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1. Name of conveying party(ies)

George T.C. Li

Additional name(s) of conveying party(ies) attached? ☐ Yes ☑ No

2. Name and address of receiving party(ies)

Name: Acorne Enterprises, LLC

Internal Address:

Street Address: 711 South Carson Street

City: Carson City

State: Nevada

Country: U.S.A. Zip: 89701

Additional name(s) & address(es) attached? ☐ Yes ☑ No

3. Nature of conveyance/Execution Date(s):

Execution Date(s) December 28, 2006

☑ Assignment ☐ Merger
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☐ Joint Research Agreement
☐ Government Interest Assignment
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☐ Other

4. Application or patent number(s):

☐ This document is being filed together with a new application.

A. Patent Application No.(s)

B. Patent No.(s)
6,867,394
6,927,365
7,012,221

Additional numbers attached? ☐ Yes ☑ No

5. Name and address to whom correspondence concerning document should be mailed:

Name: Clifford F. Rey

Internal Address:

Street Address: P. O. Box 127

City: Williamsville

State: VT Zip: 05362

Phone Number: (802) 348-7156

Fax Number: N/A

Email Address: crlaw@mindspring.com

6. Total number of applications and patents involved: 3 patents

7. Total fee (37 CFR 1.21(h) & 3.41) $ 120.00

☐ Authorized to be charged by credit card
☐ Authorized to be charged to deposit account
☑ Enclosed
☐ None required (government interest not affecting title)

8. Payment Information

a. Credit Card Last 4 Numbers
Expiration Date

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9. Signature: Clifford F. Rey 2/19/2007

Signature Date

02/26/2007 DBYRNE 00000017 6867394
01 FC:8021 120.00

Clifford F. Rey
Name of Person Signing

Total number of pages including cover sheet, attachments, and documents: 114

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Assignment of United States Patent (Single assignor; single assignee)	Docket No. P-0101(CIP2)

U.S. Patent No.	Issue Date	Application Serial No.	Filing Date
6,927,365	August 9, 2005	10/706,520	November 12, 2003

Title of Invention: **Food Serving Set For Roasting Oven**

Owner of Record (hereinafter "Assignor")	Residence or Principal Place of Business of Assignor
George T. C. Li	**2533 North Carson Street, Suite #098 Carson City, NV 89706 U.S.A.**

Assignee	Residence or Principal Place of Business of Assignee
Acorne Enterprises, LLC	**711 South Carson Street, Suite 4 Carson City, NV 89701 U.S.A.**

Whereas, the above-identified Assignor is the sole owner of record of the above-identified United States Patent, and;

Whereas, the above-identified Assignee is desirous of acquiring the entire right, title and interest in the same;

Now, therefore, in consideration of the sum of dollars ($ 700.00), and other good and valuable consideration, the receipt whereof is hereby acknowledged, Assignor, by these presents does sell, assign and transfer unto said Assignee the entire right, title and interest in and to said Patent; the same to be held and enjoyed by said Assignee for its own use and behoof, and for its legal representatives and assigns, to the full end of the term for which said Patent is granted, as fully and entirely as the same would have been held by Assignor had this assignment not been made.

Executed this 28th ***day of*** December , ***in the year*** 2006
at Carson City, NV.

Signature of Assignor (or of authorized signatory if Assignor is a corporation, partnership or association)

State of Nevada

County of Carson

CECELIA L. KELLY
Notary Public - State of Nevada
Appointment Recorded in Carson City
No: 05-99770-3 - Expires August 31, 2009

Before me personally appeared
who acknowledged the foregoing instrument to be a free act and deed and also represented that he or she is authorized to execute the same this 28 ***day of*** December , ***in the year*** 2006

(Notary Public)

Assignment of United States Patent (Single assignor; single assignee)	Docket No. P-0001c(CIP)

U.S. Patent No.	Issue Date	Application Serial No.	Filing Date
7,012,221	March 14, 2006	10/772,224	February 3, 2004

Title of Invention: **Roasting Oven With Dual Heating Elements**

Owner of Record (hereinafter "Assignor")	Residence or Principal Place of Business of Assignor
George T. C. Li	**2533 North Carson Street, Suite #098 Carson City, NV 89706 U.S.A.**

Assignee	Residence or Principal Place of Business of Assignee
Acorne Enterprises, LLC	**711 South Carson Street, Suite 4 Carson City, NV 89701 U.S.A.**

Whereas, the above-identified Assignor is the sole owner of record of the above-identified United States Patent, and;

Whereas, the above-identified Assignee is desirous of acquiring the entire right, title and interest in the same;

Now, therefore, in consideration of the sum of dollars ($ 700.00), and other good and valuable consideration, the receipt whereof is hereby acknowledged, Assignor, by these presents does sell, assign and transfer unto said Assignee the entire right, title and interest in and to said Patent; the same to be held and enjoyed by said Assignee for its own use and behoof, and for its legal representatives and assigns, to the full end of the term for which said Patent is granted, as fully and entirely as the same would have been held by Assignor had this assignment not been made.

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State of Nevada

County of Carson

CECELIA L. KELLY
Notary Public - State of Nevada
Appointment Recorded in Carson City
No: 05-99770-3 - Expires August 31, 2009

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who acknowledged the foregoing instrument to be a free act and deed and also represented that he or she is authorized to execute the same this 28 ***day of*** December , ***in the year*** 2006

(Notary Public)

Assignment of United States Patent (Single assignor; single assignee)	Docket No. P-0001b

U.S. Patent No.	Issue Date	Application Serial No.	Filing Date
6,867,394	March 15, 2005	10/617,094	July 11, 2003

Title of Invention: **Roasting Oven With Dual Heating Elements**

Owner of Record (hereinafter "Assignor")	Residence or Principal Place of Business of Assignor
George T. C. Li	**2533 North Carson Street, Suite #098 Carson City, NV 89706 U.S.A.**

Assignee	Residence or Principal Place of Business of Assignee
Acorne Enterprises, LLC	**711 South Carson Street, Suite 4 Carson City, NV 89701 U.S.A.**

Whereas, the above-identified Assignor is the sole owner of record of the above-identified United States Patent, and;

Whereas, the above-identified Assignee is desirous of acquiring the entire right, title and interest in the same;

Now, therefore, in consideration of the sum of dollars ($ 700.00), and other good and valuable consideration, the receipt whereof is hereby acknowledged, Assignor, by these presents does sell, assign and transfer unto said Assignee the entire right, title and interest in and to said Patent; the same to be held and enjoyed by said Assignee for its own use and behoof, and for its legal representatives and assigns, to the full end of the term for which said Patent is granted, as fully and entirely as the same would have been held by Assignor had this assignment not been made.

Executed this 28th *day of* December , *in the year* 2006
at Carson City, NV.

Signature of Assignor (or of authorized signatory if Assignor is a corporation, partnership or association)

State of Nevada

County of Carson

CECELIA L. KELLY
Notary Public - State of Nevada
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No: 05-99770-3 - Expires August 31, 2009

Before me personally appeared
who acknowledged the foregoing instrument to be a free act and deed and also represented that he or she is authorized to execute the same this 28 ***day of*** December , ***in the year*** 2006

(Notary Public)

US006867394B2

(12) **United States Patent**
Li

(10) **Patent No.: US 6,867,394 B2**
(45) **Date of Patent: *Mar. 15, 2005**

(54) **ROASTING OVEN WITH DUAL HEATING ELEMENTS**

(76) Inventor: **George T. C. Li**, 2533 N. Carson St., Suite #0 98, Carson City, NV (US) 89706

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **10/617,094**

(22) Filed: **Jul. 11, 2003**

(65) **Prior Publication Data**

US 2004/0007564 A1 Jan. 15, 2004

Related U.S. Application Data

(63) Continuation-in-part of application No. 10/302,202, filed on Nov. 22, 2002, now Pat. No. 6,686,569, which is a continuation-in-part of application No. 09/971,286, filed on Oct. 5, 2001, now Pat. No. 6,509,550.

(51) **Int. Cl.**[7] **A47J 37/00**; A47J 27/02; F27D 11/02; H05B 3/08

(52) **U.S. Cl.** **219/433**; 219/386; 219/402; 219/432; 219/433; 219/541; 219/542

(58) **Field of Search** 219/385, 386, 219/402, 407, 409, 417, 433, 429, 436, 542, 546, 528, 535, 355, 541, 548

(56) **References Cited**

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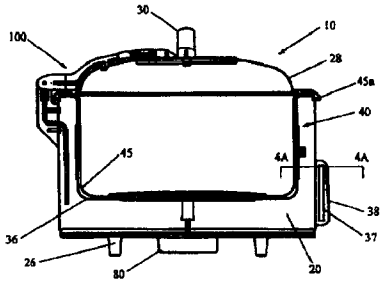
* cited by examiner

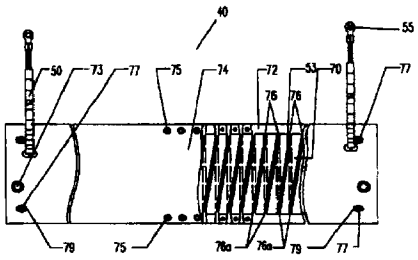
Primary Examiner—Joseph Pelham
(74) *Attorney, Agent, or Firm*—Clifford F. Rey

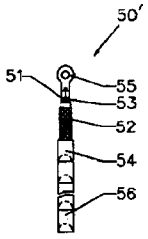
(57) **ABSTRACT**

A roasting oven having a large capacity heating well including a wrap-around heating element for heating the side walls thereof and a top heating element for browning. A function control panel featuring a touch-film interface and digital display of cooking modes is provided for the user's convenience. The heating elements are fabricated in alternative embodiments to provide single-sided or double-sided configurations for particular heating applications. A lid member including the top heating element is attached to the roasting oven by electrically conductive supporting structures, which incorporate the electrical circuit for the top heating element and also provide for convenient disconnection thereof for cleaning and storage. In an alternative embodiment the top heating element is omitted to reduce manufacturing costs and standard electromechanical switches and temperature controls provide the functions of the oven. The roasting oven includes a food serving set having an array of food containers in different embodiments.

