjacent a respective aperture on said oven face, each bearing surface being fixedly connected to said second element to be movable therewith, said latch being movable with said cantilevered end of said door to be displaced into said aperture, each bearing surface further having an edge for lockingly engaging the hooked portion of said respective latch at the end of said latch displacement; and

spring means mounted adjacent each of said bearing surfaces for biasing the respective edge into locking engagement with the hooked portion of said respective latch and for biasing the latch away from said edge upon disengagement of said edge with said hooked portion of said latch.

13. The invention of claim 15 wherein said second element further includes a lever extending through a window formed in the oven face.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 3,777,098
DATED : December 4, 1973
INVENTOR(S) : William R. Tapper

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Claim 1, line 14, insert---a second element movably mounted on said---immediately before the words "front face".

Signed and Sealed this

Fifth Day of June 1979

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

DONALD W. BANNER
Commissioner of Patents and Trademarks

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