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Skinner

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[54] **ELECTRIC HEATING ELEMENT WITH A SOCKET ASSEMBLY**

[75] Inventor: **Charles Arthur Skinner,** Laurel, Md.

[73] Assignee: **Baxter Laboratories, Inc.,** Morton Grove, Ill.

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[52] **U.S. Cl.** **219/404,** 219/403, 219/536

[51] **Int. Cl.** **F27d 11/02**

[58] **Field of Search** 219/403, 404, 447, 451, 219/463, 536, 537, 541

[56] **References Cited**

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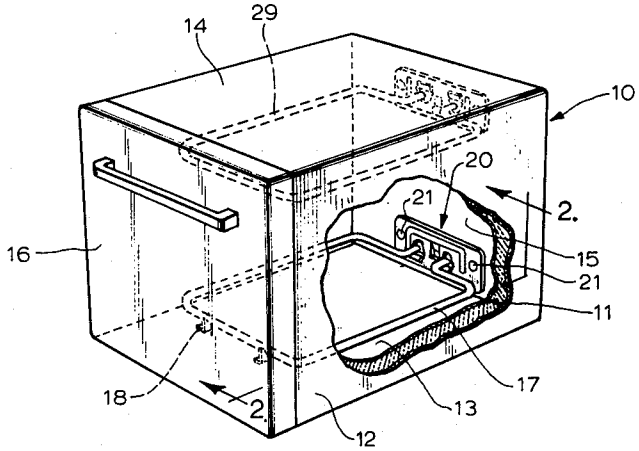
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Primary Examiner—Volodymyr Y. Mayewsky
Attorney, Agent, or Firm—Richard G. Kinney

[57] **ABSTRACT**

A socket assembly for suspending a rod-type heating element from the wall of an electric oven comprises a base plate attached to the inside surface of the oven wall and a hinge plate to which the ends of the heating element are attached. The hinge plate is pivotally engaged to the base plate to enable the heating element to pivot from a normal operating position perpendicular to the oven wall to an alternate angular position for cleaning. A finger struck from the base plate maintains the two plates in engagement and indexes the heating element in its normal and alternate positions. The socket assembly requires only two component parts, can be conveniently removed as a unit from the oven for replacement of the heating element, and has no protrusions which might interfere with use of the oven.