27 Claims, 31 Drawing Sheets







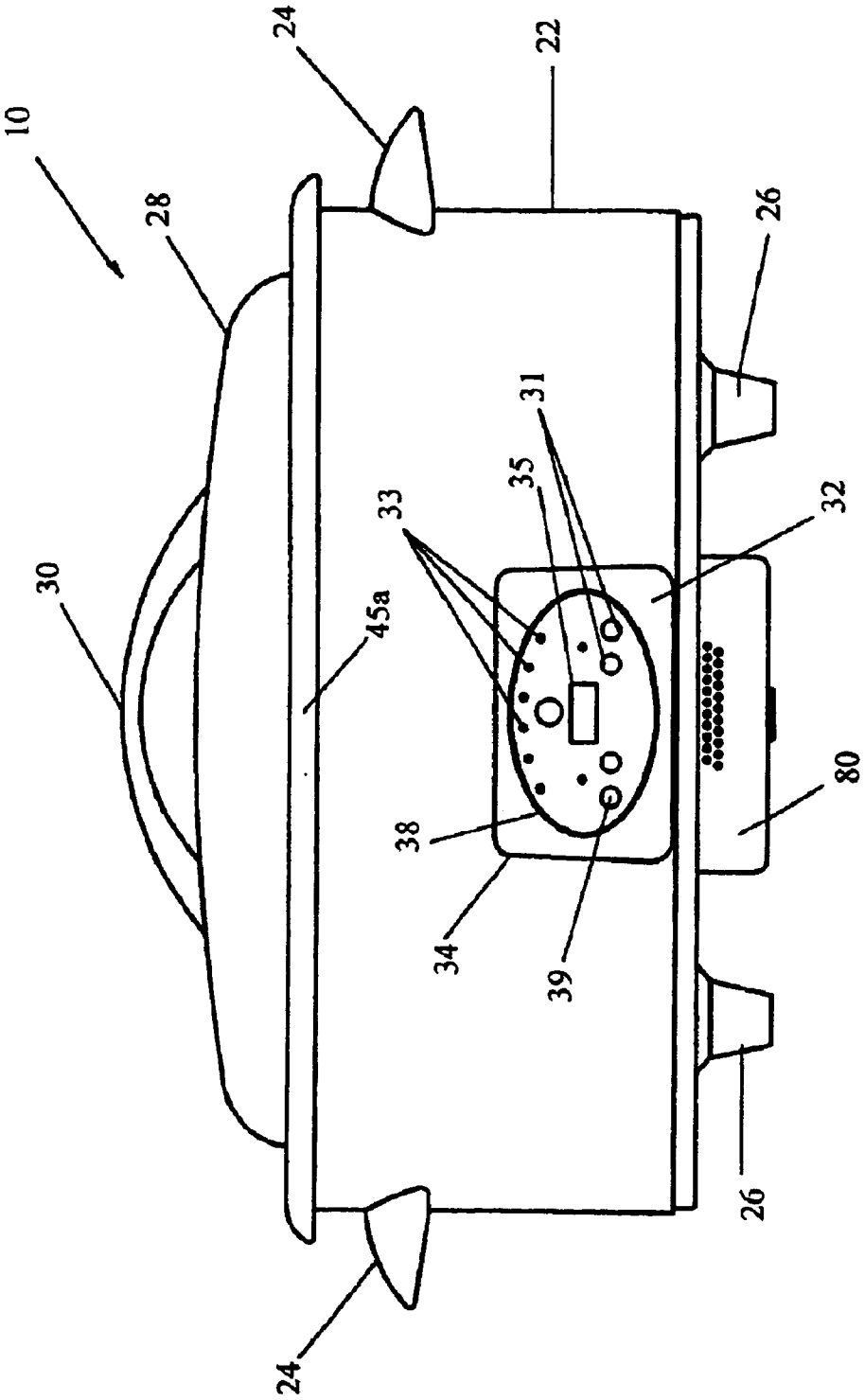


FIG. 1A

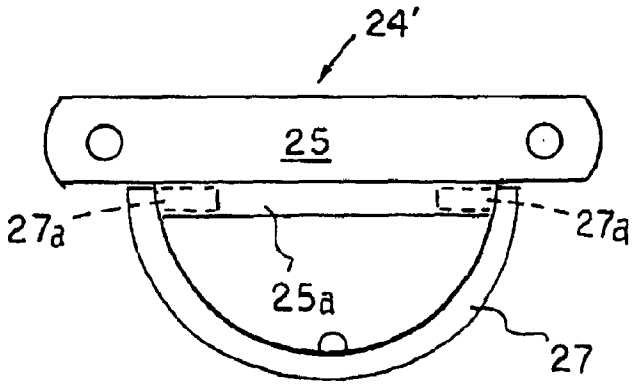


FIG. 1B

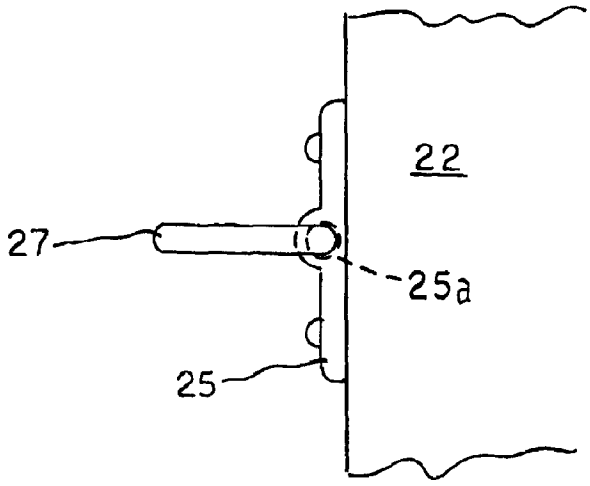


FIG. 1C

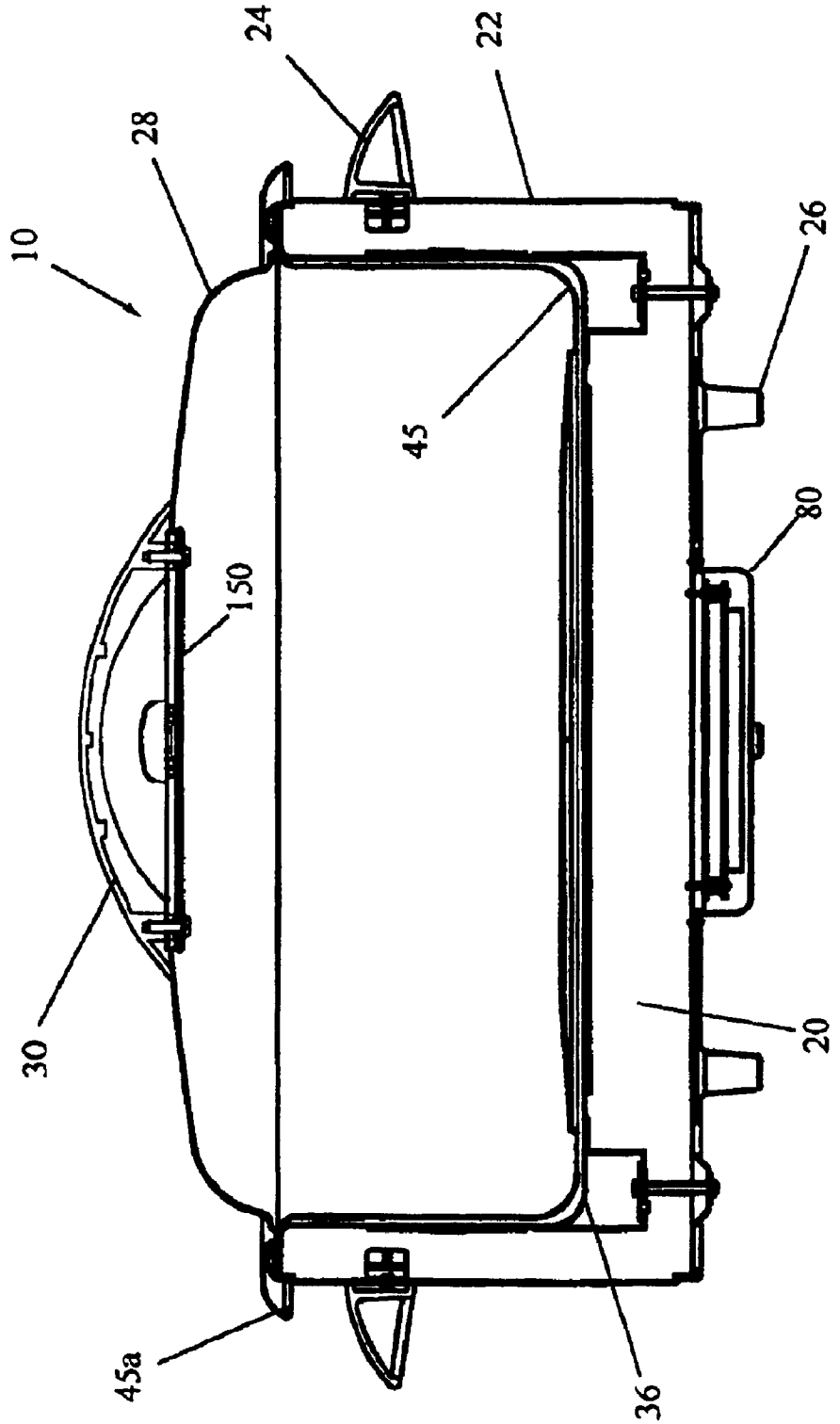


FIG. 2A

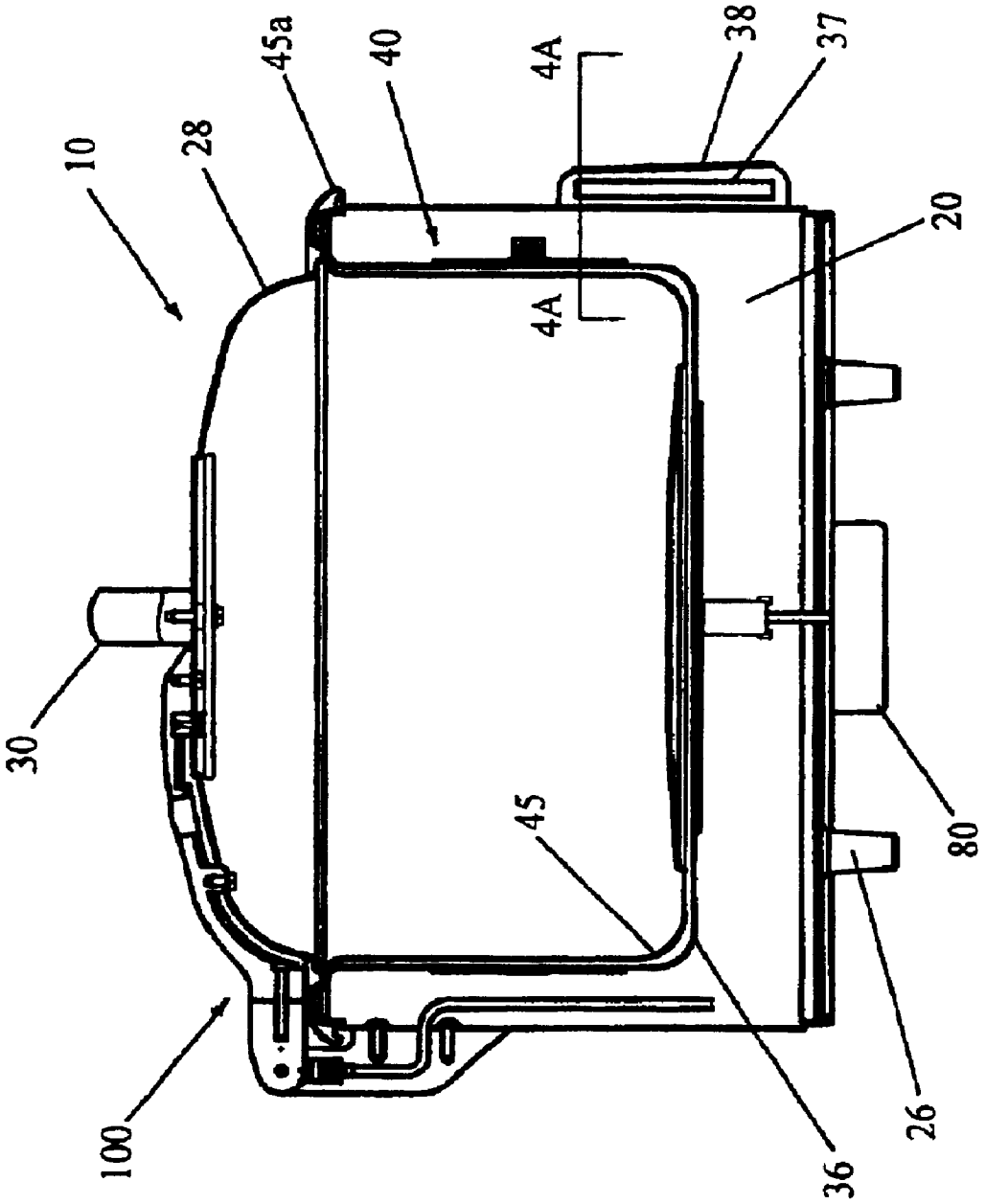


FIG. 2B

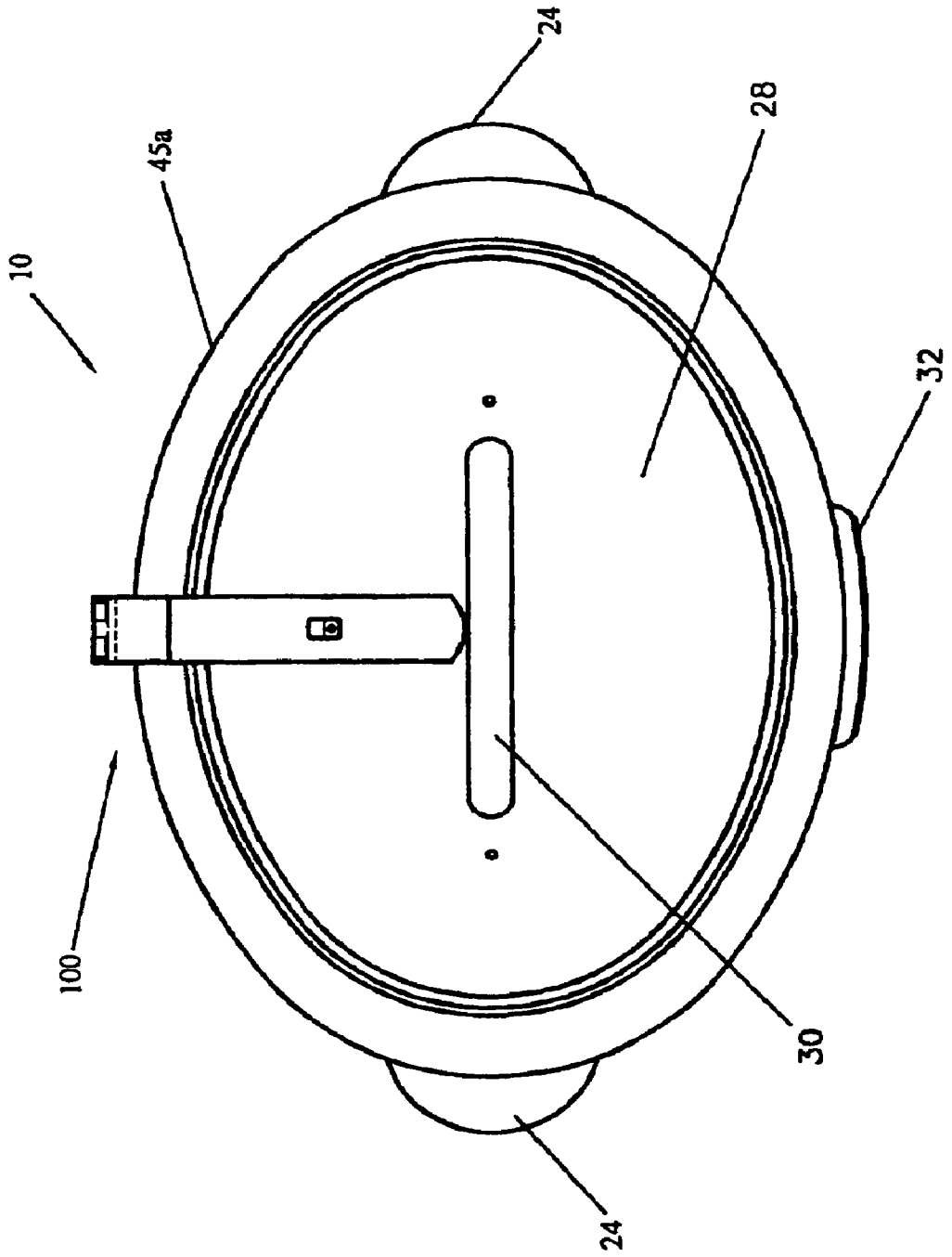


FIG. 3

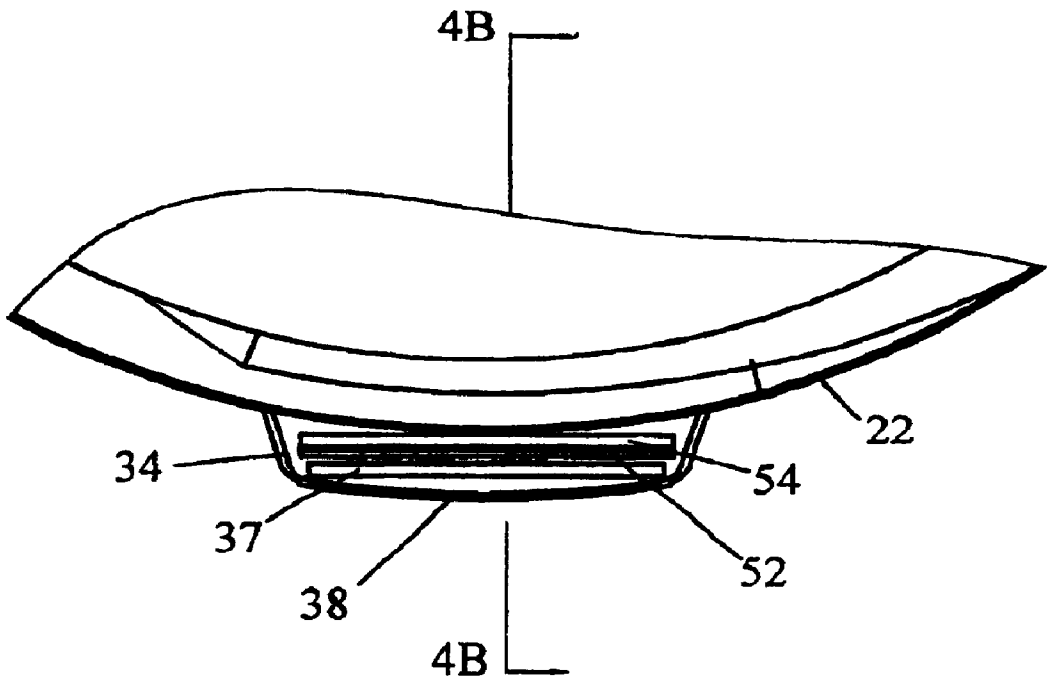


FIG. 4A

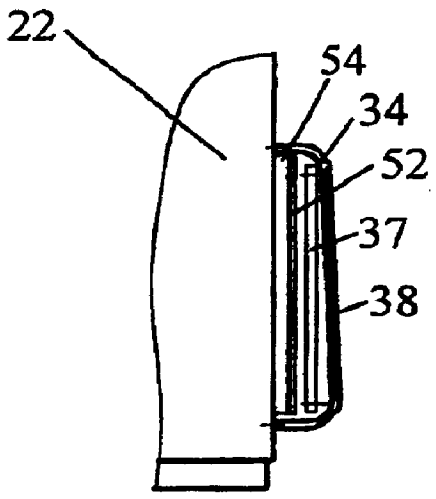
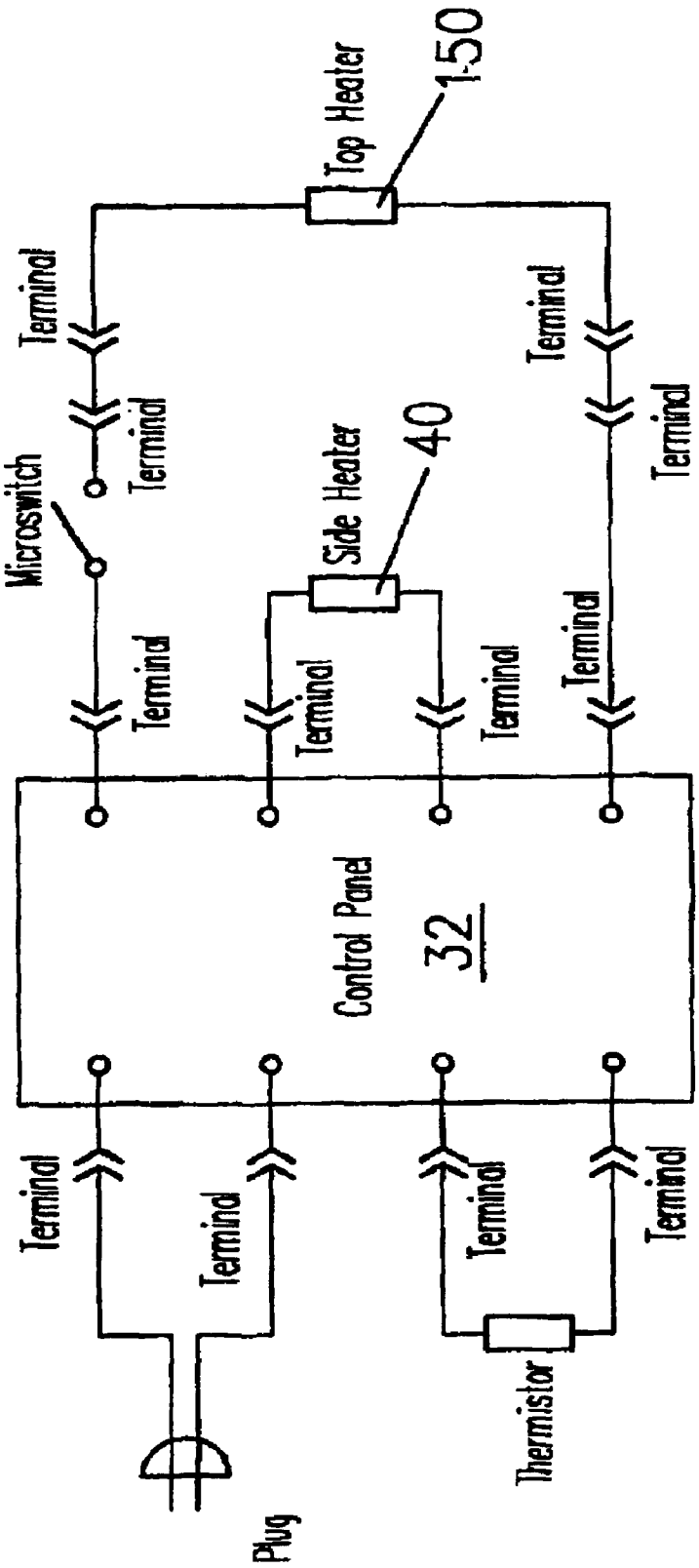


FIG. 4B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150
Terminal
Terminal
Terminal
Terminal
Microswitch
Side Heater
40
Terminal
Terminal
Terminal
Terminal
Terminal
Control Panel
32
Terminal
Terminal
Terminal
Terminal
Thermistor
Plug

