United States Patent [19]

Skinner

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[45] **Aug. 12, 1975**

[54] **OVEN, HEATING ELEMENT AND SOCKET ASSEMBLY**

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[73] Assignee: **Electro-Therm, Inc.,** Laurel, Md.

[22] Filed: **Nov. 1, 1974**

[21] Appl. No.: **519,905**

Related U.S. Application Data

[62] Division of Ser. No. 431,848, Jan. 9, 1974.

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

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

[58] **Field of Search** 219/402, 403, 404

[56] **References Cited**

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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.

1 Claim, 6 Drawing Figures

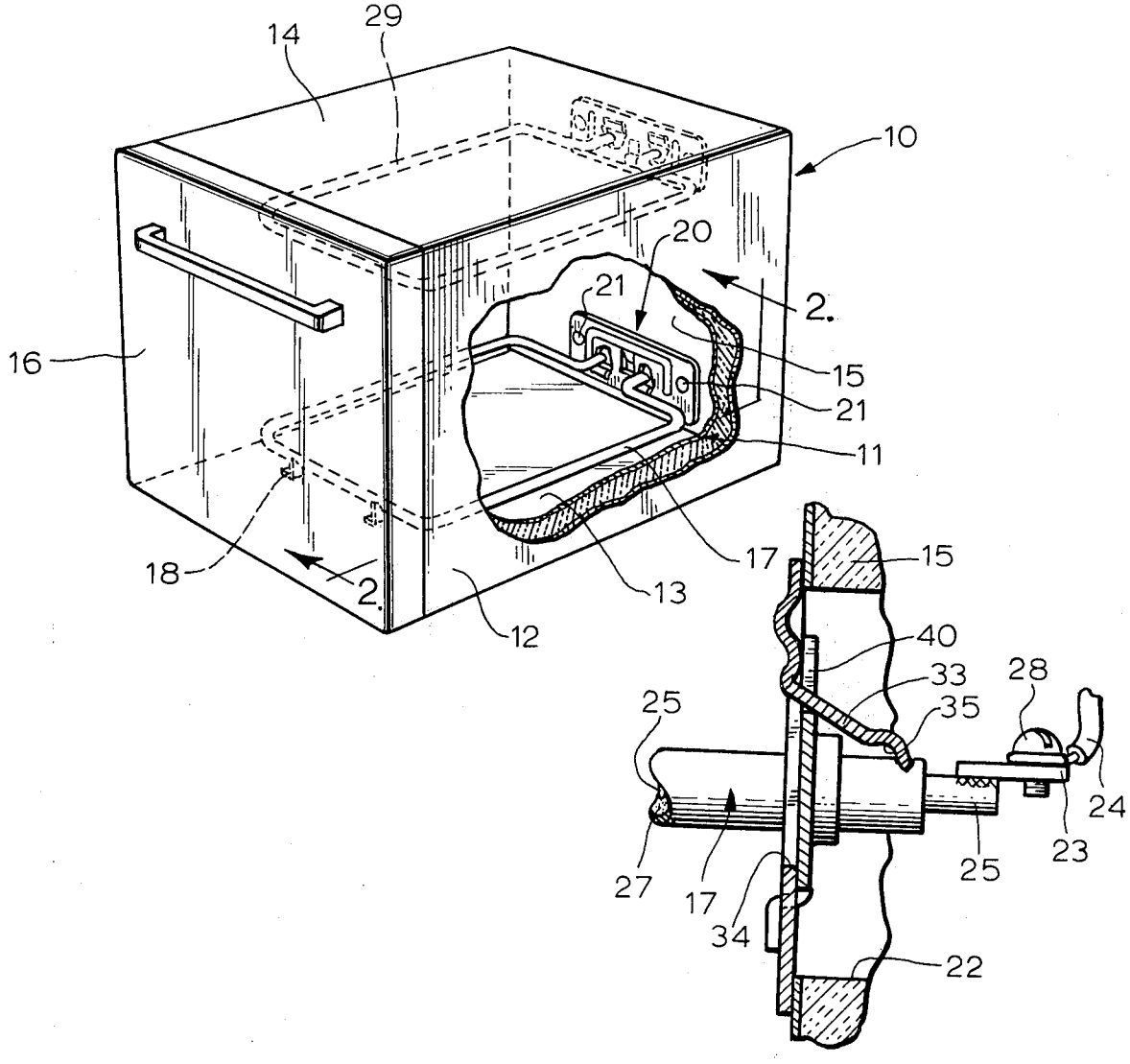


FIG. 1

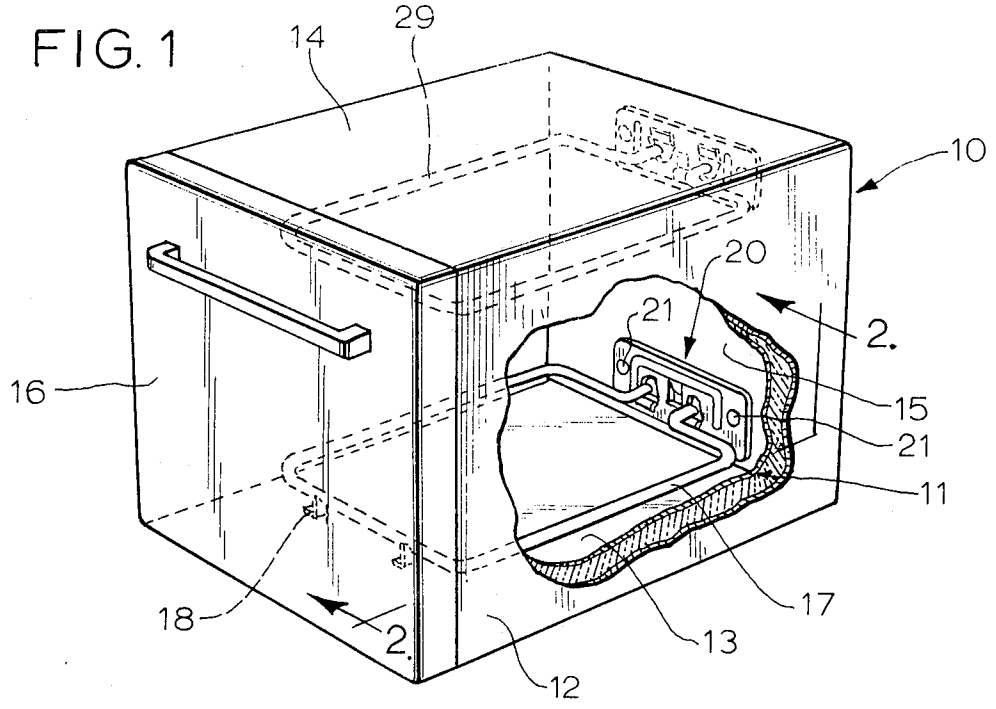


FIG. 2

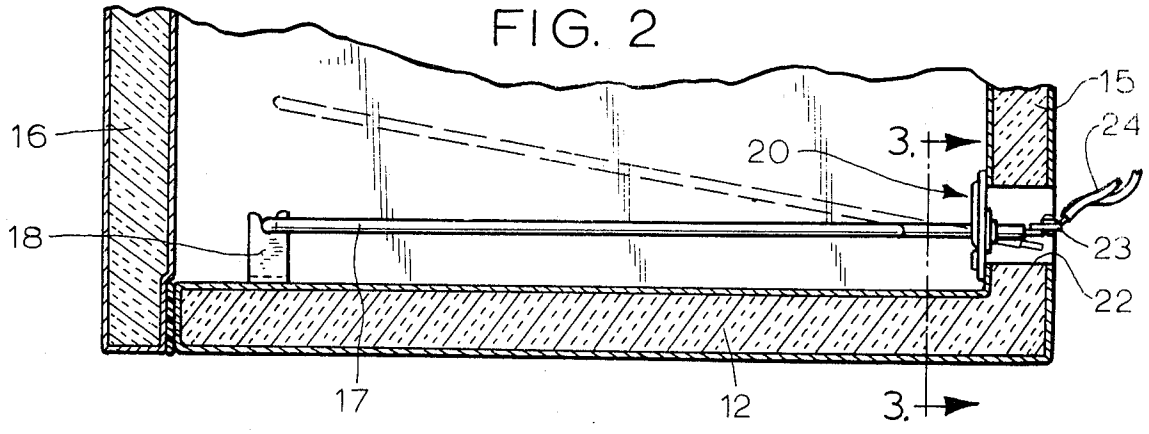


FIG. 3

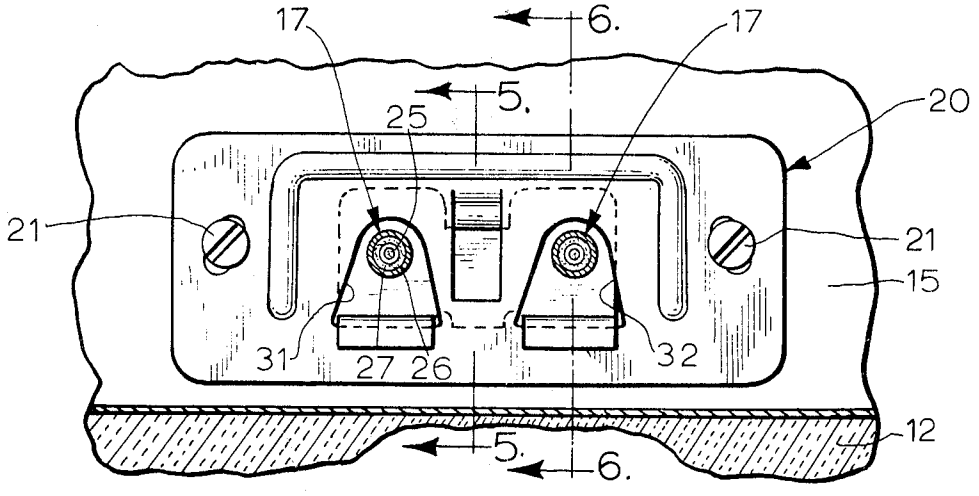
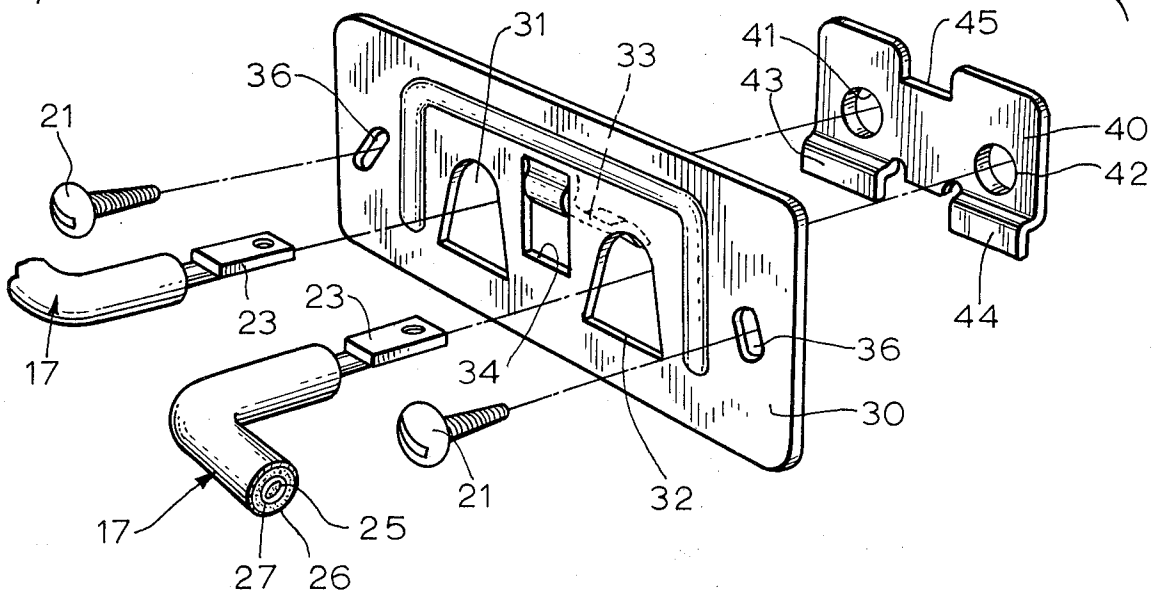