6 Claims, 6 Drawing Figures



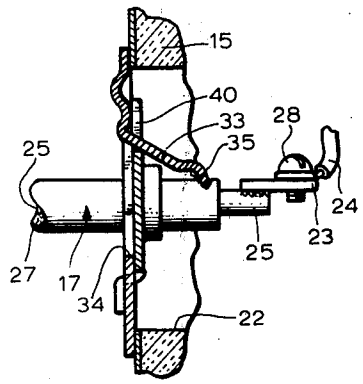


FIG. 1

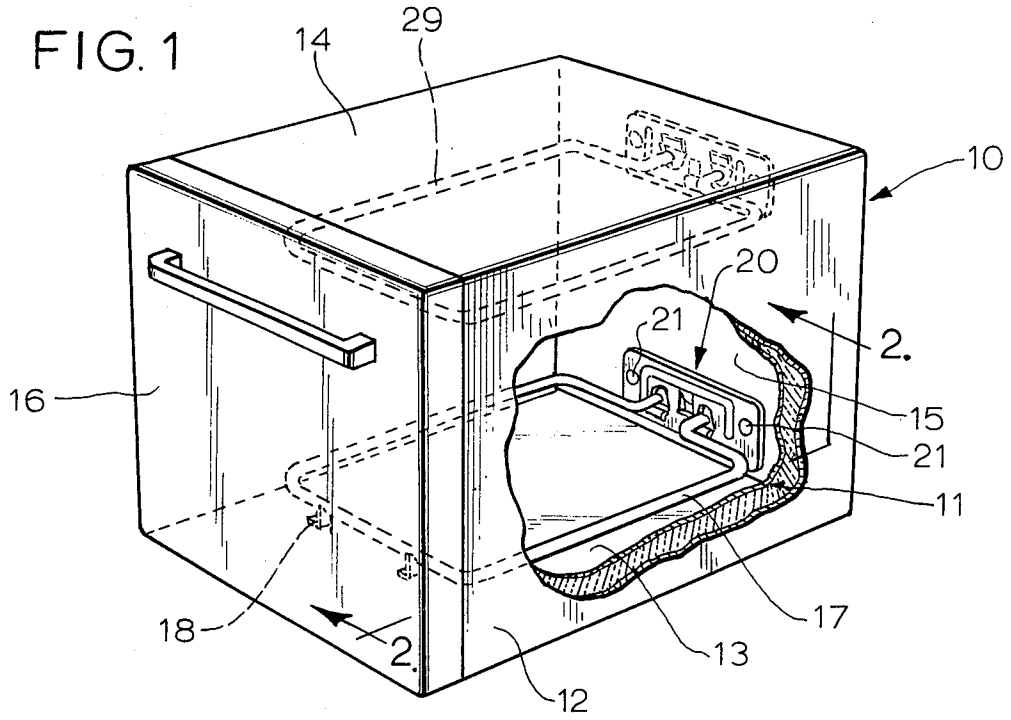


FIG. 2