FIG. 5A

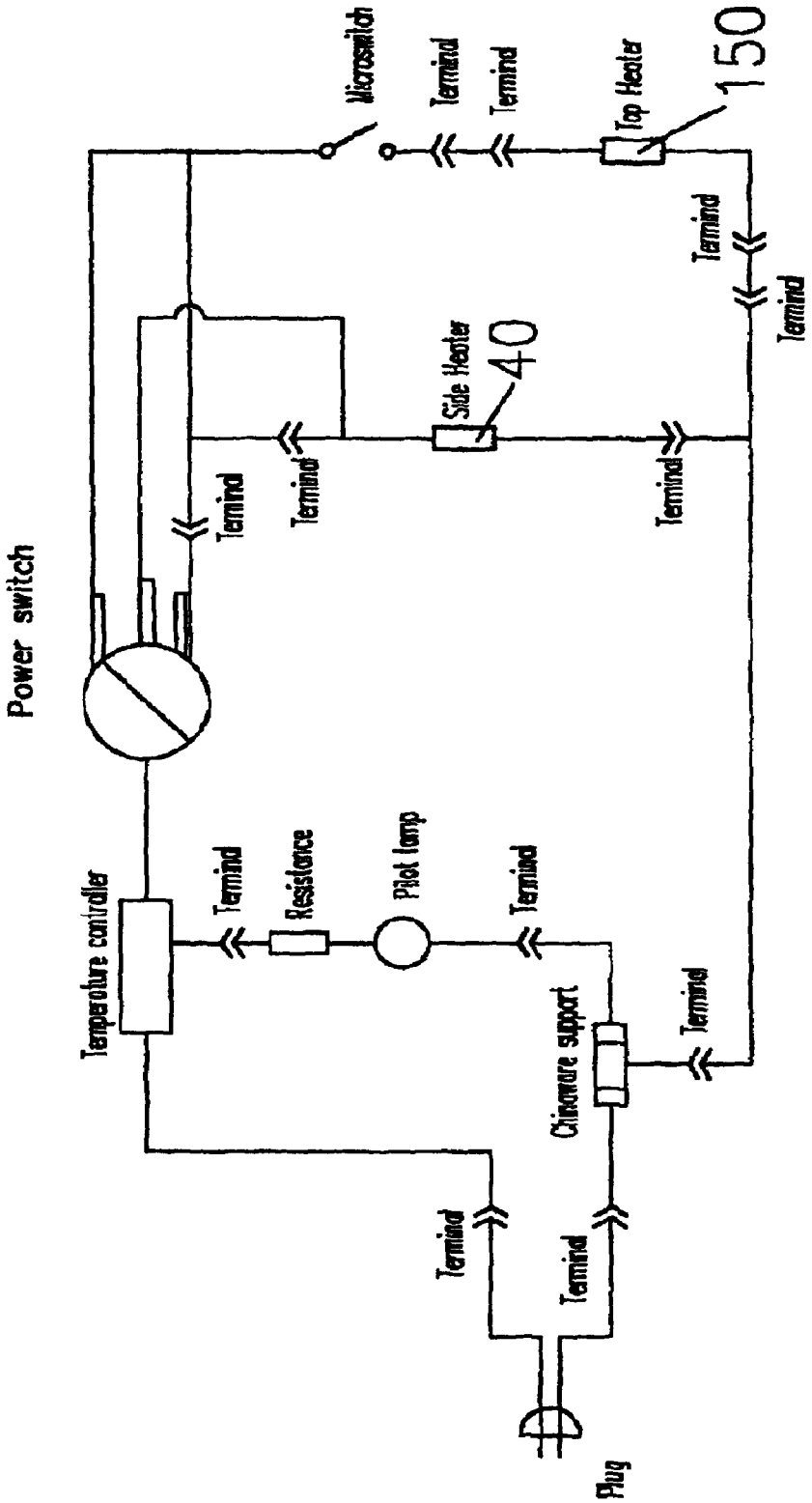

Microswitch
Terminal
Terminal
Top Heater
150
Terminal
Terminal
Side Heater
40
Terminal
Terminal
Terminal
Power switch
Temperature controller
Terminal
Resistance
Pilot lamp
Terminal
Terminal
Chloromure support
Terminal
Terminal
Terminal
Plug

FIG. 5B

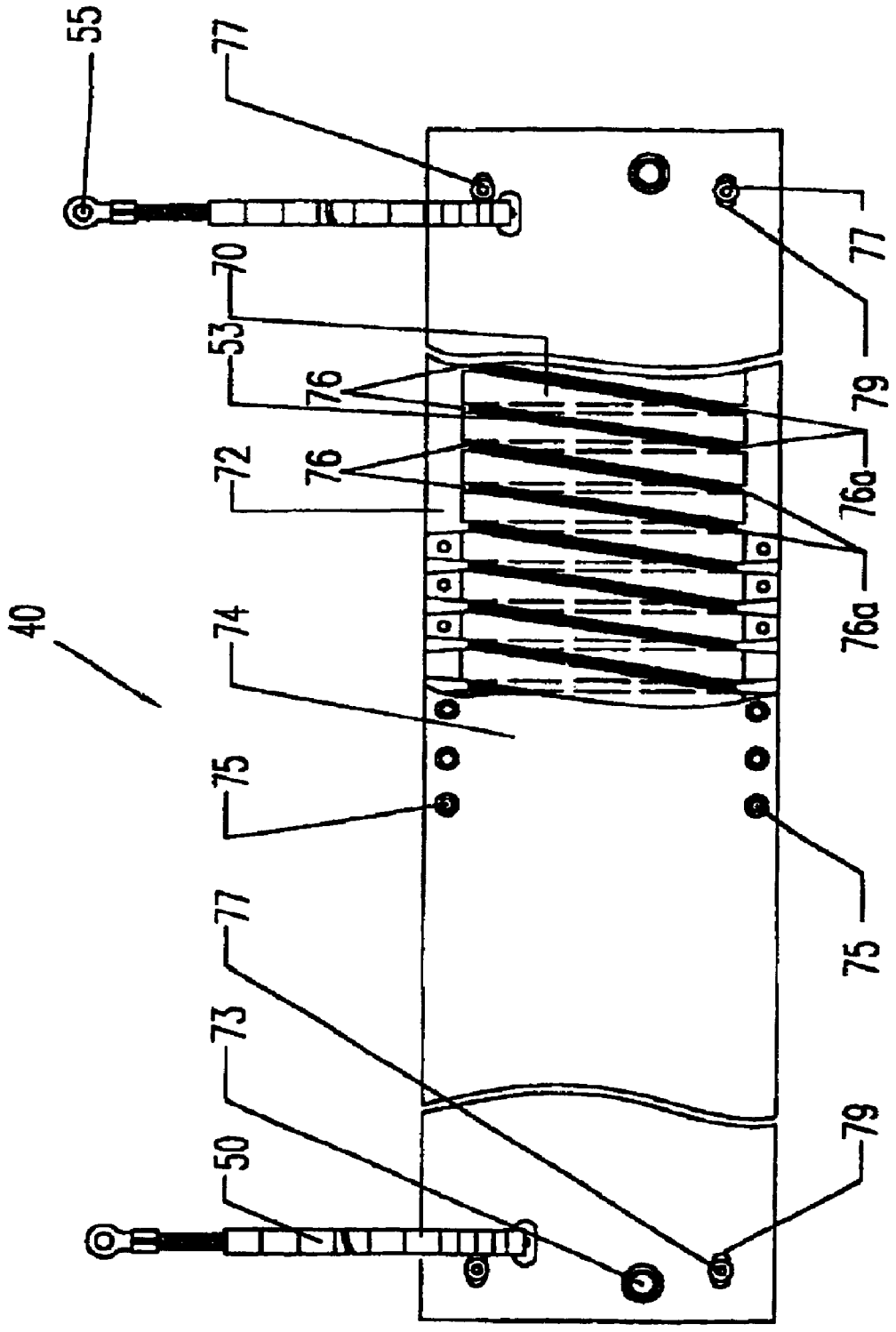


FIG.6A

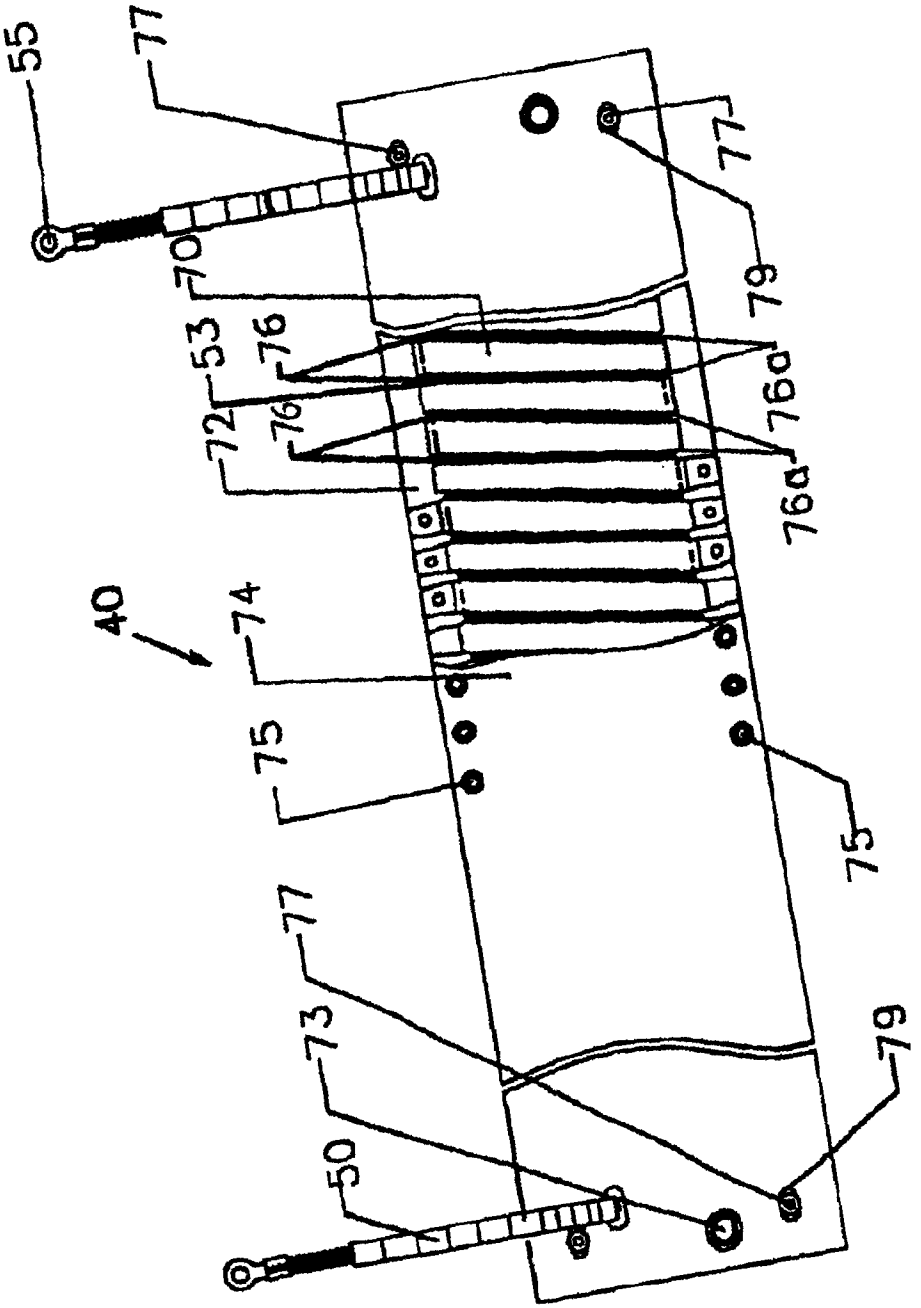


FIG.6B

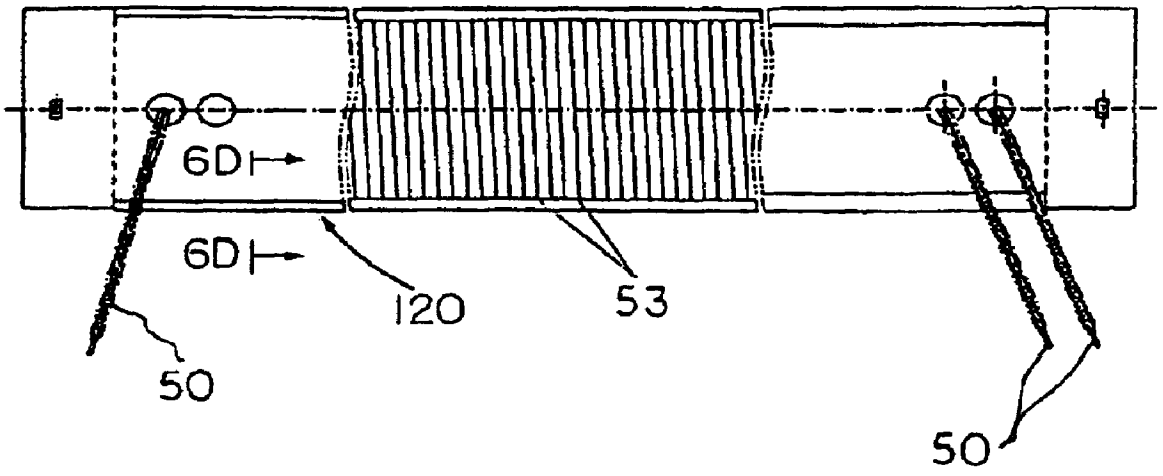


FIG. 6C

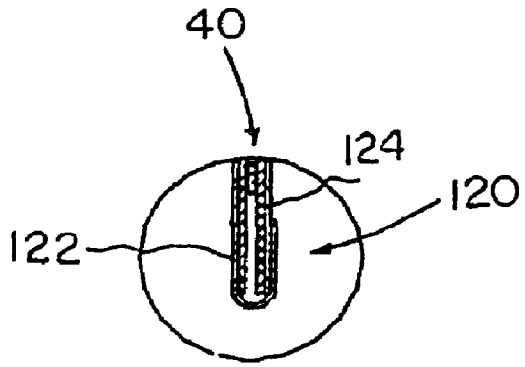
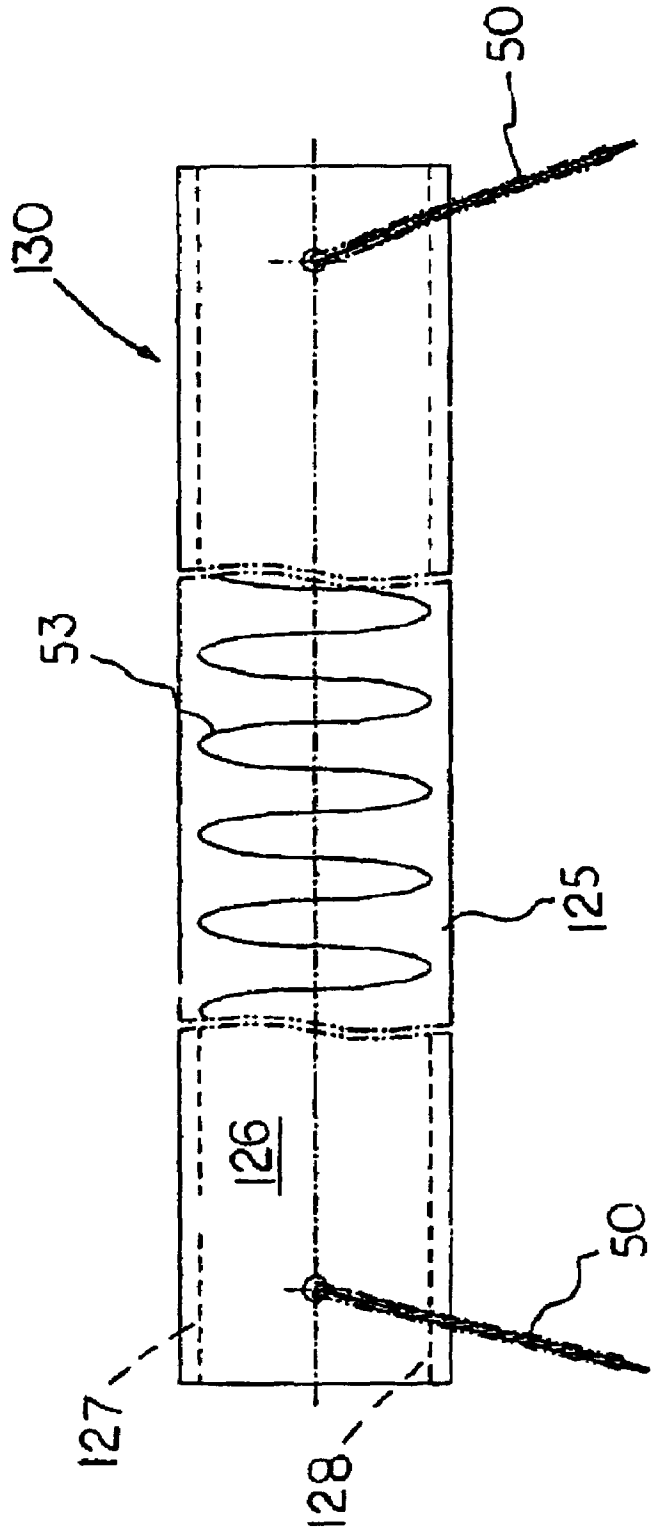


FIG. 6D


50
130
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REMARK: 1 Heater Wire Insulated With Fiberglass Molted Sheath