FIG. 4



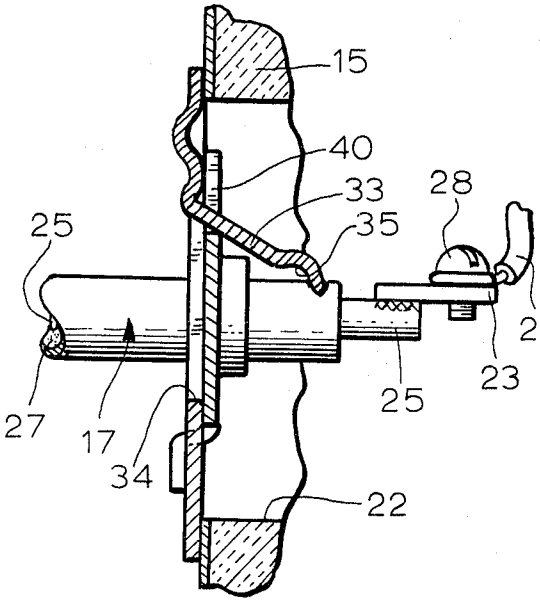


FIG. 5

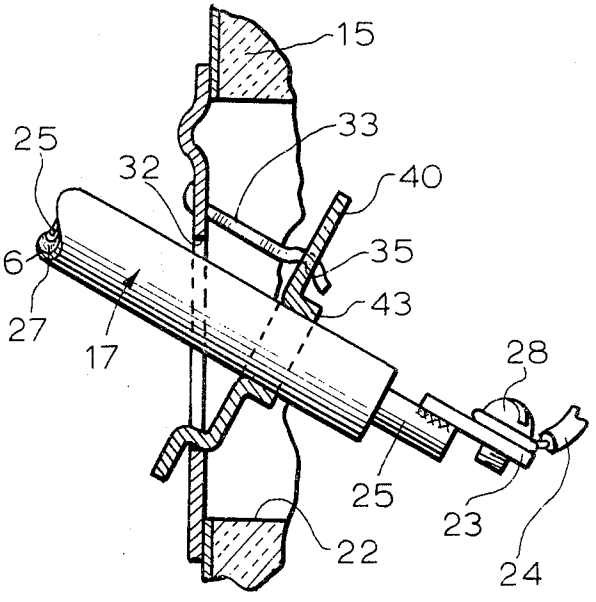


FIG. 6

OVEN, HEATING ELEMENT AND SOCKET ASSEMBLY

This is a division of application Ser. No. 431,848, filed Jan. 9, 1974.

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** having a 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 one-thirty-second inches thick, which may be conveniently formed by a simple one-step stamping operation. Base plate **30** is also provided with a resilient finger **33** which is formed by striking an additional aperture **34** in the center of the base plate between openings **31** and **32.** This resilient finger 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. one-sixteenth 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 open-

ings 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 notch 45 at its mid-point. This notch is dimensioned to receive resilient 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 adajcent 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. In an oven, the combination of:

an oven housing having a side wall and defining an aperture in said side wall;

a rod-type heating element in said oven housing; and

a socket assembly over said aperture of said housing for suspending said rod-type heating element, said socket assembly comprising:

a base plate dimensioned so as to be able to overlie the aperture of the oven and including means adapting the base plate to be affixed overlying that aperture;

a hinge plate having means for receiving in locking engagement a portion of the rod-type heating element; and

said hinge and base plates defining means for holding said plates together and for allowing said hinge plate and its captivated heating element to be pivoted from a normal operating position wherein said plates are parallel and adjacent to one another and said heating element is substantially perpendicular to said side wall, to an alternative position wherein said plates are pivoted apart to be on an angle with respect to each other, and said heating element is angularly disposed to said side wall;

said means for holding said plates together including earreceiving means formed longitudinally on one of said plates and longitudinally extending ear formed on the other of said plates; and

said means for holding said plates together further including a tab formed unitarily with and depending from one of said plates for bearing against a cutout portion of the other of said plates to urge said ear into engagement with said ear-receiving means.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,899,655 Dated August 12, 1975

Inventor(s) Charles Arthur Skinner

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

The term of this patent subsequent to April 1, 1992, has been disclaimed.

Signed and Sealed this

second Day of March 1976

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks

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