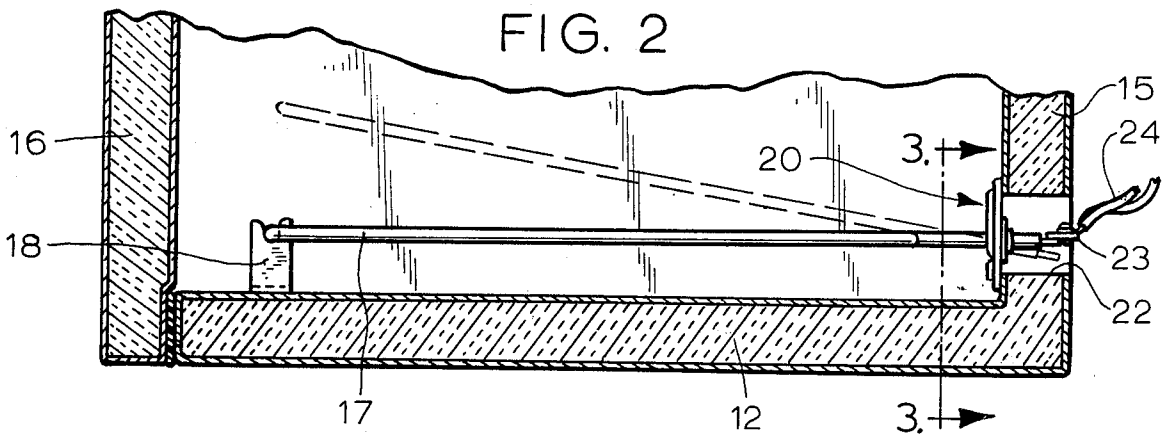


FIG. 3

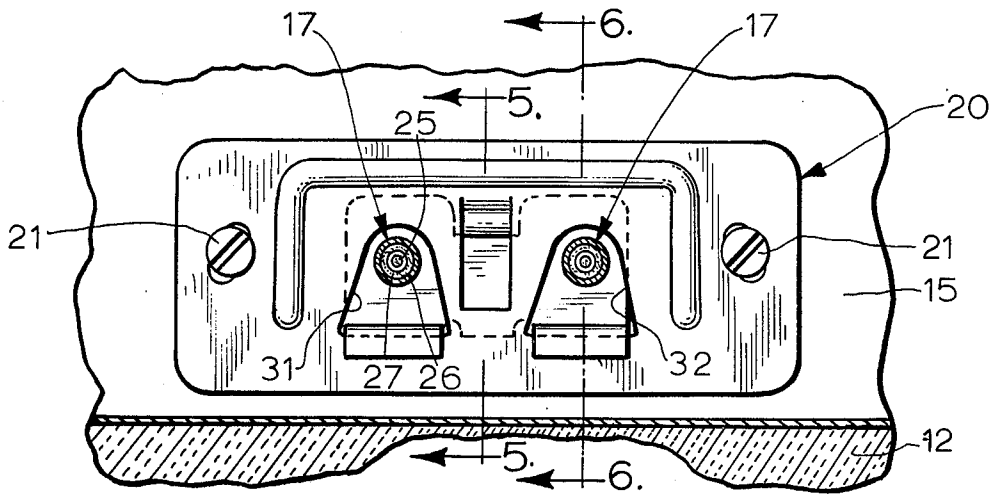
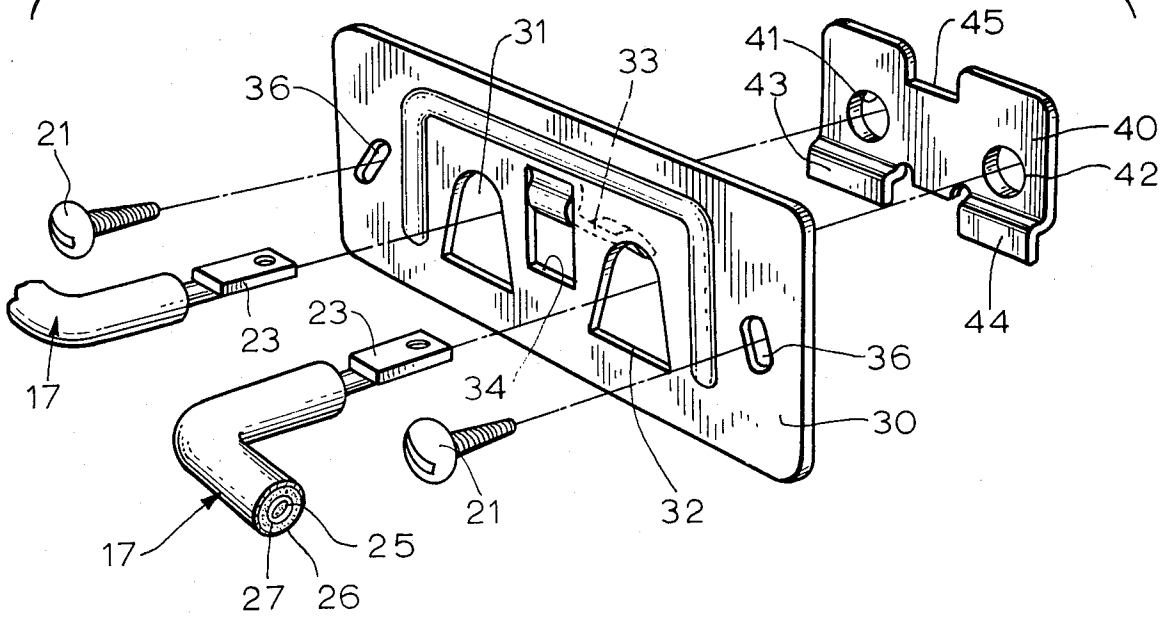