FIG. 6E

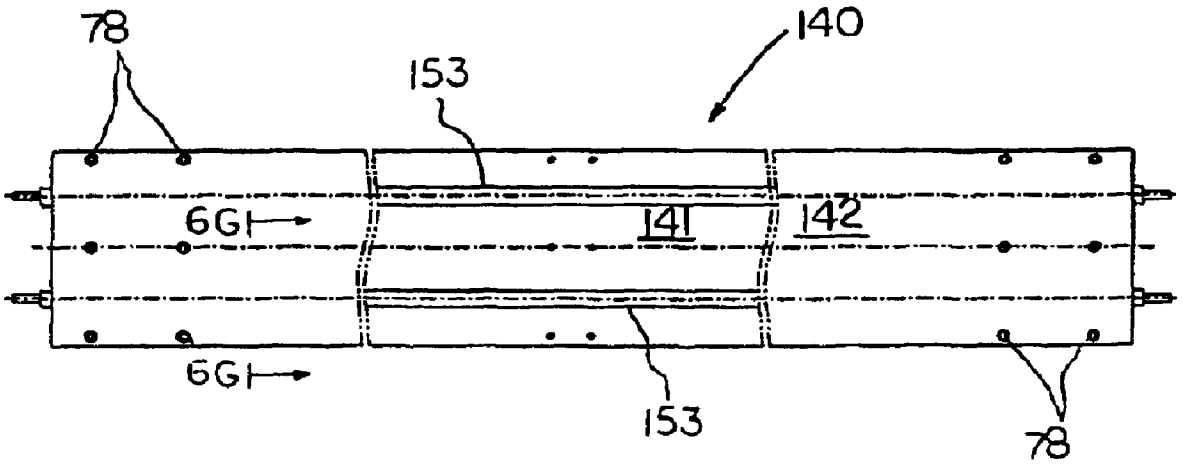

FIG. 6F

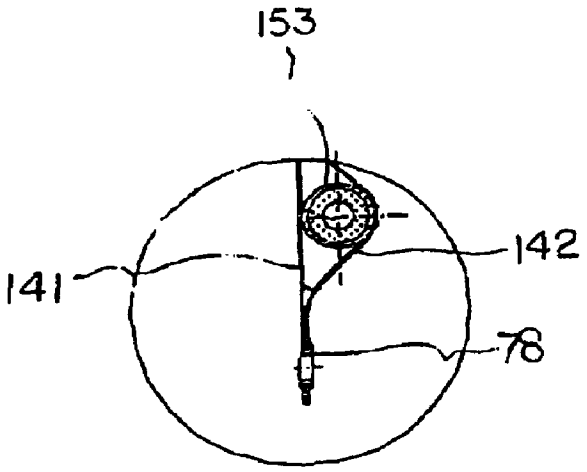

FIG. 6G

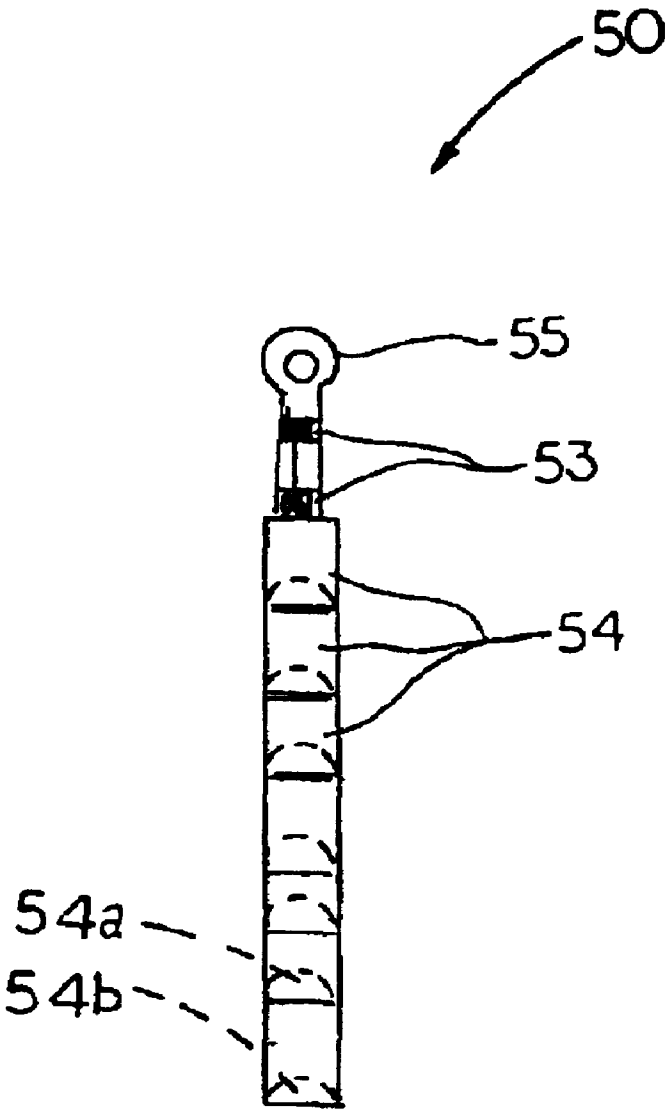

FIG. 7A

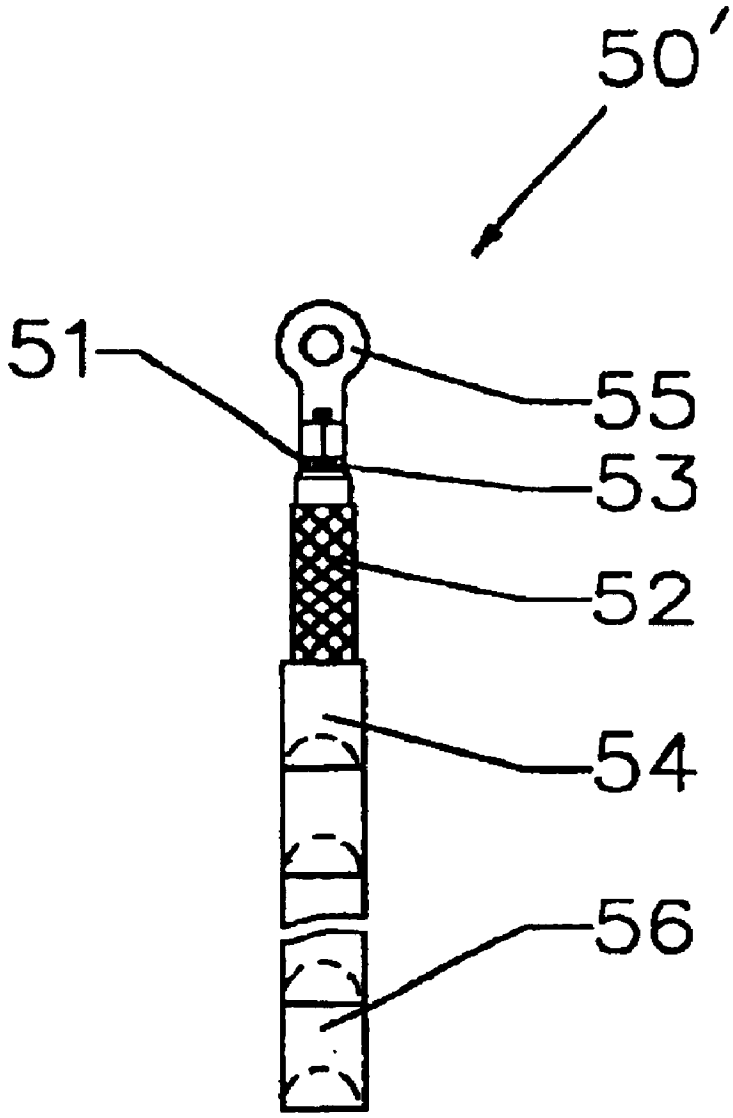

FIG. 7B

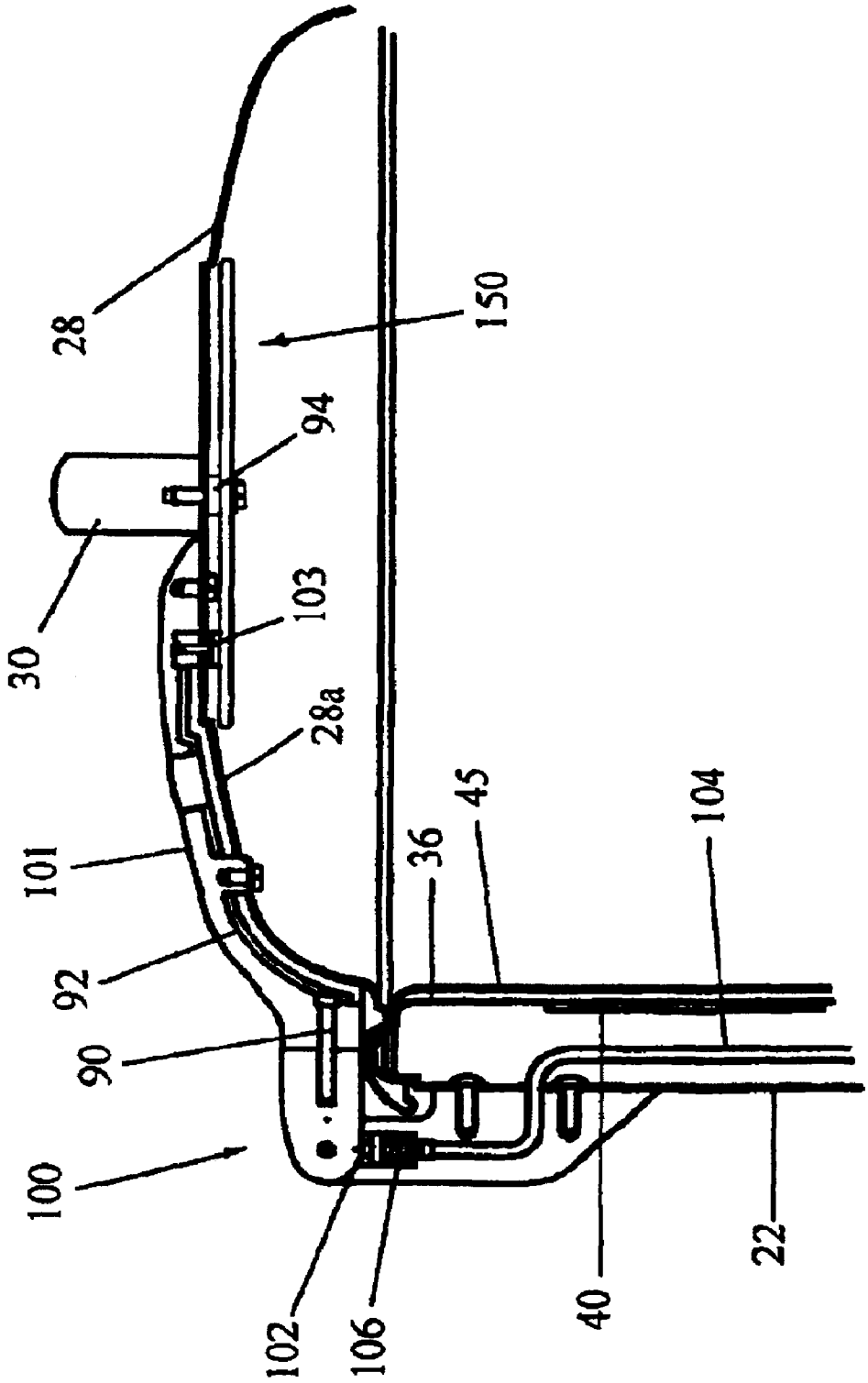

FIG. 8A

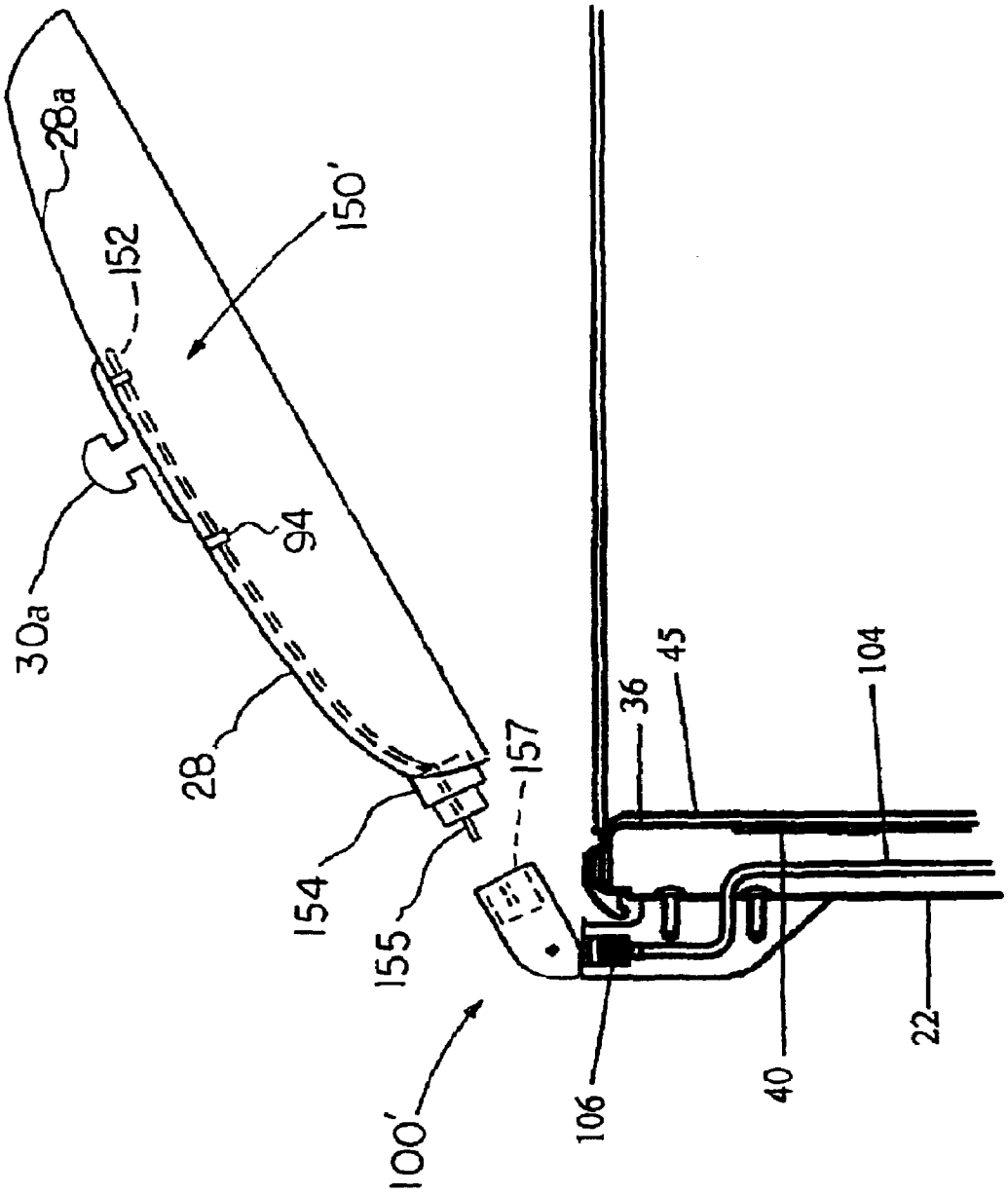

FIG. 8B

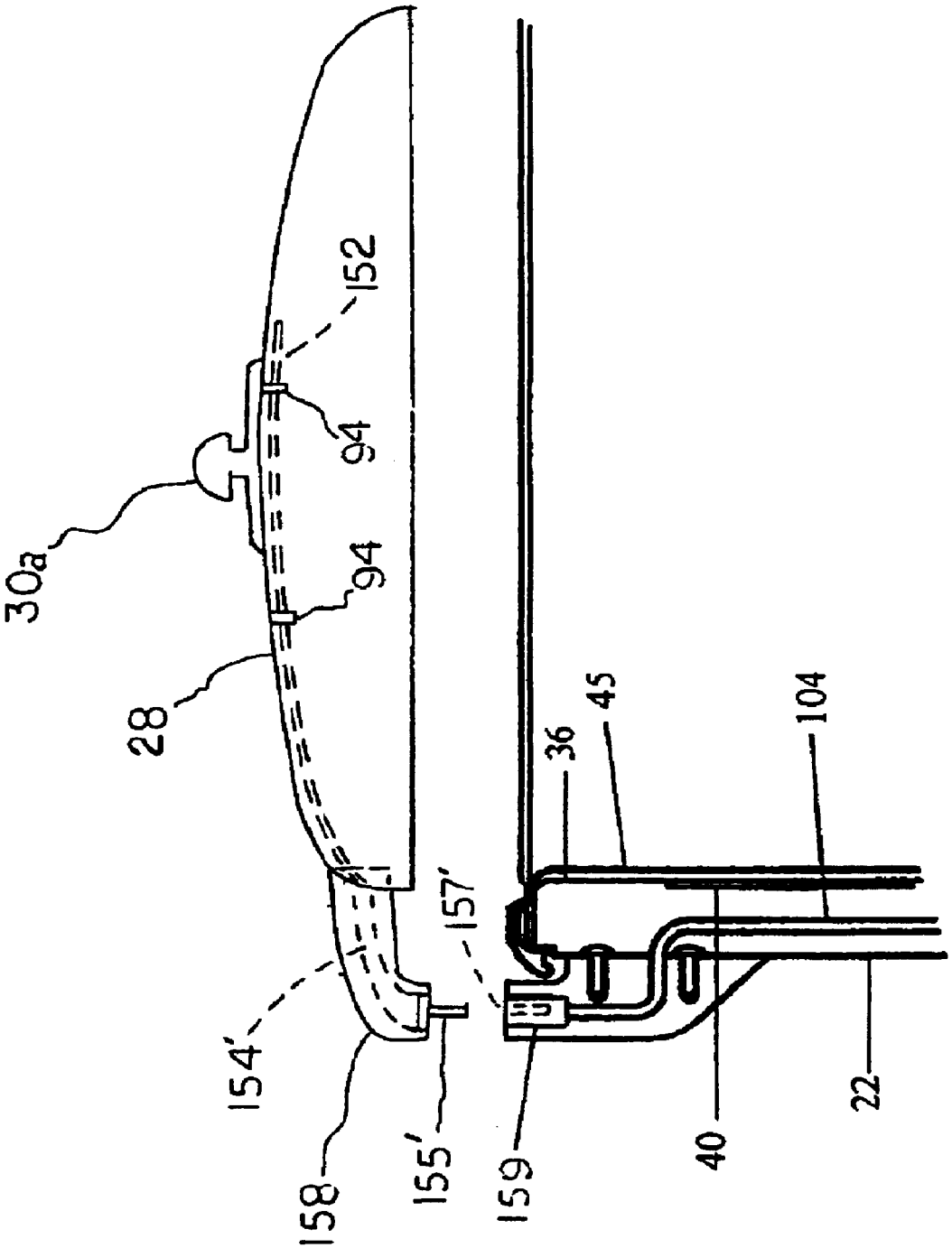

FIG. 8C

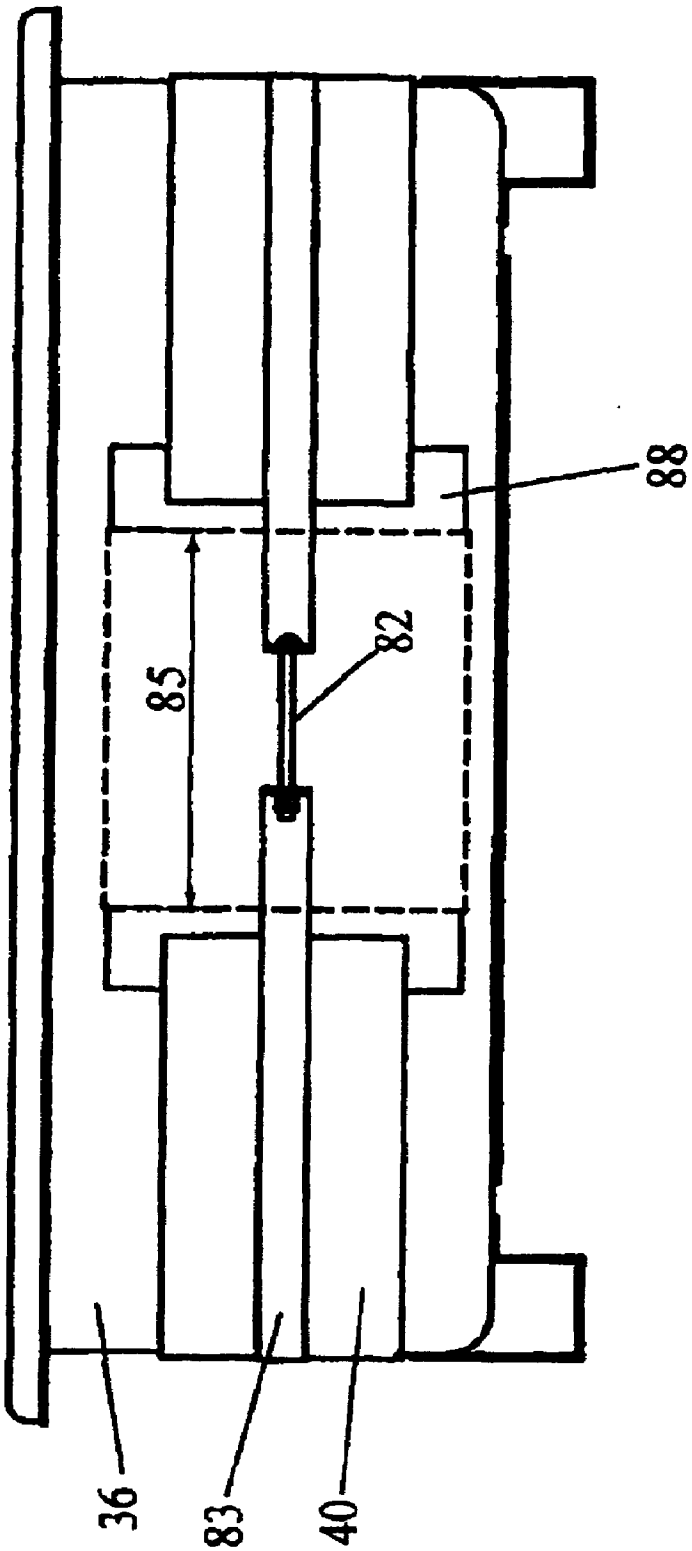

FIG. 9

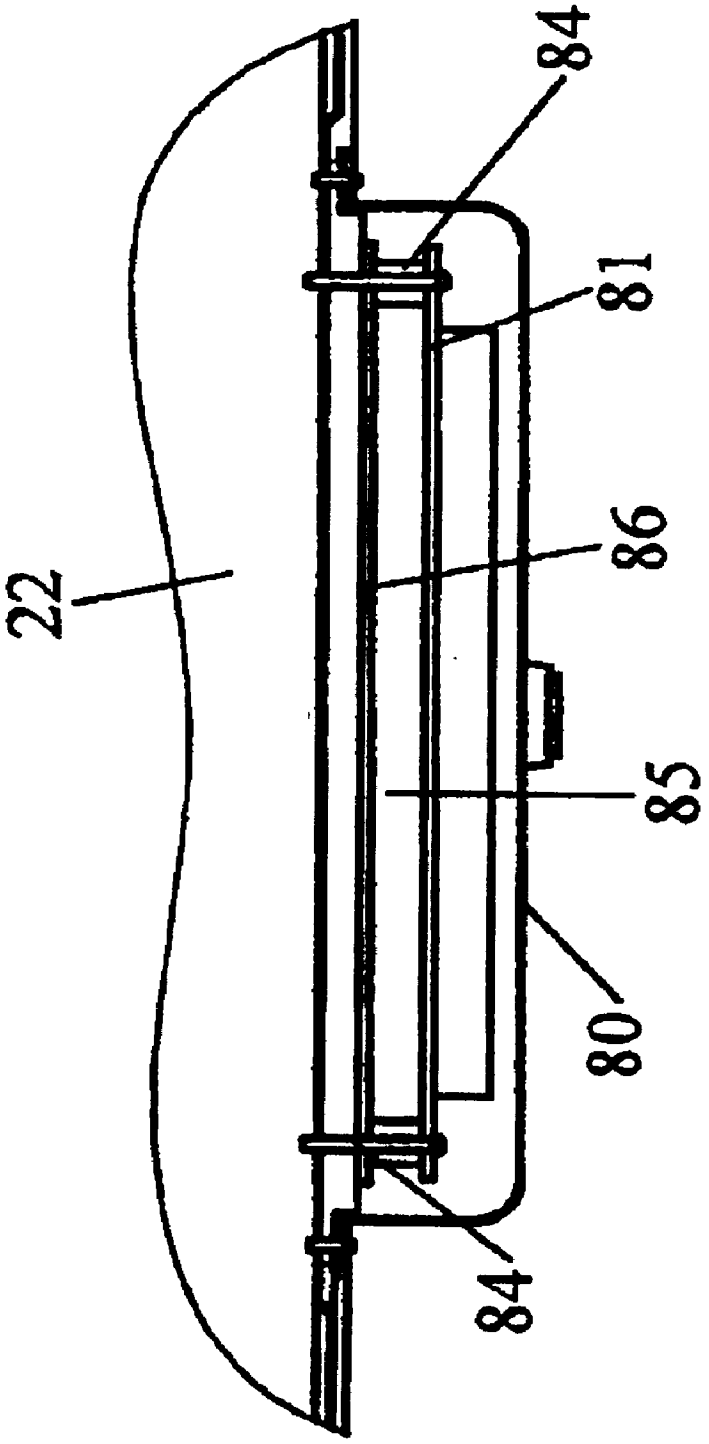

FIG. 10

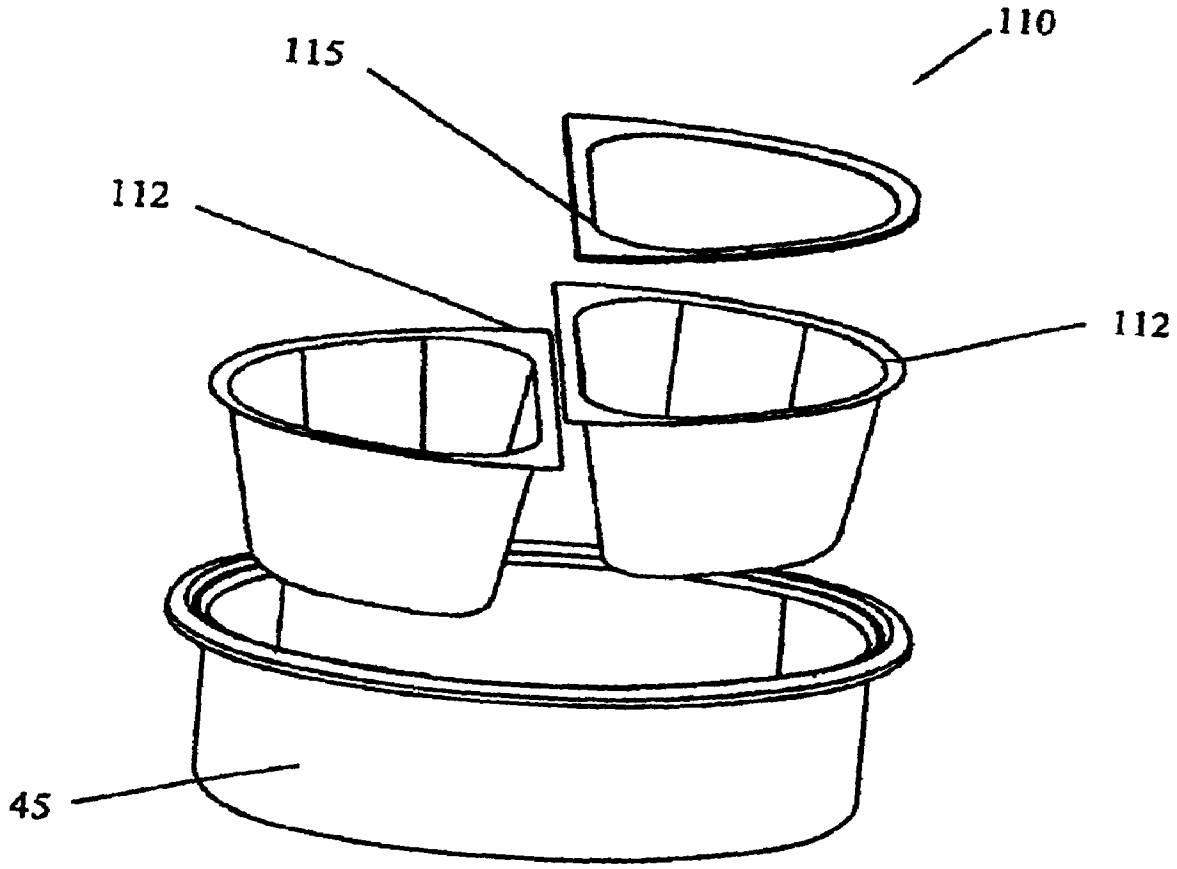

FIG. 11

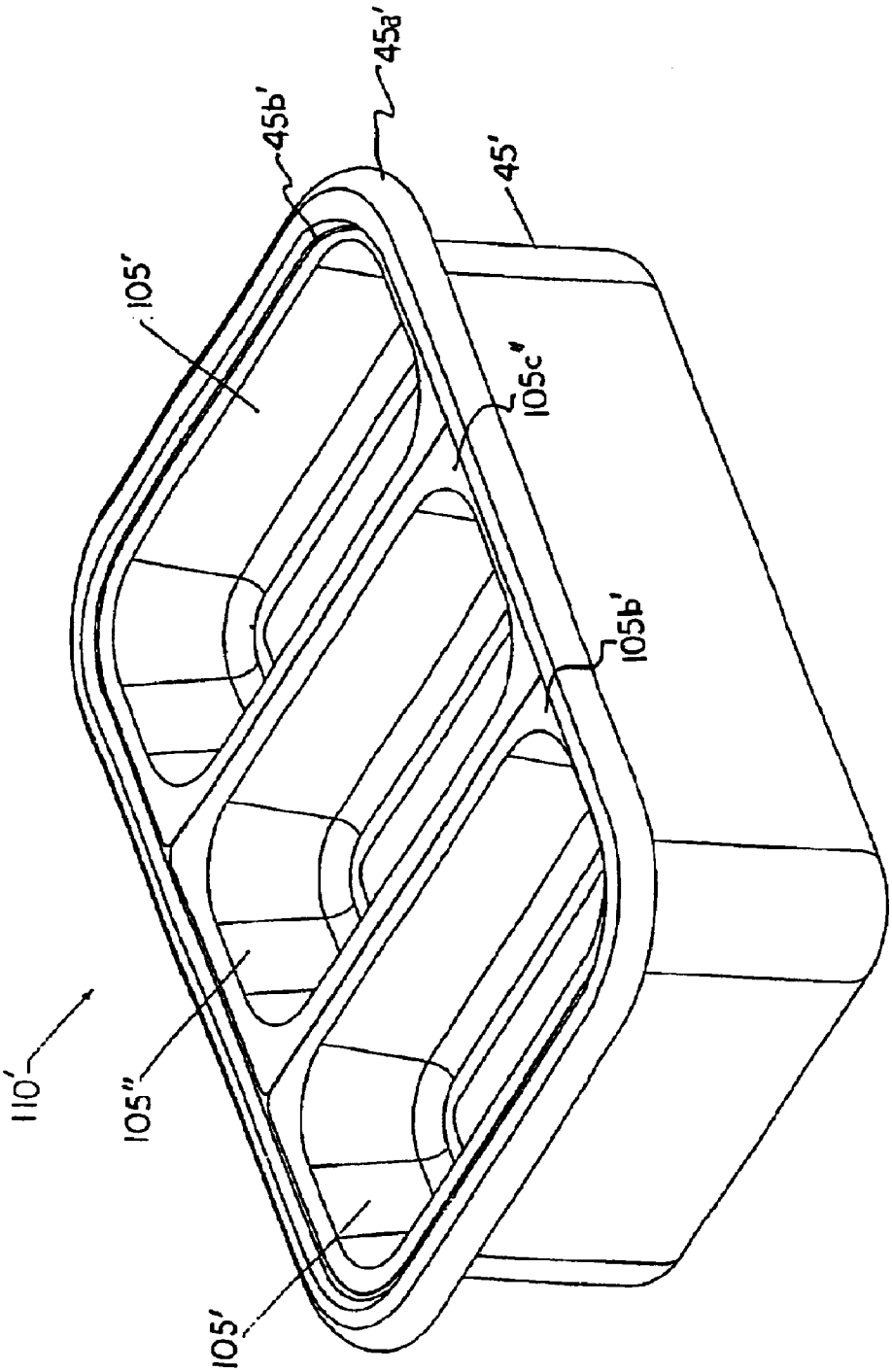

FIG. 12A

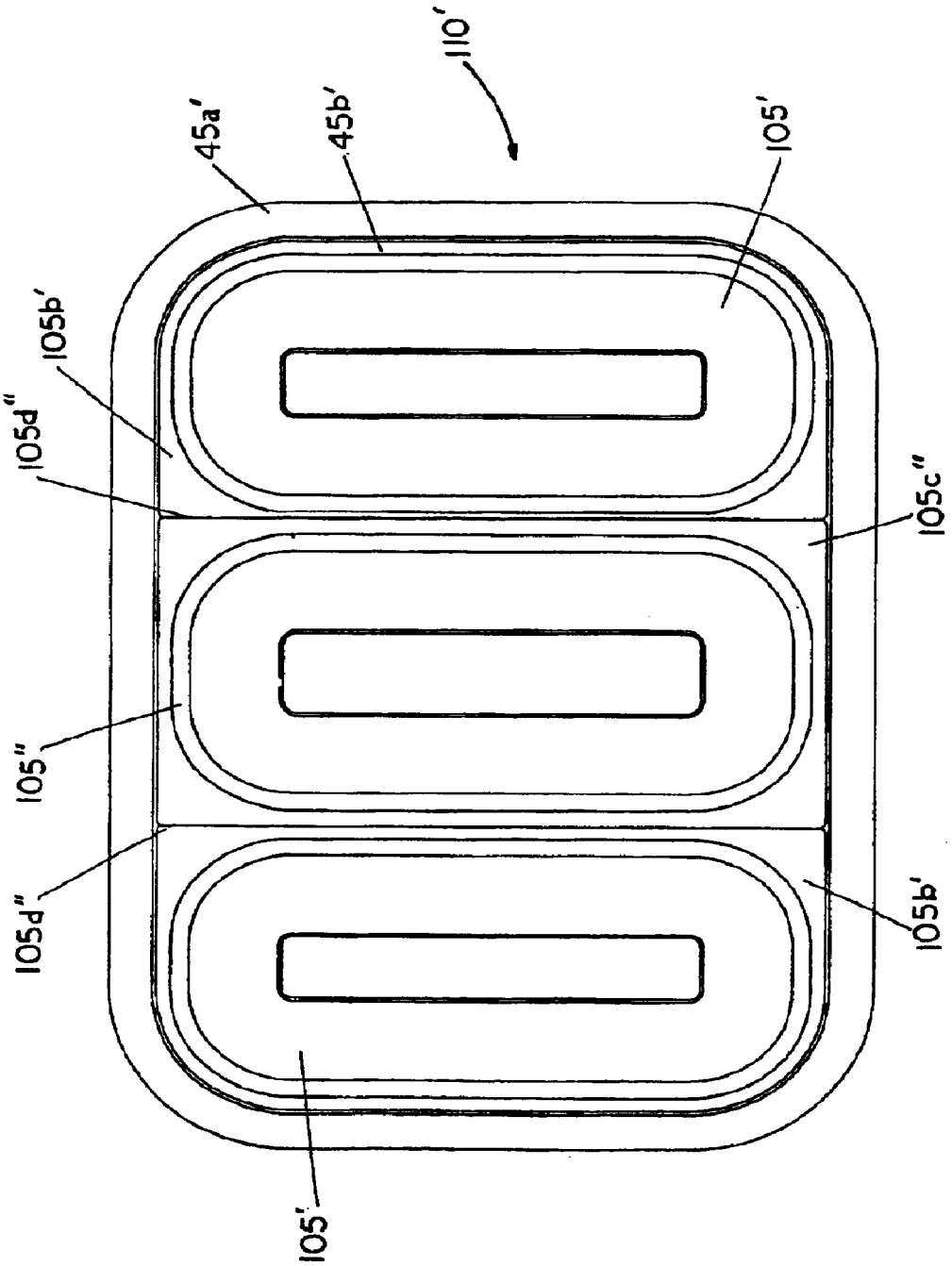

FIG. 12B

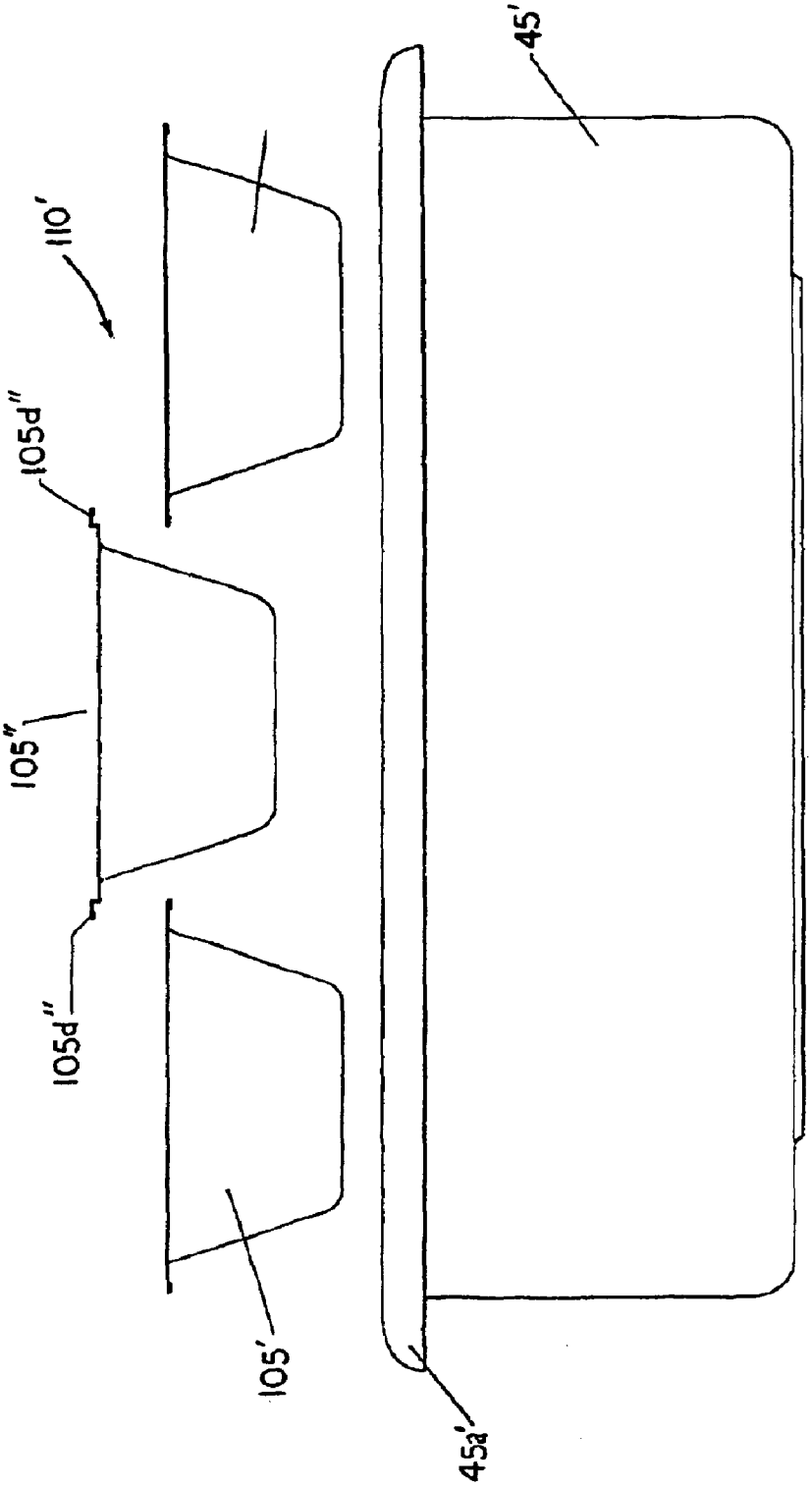

FIG. 12C

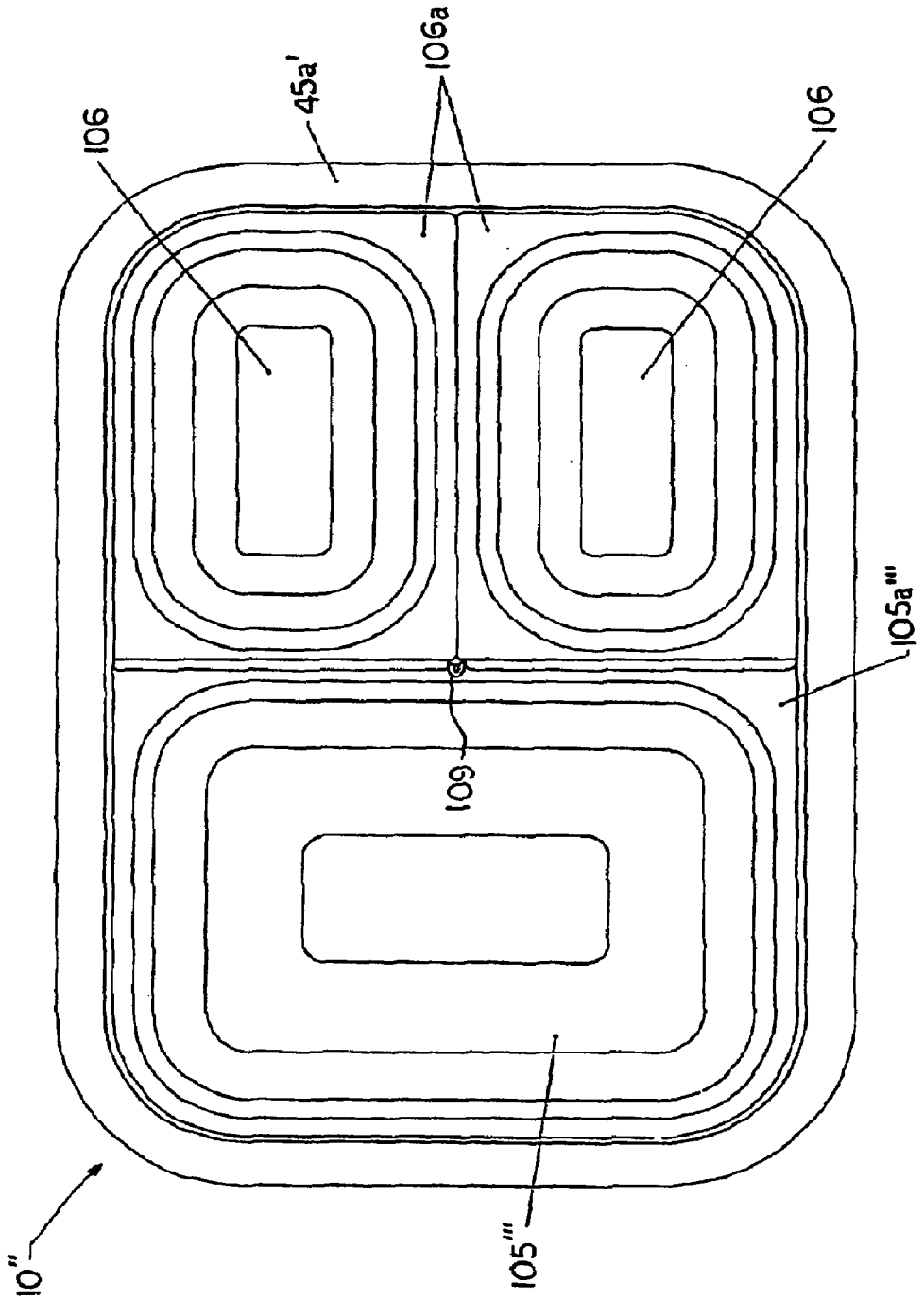

FIG. 12D

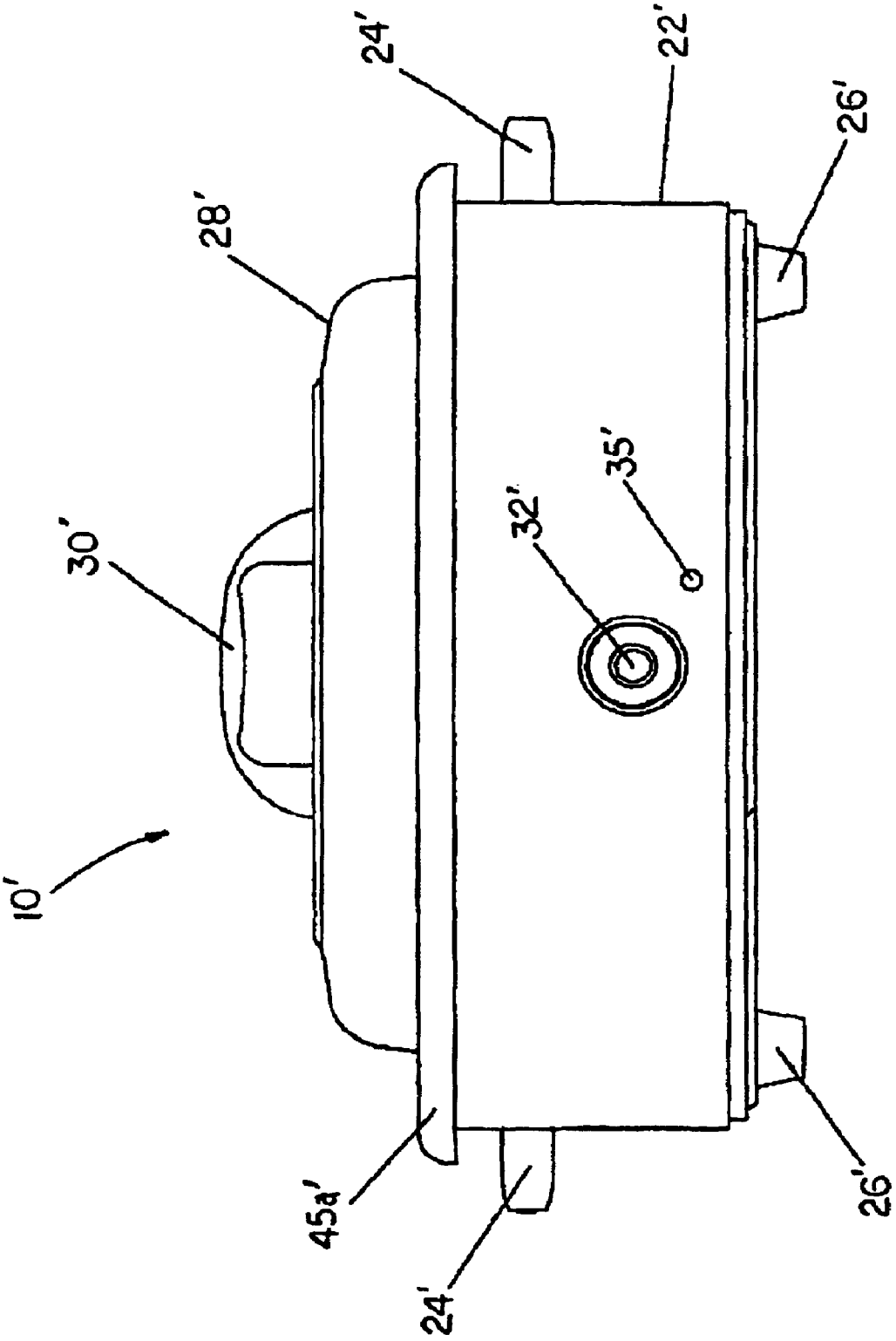

FIG. 13

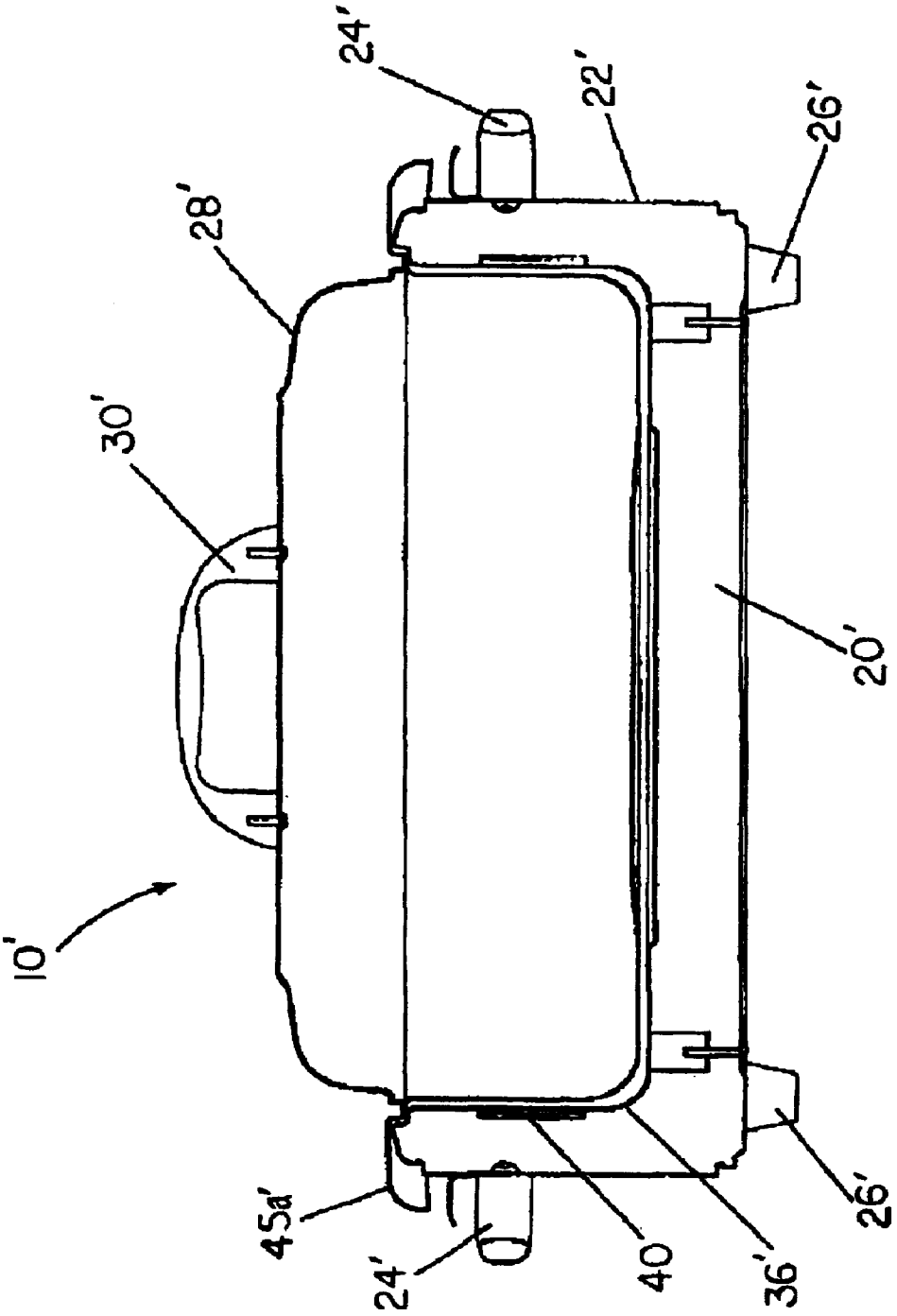

FIG. 14A

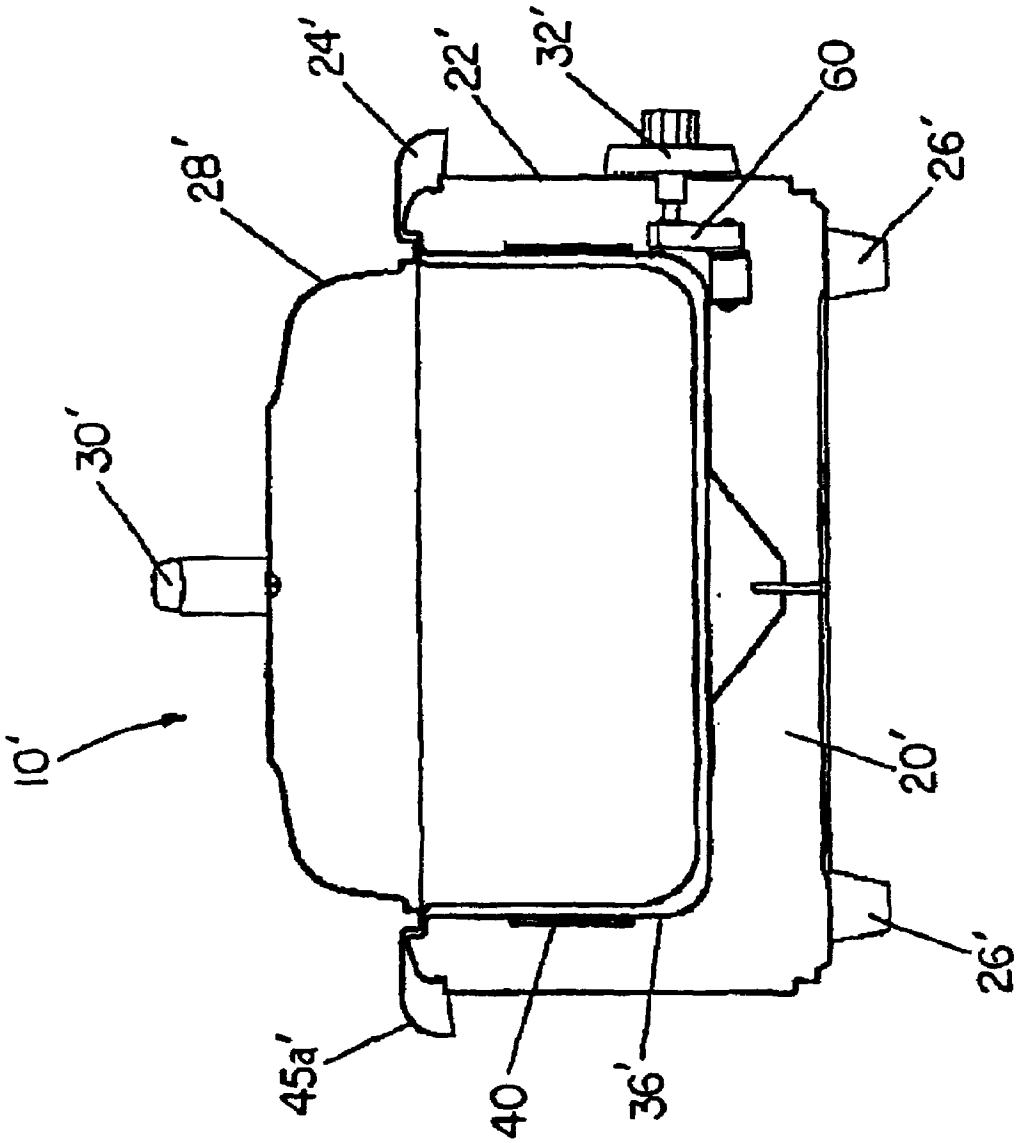

FIG. 14B

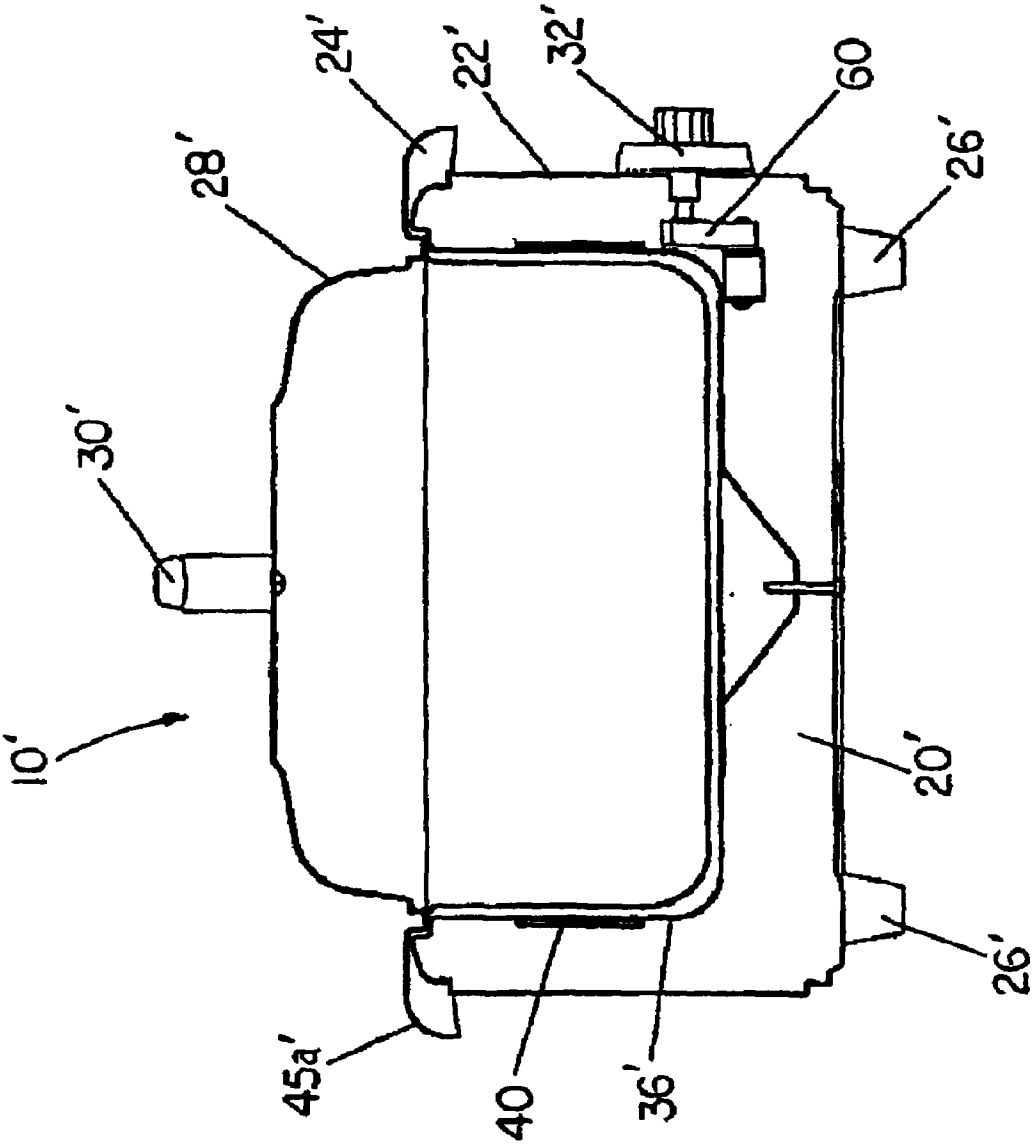

FIG. 14B

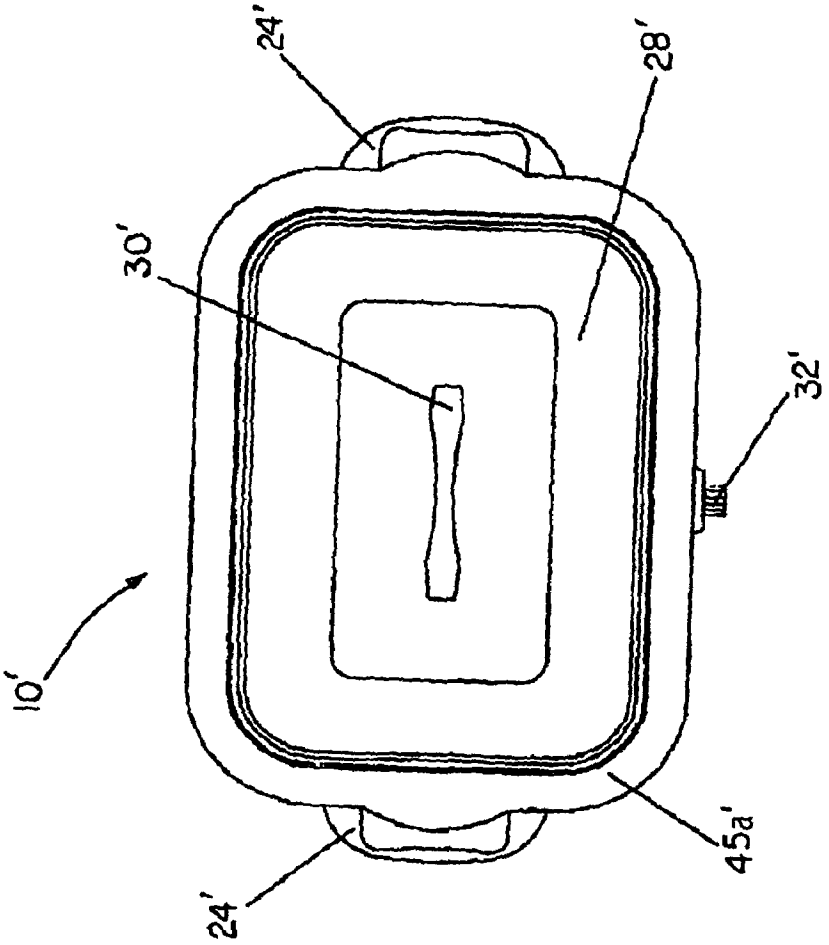

FIG. 15

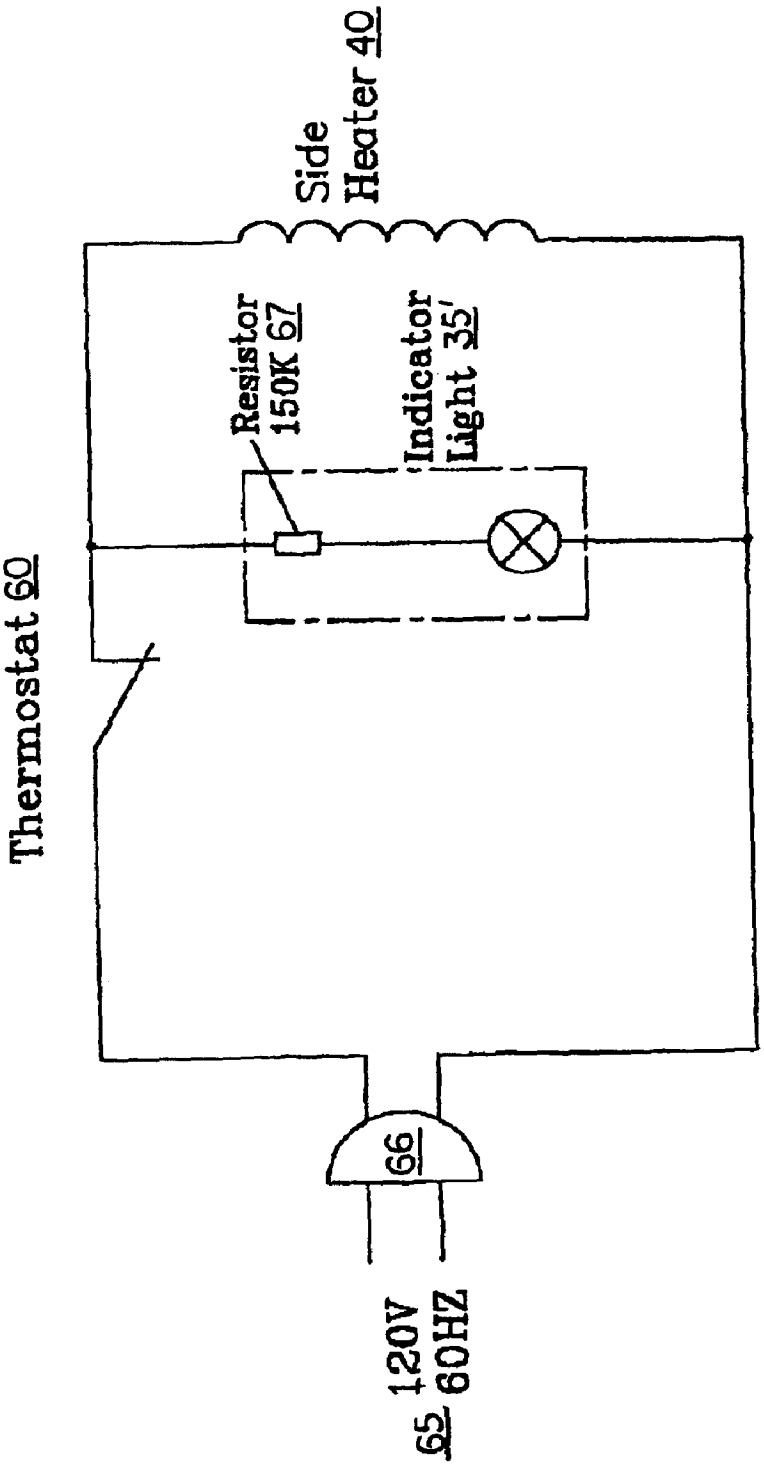
Side Heater 40
Resistor 150K 67
Indicator Light 35'
Thermostat 60
66
120V 60HZ 65

FIG. 16

ROASTING OVEN WITH DUAL HEATING ELEMENTS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of U.S. patent application Ser. No. 10/302,202 entitled Roasting Oven with Dual Heating Elements filed Nov. 22, 2002, now U.S. Pat. No. 6,686,569, which is a continuation-in-part of U.S. patent application Ser. No. 09/971,286, now U.S. Pat. No. 6,509,550 entitled Roasting Oven with Dual Heating Elements filed Oct. 5, 2001 and claims the benefits provided under 35 USC § 120.

BACKGROUND OF INVENTION

The present invention relates to cooking appliances and, more particularly, to a large capacity, roasting oven including a food serving system. In one embodiment the roasting oven includes a wrap-around type heating element for applying heat to the cooking vessel and a top heater element for browning. In an alternative embodiment the top heater element is omitted to simplify manufacturing and to reduce the cost to the consumer.

Electric cooking pots for preparing and serving hot foods are well known to those skilled in the art. Such electric cooking pots typically include a heating element arranged in functional relation underneath the bottom surface of the cooking well for supplying heat. Such cooking wells are often constructed of stainless steel or enameled steel for reasons of durability and sanitation. However, it is known that both stainless steel and enameled steel have relatively low coefficients of heat conductivity as compared with other metals.

This presents a particular problem for cooking vessels of large capacity (i.e. up to 26 quarts). Applying heat only to the bottom surface of such a large capacity cooking vessel, especially when constructed of stainless steel or enameled steel, can result in the upper portion of the cooking vessel being insufficiently heated. Thus, the food in the upper portion of the cooking vessel may become too cool for serving purposes due to the loss of heat in combination with the low rate of heat conductivity and the slow rate at which heat is supplied to the upper portion of the cooking vessel.

The heat distribution problem is compounded in a roasting oven of large capacity and cannot be resolved by simply increasing the power output of the heating element. This is due to the fact that the increased heater output tends to overheat and to cause malfunction of the temperature control components and electronic circuitry, which are typically contained within the oven housing. Thus, the present roasting oven has been developed to solve these problems and other shortcomings of the prior art.

DESCRIPTION OF RELATED PRIOR ART

Numerous examples of deep well cookers are available in the prior art and their discussion follows. One example of a prior art deep well cooker is disclosed in U.S. Pat. No. 4,024,377 to Henke comprising a heat sink preferably formed of aluminum or another corrosion resistant metal having a relatively high coefficient of heat conductivity, which is positioned over the deep well member from below. The heat sink member is generally U-shaped and has a bottom part parallel to and spaced from the