FIG. 4



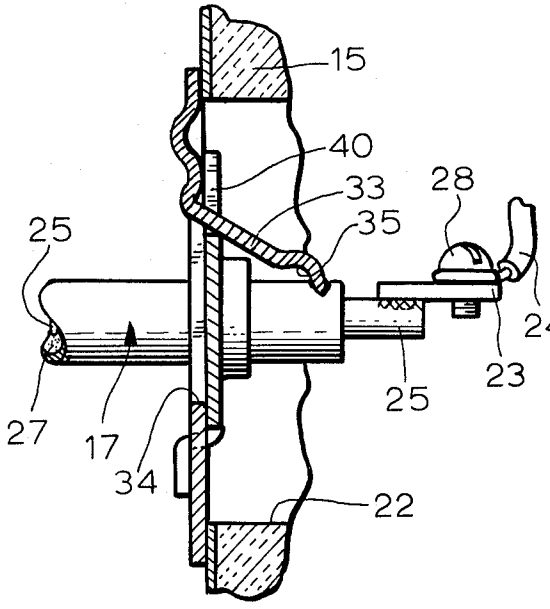


FIG. 5

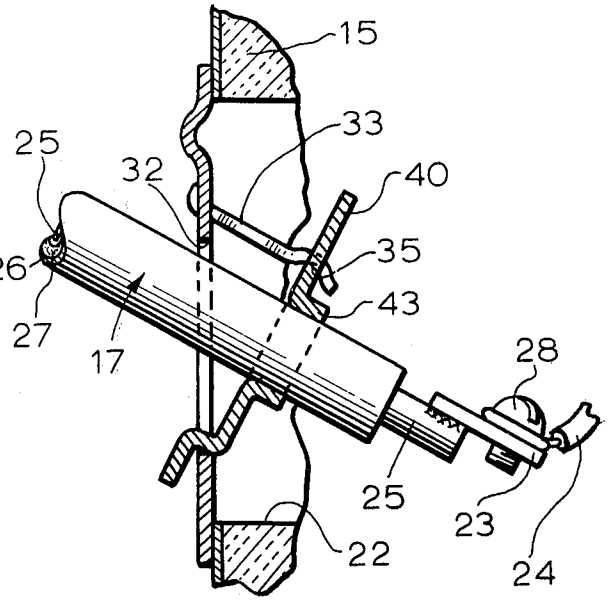


FIG. 6

ELECTRIC HEATING ELEMENT WITH A SOCKET ASSEMBLY

BACKGROUND OF THE INVENTION

The present invention relates in general to electric ovens, and more particularly to a socket assembly for mounting a tubular-type electric heating element on the wall of an electric oven.

Electric ovens typically consist of a rectangular enclosure which is heated to an elevated temperature by means of one or more tubular sheathed electric resistance heating elements mounted in spaced relationship to the inside surface of one or more of the walls of the oven. Typically, two such heating elements are provided; a baking element positioned near the top of the oven, and a broiler element positioned near the bottom of the oven. Each of the heating elements is tubular in form and may be formed in a rectangular loop or other configuration such that the two ends of the element project towards a common side wall. These ends are typically attached to a socket assembly mounted on the side wall, the respective ends of the heating element extending therethrough and terminating in electrical connections which supply operating power to the heating element.

In the operation of the oven it is frequently necessary that the wall or walls adjacent the heating element be cleaned. To this end it is desirable that the heating element be pivotable away from its adjacent side wall for better access to the inside surface of that side wall. Furthermore, during the operating life of the oven it may become necessary to replace the electric heating element. Since access to the rear of the oven is often difficult or impossible, particularly where the oven is built into a wall or cabinet, it is desirable that the replacement be accomplishable from the inside surface of the oven.

Because of the highly competitive nature of the consumer appliance industry, it is desirable that the aforementioned objectives be realized with minimum complexity and expense. Accordingly, the need exists for an improved socket assembly for a tubular heating element which provides for pivoting and removal of the heating element with a minimum number of component parts, and which can be economically fabricated from inexpensive readily available materials. It is to such a socket assembly that the present invention is directed.

Accordingly, it is a general object of the present invention to provide a new and improved socket assembly for an electric oven.

It is a more specific object of the present invention to provide a new and improved socket assembly for a tubular-type heating element in an electric oven which requires a minimal number of component parts.

It is another object of the present invention to provide a new and improved socket assembly for a tubular heating element in an electric oven which allows the heating element to be pivoted away from an adjacent side wall to a defined alternate position for cleaning, and which holds the heating element in this position until returned by the user to its normal position.

It is another object of the present invention to provide a new and improved socket assembly for a tubular heating element in an electric oven which may be economically fabricated by known stamping techniques.

It is another object of the present invention to provide a new and improved socket assembly for a tubular heating element in an electric oven which allows the heating element to be readily removed for repair or replacement from inside the oven.

SUMMARY OF THE INVENTION

The invention is directed, in an oven having a housing and a rod-type heating element, to a socket assembly for suspending the heating element from an aperture in the housing. The socket assembly comprises means including a base plate dimensioned to overlie the aperture, the base plate having at least one opening for allowing the ends of the heating element to extend through the base plate. Means comprising a hinge plate having a pair of apertures for receiving in locking engagement respective ends of the rod-type heating element, and further having at least one ear along one margin thereof, are provided for engaging the base plate whereby the heating element may be pivoted from a normal operating position substantially perpendicular to the side wall to an alternate position angular to the side wall, and means including a resilient tab depending from the base plate are provided for bearing against the hinge plate to urge the ear into engagement with the base plate.