bottom of the well member and side parts parallel to and engaging the sides of the well member in heat exchanging relation. An electric heating element is disposed in the space between the bottom of the well member and the bottom part of the U-shaped heat sink member. When the electric heater is energized, heat is supplied to the bottom of the well member by direct radiation and by radiation from the bottom part of the U-shaped member and by convection due to the air in the space occupied by the heating element. Simultaneously, however, heat also flows from the bottom part of the U-shaped member, up side parts of the U-shaped member, and into the sides of the well member. The heat supplied by conduction to the sides of the well member provides for more uniform heating of the well member while also providing for more efficient utilization of the energy supplied to the heating element. However, this device is designed for use with a deep well cooker having a capacity of approximately 8–12 quarts based on the dimensions provided in the specifications. This device necessarily becomes less efficient when applied to a larger capacity cooker having increased side wall dimensions.

Another example of a prior art cooking device having multiple heating elements is disclosed in U.S. Pat. No. 3,393,295 to Jepson et. al. comprising a pan with a lower electric heating element supported on its underside and a deep cover with an upper heating element supported within. A thermostatic control is connected to the lower heating element for energization thereof. When the cover is closed, an electrical connection for energizing the upper heating element is completed. The control serves thermostatically to control the energization of either element in a repeating, alternating sequence and is capable of performing the functions of a frying pan, broiler, and oven. However, this invention is not directly applicable to deep well cookers nor does it disclose a wrap-around heating element for controlling heat distribution to the upper surfaces of a deep well member within such a cooker.