The invention is further directed, in an oven having a side wall and a rod-type heating element, to a socket assembly for suspending the heating element from an aperture in the side wall. The socket assembly comprises means including a base plate dimensioned to overlie the aperture and having a pair of openings for allowing respective ends of the heating element to extend through the base plate, and means for fastening the base plate to the inside surface of the side wall. Means comprising a hinge plate having a pair of apertures are provided for receiving in locking engagement respective ends of the heating element. The hinge plate further has an additional aperture and a pair of ears along one margin thereof for engaging the base plate along the margins of respective ones of the openings whereby the heating element may be pivoted from a normal operating position substantially perpendicular to the side wall to an alternate position angular to the side wall. Means comprising a resilient tab struck from the base plate and extending through the additional aperture are also provided for urging the ears into engagement with the base plate, the resilient tab including a detent for coacting with the margin of the additional aperture to index the heating element in the alternate position.

BRIEF DESCRIPTION OF THE DRAWINGS

The features of the present invention, which are believed to be novel, are set forth with particularity in the appended claims. The invention, together with the further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawings, in the several figures of which like reference numerals identify like elements, and in which:

FIG. 1 is a perspective view of an electric oven partially broken away to show a socket assembly constructed in accordance with the invention for supporting a tubular-type heating element within the oven.

FIG. 2 is a cross-sectional view taken along lines 2—2 of FIG. 1 showing the heating element in solid lines in

its normal operating position, and in broken lines in its alternate position for cleaning.

FIG. 3 is an enlarged cross-sectional view taken along lines 3—3 of FIG. 2 which presents a front elevational view of the socket assembly of the present invention.

FIG. 4 is an enlarged exploded view of the socket assembly of the present invention.

FIG. 5 is a cross-sectional view taken along lines 5—5 of FIG. 3 showing the socket assembly of the present invention with the heating element in a normal position extending perpendicular to the rear wall of the oven.

FIG. 6 is a cross-sectional view taken along lines 6—6 of FIG. 3 showing the socket assembly of the present invention in its alternate position wherein the heating element is raised away from its adjacent side wall to facilitate cleaning of the side wall.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Although it will be appreciated that the socket assembly of the present invention can be constructed in various forms for use in conjunction with various types of electrically heated appliances, the socket assembly finds particular utility in conjunction with an electric oven such as that shown in FIG. 1.

Referring to the figures in greater detail, and particularly to FIGS. 1 and 2, the electric oven 10 is seen to comprise a thermally-insulated housing 11 consisting of two side walls 12, a bottom wall 13, a top wall 14, a rear wall 15, and a front door 16, which is hinged to bottom wall 13.

The oven 10 includes a tubular electric heating element 17 which, in its normal operating position, lies in a plane parallel to the bottom wall 12 of the oven in spaced relationship thereto. The heating element 17 is supported at its front end by a pair of laterally spaced support posts 18 appropriately notched to receive the element, and at its rear end by a novel socket assembly 20, which will be described in detail presently. Socket assembly 20 is mounted by a pair of self-tapping machine screws 21 to the inside surface of the rear wall 15 of housing 11, which wall is provided with an appropriately dimensioned aperture 22 immediately behind the socket assembly to facilitate electrical connections to heating element 17. To this end, heating element 17 is formed in a generally rectangular loop with its ends extending outwardly along one side in parallel spaced relationship through aperture 22. As shown in FIG. 2, these ends are preferably fitted with electrical terminal assemblies 23 to which flexible conductors 24 may be attached for the purpose of supplying operating power to the heating element.

The heating element 17 may be entirely conventional in design and construction. Referring to FIGS. 3 and 4, this element comprises a helically wound resistance conductor 25 which extends along the axis of element 17 substantially throughout its active heating portion. Resistance conductor 25 is electrically insulated from a concentric metallic sheath 26 by means of a thermally conductive dielectric sleeve 27. The metallic sheath 26, which serves to protect the relatively delicate resistance conductor 25 from damage and the user from potential shock from contact with conductor 25, is attached to the socket assembly 20 and supported thereby in its normal operating and alternate cleaning positions. The attachment of heating element 17 to socket assembly 20 may be accomplished in a number of ways, such as by providing one or more threaded retaining members over respective ends of the sheath, or by a friction or force fit into a suitably flanged aperture in the bracket assembly, as shown in the present embodiment.

The outer sheath 26 preferably extends a suitable distance beyond the socket assembly 20 such that electrical connections may be made to the electrical resistance conductors behind the rear wall 15 of the oven enclosure. To this end, the electrical resistance conductor 25 may extend a sufficient distance beyond sheath 26 to enable terminal block 23 to be fastened thereto by suitable means, such as by soldering or welding. Terminal block 23 is conventional in design and construction, and is appropriately dimensioned to accommodate conductor 24 under a retaining screw 28.

It will be noted that in accordance with customary practice oven 10 is provided with two heating elements; the previously described bottom heating element 17 which is intended for use during baking and broiling, and a top heating element 29 which is intended for use during baking only. These elements are identical in structure and, except for their relative orientation within the oven, are mounted in like manner with mounting assemblies of like structure. Accordingly, a detailed description of the structure of heating element 29 and its associated socket assembly need not be given.

Referring now to FIGS. 3 and 4, the socket assembly 20 provided in oven 10 for supporting heating element 17 is seen to comprise a base plate 30 defining a cutout area, namely, the pair of openings 31 and 32, suitably dimensioned to allow the parallel-extending ends of heater element 17 to extend therethrough. These openings each have a straight bottom margin and an arched upper margin. Base plate 30 is preferably constructed of a relatively thin hard metal, such as 301 series stainless steel 1/32 inch thick, which may be conveniently formed by a simple one-step stamping operation. Base plate 30 is also provided with a resilient tab 33 which is formed by striking an additional aperture 34 in the center of the base plate between openings 31 and 32. This resilient tab or finger 33 is formed to extend rearwardly at a downward angle relative to base plate 30 and is provided with a detented portion 35. A pair of slot-like apertures 36 are also provided at either end of base plate 30 for the purpose of allowing mounting screws 21 to extend through the plate and into engagement with the inside surface of the back panel 15 of the oven,

The heater element mounting assembly 20 further comprises a hinge plate 40. This plate, which is also formed by means of a single stamping operation from a sheet of stainless steel (e.g. 1/16 inch thick), contains two holes 41 and 42 for receiving respective ends of heating element 17. Apertures 41 and 42 are dimensioned to provide a tight force-fit for the outer sheath 26 of the heating element, and for improved lateral support for the heating element hinge plate 40 is preferably provided with rearwardly extending flanged portions 43 about the margins of apertures 41 and 42.

Hinge plate 40 is also provided with pivotal engagement means in the form of a pair of ears 43 and 44 which extend forwardly and downwardly along opposite ends of its bottom margin. As shown in FIGS. 5 and 6, these ears extend through respective ones of openings 31 and 32 in base plate 30 and engage the widened

flat bottom margins thereof. As a result, a point of pivotal engagement is formed with base plate 30, such that hinge plate 40 may be pivoted between a normal operating position, wherein the heating element 17 extends perpendiuclarly to the inside surface of the rear wall 15 of the oven, and an alternate cleaning position, as shown in FIG. 6, wherein heating element 17 extends at an angle to this surface.

The top margin of hinge plate 40 is provided with a tab-receiving cutout or notch 45 at its mid-point. This notch is dimensioned to receive the resilient tab or finger 33, which it will be recalled depends from base plate 30. Finger 33 bears down on the bottom surface of notch 45 so as to force or urge the tabs 43 and 44 into engagement with the bottom surfaces of openings 31 and 32, respectively. This insures a continuous engagement between the two elements of the socket assembly at all times.

In addition to biasing hinge plate 40 into engagement with base plate 30, resilient finger 33 performs the additional function of indexing the hinge plate in its normal operating and alternate cleaning positions. Indexing in the normal operating position is accomplished by the over-center spring action of finger 33. This is seen in FIG. 5, where the effect of resilient finger 33 bearing down on the bottom margin of notch 45 when hinge member 40 is in its normal position is seen to force hinge member 40 against base plate 30. Indexing in the alternate position is accomplished by reason of detent 35, which receives the bottom margin of notch 45 when the heating element is positioned by the user into its alternate position, as shown in FIG. 6. Thus, the resilient finger 33 effectively indexes the heating element 17 into one of two positions, it being necessary for the user to exert an external force sufficient to overcome the downward bias of the finger to move the heating element out of either of these positions.