U.S. Pat. No. 2,265,295 to Layton discloses an electric roaster with a housing and a well with a bare resistance wire wrapped around asbestos paper which serves as an insulator (see FIGS. 1–2). Layton does not disclose or suggest control circuitry allowing various cooking modes.

U.S. Pat. No. 2,292,854 to Wilcox discloses an electric heating wire wrapped around a mica support strip with notches and sandwiched between insulating layers (see FIG. 3). Wilcox also discloses a spring clamp (see FIG. 6) and rivet fastening of laminated structures.

U.S. Pat. No. 6,170,388 to Shovick; U.S. Pat. No. 2,187,888 to Nachumsohn; and German Patent document 3606800 to Rederer disclose heating/cooking devices, which are pertinent to applicant's disclosure in the present application.

SUMMARY OF THE INVENTION

Accordingly, the present invention provides a roasting oven including a food serving system having a large capacity (i.e. up to 26 quarts) that includes a wrap-around heating element, which is disposed about the heating well for heating the sides thereof, and a top heating element for browning (i.e. to scorch slightly in cooking) mounted within the oven lid. In another embodiment the top heating element is omitted to simplify manufacturing and to reduce cost to the consumer.

Both the wrap-around heating element and the top heating element are provided in alternative embodiments utilizing different types of heating elements for versatility in manufacturing and heating requirements. The wrap-around heating element and the top heating element are interconnected by temperature controls for heat regulation and a function

control switch for selectively energizing the desired heating elements individually or in combination.

For convenience the roasting oven lid containing the top heating element is removable being provided with detachable electrical connectors, which form a portion of the electrical circuit for the top heating element. The present roasting oven also includes serving containers for maintaining the cooked food in ready-to-eat condition and for re-heating leftover food items.