Since base plate 30 is secured to the inside surface of the rear wall 15 by self-tapping screws 21, the entire socket assembly 20 can be readily removed to facilitate repair or replacement of heating element 17. In this respect, it should be noted that by reason of the resilient finger 33 maintaining hinge plate 40 in engagement with base plate 30, notwithstanding the presence or proximity of the rear wall 15 and aperture 22, it is possible to remove heating element 17 and socket assembly 20 from rear wall 15 as a single unit. Replacement of heating element 17 can then be accomplished by pulling conductors 24 through aperture 22 a sufficient distance to gain access to the screws 28 on terminals 23. After loosening these screws, the entire assembly can be pulled clear of the oven and the heating element 17 can be readily removed from hinge plate 40. Alternatively, because of the economical construction of the present invention, it would be possible to provide a new socket assembly 20 with the replacement heating element so that the socket assembly previously removed could be discarded with the defective heating element.

Thus, a novel socket assembly has been shown for supporting a tubular-type heating element within an oven. This assembly requires only two components, a base plate and a hinge plate, each of which can be fabricated by a single punching operation. The resulting socket assembly completely covers the aperture in the oven wall to prevent heat loss and has no projecting members extending into the interior of the oven which might interfere with use of the oven or possibly injure a user while cleaning the oven. The heating element may be conveniently raised for cleaning by simply grasping the end of the heating element and lifting it away from its adjacent side wall, the element being automatically indexed and retained in the raised position. To return the oven to normal operation it is only necessary to push the heating element back down to its normal position, the heating element then being automatically indexed and ready for use. No sliding electrical contacts are involved, and by reason of the novel unitary construction of the invention whereby the two component members are retained in engagement without external means, removal of the heating element for repair or replacement is easily accomplished without special tools or skill from the inside of the oven.

While a particular embodiment of the invention has been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made without departing from the invention in its broader aspects, and, therefore, the aim in the appended claims is to cover all such changes and modifications as fall within the true spirit and scope of the invention.

I claim:

1. A socket assembly for suspending a rod-type heating element from an aperture in an oven housing, said socket assembly comprising, in combination:

means comprising a base plate dimensioned to overlie said aperture, said base plate defining cutout means for allowing the ends of said heating element to extend through said base plate, and including ear-receiving means for receiving a marginal extending car of hinge plate means;

means for allowing said base plate means to be affixed to said housing so as to overlie said aperture of said housing;

means comprising a hinge plate having a pair of aperture for receiving in locking engagement respective ends of said rod-type heating element, and further having at least one ear along a portion of one margin thereof for engaging said ear receiving means of said base plate whereby said heating element may be pivoted from a normal operating position substantially perpendicular to said side wall to an alternate position angular to said side wall; and

means including a resilient tab formed unitarily with and depending from said base plate for bearing against said hinge plate to urge said ear into engagement with said base plate.

2. A socket assembly as defined in claim 1 wherein said hinge plate defines a tab-receiving cutout, and wherein said resilient tab extends transversely through said tab-receiving cutout, said tab and tab-receiving cutout being shaped to coact so as to index said hinge plate in said normal and alternate positions.

3. A socket assembly as defined in claim 2 wherein said resilient tab includes at least one detent for indexing said heating element in said alternate position.

4. A socket assembly as defined in claim 3 wherein said ear on said hinge plate engages said base plate along the margin of said opening.

5. A socket assembly as defined in claim 4 wherein said base plate has as said cutout means a pair of openings for allowing respective ends of said heating element to extend through said base plate, and wherein said hinge plate has a pair of ears for engaging said base

plate along the margins of respective ones of said openings.

6. A heating element assembly for use in an oven having a side wall comprising a rod-type heating element, a socket assembly for suspending said heating element from an aperture in said side wall, said socket assembly comprising, in combination:

means comprising a base plate dimensioned to overlie said aperture and having a pair of openings for allowing respective ends of said heating element to extend through said base plate and ear-receiving means;

means for fastening said base plate to the inside surface of said side wall;

means comprising a hinge plate having a pair of apertures for receiving in locking engagement respective ends of said heating element, said hinge plate further defining a tab-receiving cutout and a pair of ears along a portion of one margin of said hinge-plate for engaging said ear-receiving means of said base plate along the margins of respective ones of said openings whereby said heating element may be pivoted from a normal operating position substantially perpendicular to said side wall to an alternate position angular to said side wall; and

means comprising a resilient tab struck from said base plate and extending through said tab-receiving cutout defined by said hinge plate for urging said ears into engagement with said base plate, said resilient tab including a detent for coating with the margin of said cutout to index said heating element in said alternate position.

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