Other features and technical advantages of the present invention will become apparent from a study of the following description and the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features of the present invention are set forth in the appended claims. The invention itself, however, as well as other features and advantages thereof will be best understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying figures wherein:

FIG. **1A** is a front elevational view of the roasting oven of the present invention;

FIG. **1B** is an elevational view of the folding handle assembly of an alternative embodiment the present invention;

FIG. **1C** is a side view of the handle assembly of FIG. **1B** showing the handle member in a raised position;

FIG. **2A** is a longitudinal cross-section of the roasting oven showing details of the construction thereof;

FIG. **2B** is a transverse cross-section of the roasting oven showing further details thereof including the hinge mechanism;

FIG. **3** is a top plan view of an oval-shaped embodiment the roasting oven of the present invention;

FIG. **4A** is a partial horizontal section view taken along the section line **4A**—**4A** of FIG. **2B** showing the construction of the temperature control panel;

FIG. **4B** is a partial vertical section view taken along the section line **4B**—**4B** of FIG. **4A** showing the construction of the temperature control panel;

FIG. **5A** is a schematic diagram representing the circuitry of the present roasting oven wherein an electronic control panel is utilized;

FIG. **5B** is a schematic diagram representing an alternative embodiment of the circuitry wherein electromechanical switches and rheostatic temperature controls are utilized;

FIG. **6A** is a partially cutaway elevational view showing the details of the construction of the heating elements in a double-sided configuration;

FIG. **6B** is a partially cutaway elevational view showing the details of the construction of the heating elements in a single-sided configuration;

FIG. **6C** is a partially cutaway elevational view of an alternative embodiment of the wrap-around heating element;

FIG. **6D** is a sectional view taken along line **6D**—**6D** of FIG. **6C** showing details thereof;

FIG. **6E** is a partially cutaway elevational view of another embodiment of the wrap-around heating element;

FIG. **6F** is a partially cutaway elevational view of another embodiment of the wrap-around heating element;

FIG. **6G** is a sectional view taken along line **6G**—**6G** of FIG. **6F** showing details thereof;

FIG. **7A** is a plan view of an embodiment of the wire lead assembly of the heating element of the present invention;

FIG. **7B** is a plan view of an alternative embodiment of the wire lead assembly of the heating element of the present invention;

FIG. **8A** is a partial cross-section view showing the top heating element within the lid;

FIG. **8B** is an exploded, cross-section view showing an alternative embodiment of the lid including a tubular heating element and detachable plug connectors;

FIG. **8C** is a partial cross-section view showing an alternative embodiment of the lid including detachable magnetic connectors;

FIG. **9** is an enlarged front elevational view showing the wrap-around heating element installed about the deep well member of the present roasting oven;

FIG. **10** is an enlarged view of the power supply circuit board within the ventilated compartment;

FIG. **11** is an exploded perspective view showing an optional food serving set of the present invention;

FIG. **12A** is a perspective view of an alternative embodiment of the present serving set in a rectangular configuration;

FIG. **12B** is a top plan view of the serving set shown in FIG. **12A**;

FIG. **12C** is an exploded elevational view of the serving set shown in FIGS. **12A** and **12B**;

FIG. **12D** is a top plan view of another embodiment of the serving set;

FIG. **12E** is an exploded perspective view of the serving set shown in FIG. **12D**;

FIG. **13** is a front elevation of another embodiment of the present roasting oven;

FIG. **14A** is a longitudinal cross-section of the embodiment shown in FIG. **13** showing details of the construction thereof;

FIG. **14B** is a transverse cross-section of the embodiment shown in FIG. **13** illustrating further details thereof;

FIG. **15** is a top plan view of the rectangular embodiment of the roasting oven shown in FIG. **13**; and

FIG. **16** is a schematic diagram representing the electromechanical components and circuitry of the embodiment shown in FIG. **13**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

With further reference to the drawings, there is shown therein an embodiment of a roasting oven in accordance with the present invention, indicated generally at **10**, and illustrated in FIG. **1A**. The present roasting oven **10** is comprised of an outer housing **22** equipped with fixed external handles **24** and feet **26**. The roasting oven **10** is also provided with a lid **28** equipped with a handle **30**.

In an alternative constructon, the roasting oven **10** is provided with folding handle assemblies, indicated generally at **24'**, as shown in FIGS. **1B** and **1C**. Each handle assembly **24'** includes a mounting plate **25** conforming to the exterior contour of the housing **22**. Mounting plates **25** include a horizontally disposed groove **25***a* formed along the breadth thereof, which is configured to receive a generally D-shaped handle member **27**. The handle member **27** includes shank portions **27***a* (shown in broken outline) which engage the groove **25***a* to impart pivoting movement to the handle member **27** as shown in FIG. **1C**. Handle members **27** are designed to temporarily lock in the extended position shown in FIG. **1C**. Thereafter, handle

members **27** pivot downwardly to the position shown in FIG. **1A** for convenient storage. This provides space savings for display on store shelves and cost savings on shipping carton size.

In the preferred embodiment the housing **22** is constructed of sheet steel, heat resistant plastic, or other suitable material and is provided in various exterior finishes such as powder coating, stainless steel, or plated steel.

The present roasting oven **10** also includes an internal heating well **36** disposed within the housing **22** as more clearly shown in FIGS. **2A** and **2B**. The heating well **36** is constructed of enamel-coated steel cast aluminum, cast iron or other suitable material. The present oven **10** features a wrap-around heating element, indicated generally at **40**, and a top heating element, indicated generally at **150**, as described hereinafter in further detail.

The present roasting oven **10** also includes a removable cooking liner **45** including a peripheral flange member **45*a*** which is seated on the upper edge of the housing **22** as shown. The liner **45** is constructed of stainless steel, enamel-coated steel, cast aluminum, ceramic, or other suitable material. The cooking liner **45** is easily removed from the heating well **36** for cleaning for the convenience of the user.

A layer of heat-resistant insulating material (not shown) is disposed in the air space as at **20** between the housing **22** and the cooking well **36** as shown in FIGS. **2A** and **2B**. Numerous types of heat insulating materials having physical and chemical properties suitable for this application are commercially available. Since such heat insulating materials are well known to those skilled in the art, further detailed discussion of the same is not deemed necessary.

Referring to an embodiment illustrated in FIG. **3**, the present roasting oven **10** is oval-shaped in configuration. It has been determined that optimal heating of the side wall surfaces of the large capacity (i.e. up to 26 quarts) heating well **36** can be achieved at all times in the oval configuration. However, it will be appreciated that the roasting oven **10** may be constructed in a circular, square, or rectangular configurations with minor modifications to the heating elements.

Referring again to FIG. **1A**, a control panel, indicated generally at **32**, is provided on the lower front surface of the housing **22** to carry out the functions of the present roasting oven **10**. The control panel **32** includes a plurality of temperature control switches **33** which are electrically interconnected with both the wrap-around and top heating elements **40**, **150** respectively and serve to regulate the operation thereof The control panel **32** also includes a digital display **35**, cooking mode switches **31**, and a power switch **39**.

In the embodiment shown in FIG. **1A**, the control panel **32** is comprised of a heat-resistant housing **34** including a flexible, push button film **38** which overlays an electronic control circuit board **37** (FIG. **2B**) that provides the user with fingertip control of the cooking functions. A key innovation of the present oven **10** is a ventilated compartment **80** wherein the power supply circuit board **81** (FIG. **10**) is protected from the heat source as explained hereinafter in further detail.

As more clearly shown in FIGS. **4A** and **4B** the electronic control circuit board **37** is insulated from the wrap-around heating element **40**, which is disposed around the outer circumference of the heating well **36**, by layers of mica sheet insulation board installed as at **52** and/or other suitable heat insulating material installed as at **54** adjacent the exterior of the housing **22**.

Referring now to FIGS. **5A** and **5B**, there are shown schematic representations of alternative embodiments of the present roasting oven **10**. It will be appreciated by those skilled in the art that the electrical functions may be carried out by the electronic control panel **32** as shown in FIG. **5A** or, in the alternative, by the use of standard electromechanical switches and rheostatic temperature control devices shown in FIG. **5B**.

The present roasting oven **10** is designed for use with standard household electrical systems. In the preferred embodiment the wrap-around heating element **40** is designed to operate in the range of 1000–1500 watts and the top heating element **150** to operate in the range of 25 to 150 watts. This wattage rating can be varied for a given application and capacity of the oven.

With reference to FIGS. **6A** and **6B**, the present invention provides structures which comprise heating means including, but not limited to, the following structures. In one embodiment both the wrap-around heating element **40** and the top heating element **150** are constructed as layered assemblies wherein a sheet of heat insulating material, indicated generally at **70**, such as mica insulation board is interposed between interior and exterior sheets **72**, **74** of similar heat insulating material. Since the physical and chemical properties of mica insulation board and other similar heat insulating materials are well known to those skilled in the art, further detailed discussion of this material is not deemed necessary.

Still referring to FIGS. **6A** and **6B**, it will be noted that the sheet of heat insulating material **70** is fabricated with a plurality of die-cut notches **76** and **76*a***, which are formed at predetermined intervals along the opposite lateral edges thereof. Using a construction method of the present invention, the heater wire **53** is drawn across a pair of diagonally opposed notches as at **76** and **76*a***, wrapped in continuous revolutions around the heat insulating sheet **70**, and advanced in this manner along the entire length thereof as shown by directional arrows. It will be appreciated that using the aforementioned technique produces a so-called double-sided heating element (FIG. **6A**) having heating wire **53** disposed on both sides thereof.

Using an alternative construction technique shown in FIG. **6B**, a single-sided heating element can be produced by initially drawing the heater wire **53** across the heat insulating sheet **70** as described in the first step hereinabove. Next, the wire **53** is interlaced between adjacent notches **76** on the same lateral edge of the heat insulating sheet **70** as shown by directional arrows. Thereafter, the wire **53** is again drawn across the sheet **70** to the next diagonally opposed notch **76*a*** on the opposite lateral edge thereof. Next, the wire **53** is interlaced between adjacent notches **76*a*** on the opposite lateral edge of the heat insulating sheet **70**.

In this manner, it will be understood that a single-sided heater element having at least 75% of the total amount of heater wire **53** used in its construction disposed on one surface of the sheet **70** may be produced. Such a single-sided heating element (FIG. **6B**) is advantageous in reducing the radially outward reflection of heat generated by the heating elements thereby improving heating efficiency and providing a cooler outer surface in the event of user contact for safety purposes.

In both of the above described embodiments, the sheet **70** is permanently captured between the interior and exterior sheets **72** and **74**, and secured at periodic intervals as shown by rivets **75** or other suitable fasteners to maintain alignment of the individual layers.

Various alternative materials and techniques may be employed in the fabrication of the heating elements as shown in FIGS. **6**C to **6**G. For example, in FIGS. **6**C and **6**D the wrap-around heating element **40** as described above is enclosed in a metallic sheath, indicated generally at **120**. Sheath **120** is comprised of inner and outer layers **122, 124** respectively of light gauge sheet metal such as aluminum or galvanized steel, or a combination thereof, which is folded about the heating element **40** (FIG. **6**D) to form a protective enclosure.

In another embodiment shown in FIG. **6**E the heater wire **53** is provided in a serpentine pattern and permanently captured between opposed layers **125, 126** of a matted fiberglass sheath, indicated generally at **130**, having exceptional chemical characteristics for heat resistance. Layers **125, 126** are sewn together along suture lines **127, 128** to form the protective sheath **130** about the heater wire **53**.

In yet another embodiment shown in FIGS. **6**F and **6**G, a pair of tubular heating elements **153** are disposed between the opposed layers **141, 142** respectively of a metallic sheath, indicated generally at **140**. In this embodiment the opposed layers **141, 142** are fabricated from aluminum sheet material and the tubular heater elements **153** are secured in position by installation of parallel rows of rivets **75** or grommets **78** as shown.

Referring now to FIG. **7**A there is shown therein a heater lead wire assembly, indicated generally at **50**, for installation on the terminal ends of the heater wire **53**. In this embodiment the terminal ends of the heater wire **53** are insulated by a plurality of ceramic sleeves **54** to shield the temperature controls from exposure to heat from the wire **53**. It can be seen that each ceramic sleeve **54** includes a convex tip **54***a* (shown in broken line) which engages a concave end **54***b* on the adjacent sleeve to impart flexibility to the wire lead assembly. A terminal loop connector **55** is applied to the end of each heater lead wire assembly **50**' as illustrated.

In an alternative construction of the heater lead wire assembly, indicated generally at **50**', in FIG. **7**B the terminal ends of the heater wire **53** are joined with a bundle of nickel conductors **51** or other suitable conductors to create a heat sink, which effectively insulates the heater wire **53** from the temperature controls. Further, the bundle of conductors **51** and heater wire **53** is covered with a fiberglass insulation sleeve **52** and insulated by the same ceramic sleeves **54** to insure that the temperature controls are protected and not influenced by their proximity to the wrap-around heater element **40**. A terminal loop connector **55** is applied to the terminal end of the heater lead wire assembly **50**' as described hereinabove.

In the embodiment shown in FIG. **8**A, the top heating element **150** conforms generally to the configuration of the lid **28** and is constructed using the single-sided wire wrapping technique described hereinabove. In the present invention the lid **28** is provided with structures, which comprise electrically conductive supporting means including, but not limited to, the following structures. As shown in FIG. **8**A, the top heating element **150** is mounted on the inner surface **28***a* of the lid **28**. The top heating element **150** is electrically connected to the power source by a pin connector **103**, which is attached by electrical wiring (not shown) to an electrical plug assembly **90** within the hinge mechanism **100**.

The wiring is disposed within a wire channel **92** formed in the body **101** of the hinge and extends through the hinge mechanism, indicated generally at **100**, to a power cord **104**, which extends from the housing **22** as shown. An electrical circuit for the top heating element **150** is completed at contact **102** when the hinge mechanism **100** is in the closed position as shown in FIG. **8**A. A compression spring **106** maintains the electrical connection when the lid **28** is in the closed position.

Referring to FIG. **8**B there is shown another embodiment of a top heating or browning element **150**', which is generally U-shaped in configuration. In this embodiment a tubular type (e.g. Cal-rod) element **152** is mounted on the inner surface **28***a* of the lid **28** as shown. In this embodiment the lid **28** is fabricated from a heatproof glass material. The browning element **150**' extends through the lid **28** within an insulating block **154** and terminates in a plug connector **155**. Plug connector **155** is received in an electrical receptacle **157**, which is integrated into the modified hinge mechanism **100**'. Thus, the top browning element **150**' is electrically connected to the power source via power cord **104** within the housing **22**. Advantageously, the plug **155** and receptacle **157** may be disconnected for food service, cleaning, and storage purposes.

In another embodiment shown in FIG. **8**C a tubular type browning element **150**' extends through the lid **28** within a modified insulating block **154**' and terminates in a right angle plug connector **155**'. A cover **158** encloses the insulating block **154**' and the plug connector **155**'.

Plug connector **155**' is received in an electrical receptacle **157**', which includes a permanent magnet block **159**. Magnet block **159** engages and retains plug connector **155**' at the interface thereof to maintain electrical contact with the top browning element **150**' and to secure the lid **28** in position on the oven. The plug connector **155**' and receptacle **157**' may be conveniently disconnected for food service, cleaning, and storage purposes.

In an assembly procedure of the present roasting oven **10**, the wrap-around heating element **40** is secured to an outer surface of the heating well **36** by use of an adjustable band clamp, indicated generally at **83**, as shown in FIG. **9**. The band clamp **83** is constructed of sheet metal such as steel in the form of an elongated belt and includes a turnbuckle mechanism, indicated generally at **82**, which is capable of securing the heating element **40** about the outer periphery of the heating well **36**. The wrap-around heating element **40** is mounted onto studs **77** (FIGS. **6**A and **6**B) which are coupled to and project from the band clamp **83** in predetermined locations.

A plurality of elongated slots **79** (FIGS. **6**A and **6**B) are formed in the terminal ends of the wrap-around heater element **40** so as to be positioned in alignment with studs **77**. Studs **77** engage the elongated slots **79** during assembly and provide for slight differences in length and movement between the interior and exterior insulation boards **72** and **74** and the sheet **70**.

Referring to FIG. **9**, it will be noted that the wrap-around heating element **40** is fabricated to a predetermined length. During assembly it is positioned so as to leave a gap as at **85** corresponding to the position of the temperature control panel **38** and the circuit board **37**, which are subject to heat damage. In the construction process the gap **85** may be filled with fiberglass insulation material, mica insulation board, or other appropriate insulating materials to protect the temperature controls.

Referring again to FIGS. **8**A–**8**C, the top heating elements **150, 150**' are installed in spaced apart relation to the inner surface **28***a* of the lid **28** by the use of mounting brackets **94** which project downwardly from the lid **28** into the cooking vessel.

It will be appreciated that because the present invention omits the conventional bottom heating element of the prior art, the temperatures achieved on the undersurface of the heating well **36** and housing **22** in operation are relatively lower in comparison to prior art cookers. Accordingly, the roasting oven **10** includes a ventilated compartment **80** as shown in FIG. **10**, which is located on the undersurface of the housing **22** and functions to protect the power supply circuit board **81** from heat damage. This design isolates the power supply circuit board **81** from the rising heat of the oven and facilitates the use of the relatively high wattage heating elements **40** and **150** required for the large capacity of the present roasting oven.

The power supply circuit board **81** is mounted in space to-part relation to the undersurface of the housing **22** by the use of spacers **84** so as to create an air gap as at **85** to further isolate the circuit board **81** from the housing **22** and the heat source. In addition, a layer of mica insulation board or other suitable insulating material is installed as at **86** to further insulate and protect the power supply circuit board **81**.

Referring to FIG. **11** the present oven is provided with a food serving set, indicated generally at **110**. In the preferred embodiment the food serving set is comprised of a plurality of serving containers **112** which closely conform to the shape and dimensions of the cooking liner **45** and are inserted therein. The serving containers **112** are provided with lids **115** to maintain the cooked food in warm condition. The food serving set **110** is provided in a variety of materials and/surface finishes at the option of the consumer.

Referring to FIGS. **12**A and **12**B there is shown another embodiment of the food serving set, indicated generally at **110'**, which is adapted for use with a roasting oven of the present invention. In this embodiment three generally rectangular food containers **105'**, **105"** including peripheral flanges **105***b'*, **105***c"* respectively are configured to fit the inner edge **45***b'* of the flange **45***a'* of the cooking liner **45'** as shown. It can be seen that the peripheral flanges **105***b'* of the outer pair of containers **105'** are generally D-shaped in configuration being interchangeable and fitted to the opposite ends of the cooking liner **45'**.

Still referring to FIGS. **12**A and **12**B, the center food container **105"** includes a rectangular, peripheral flange **105***c"*, which is configured to fit the central portion of the inner edge **45***b'* of the cooking liner **45'** as shown. As can be seen in FIG. **12**C the lateral edges **105***d"* of the flange **105***c"* of the center container **105"** are bent at a predetermined angular offset and are positioned in overlapping relation to the corresponding lateral edges of the outer pair of food containers **105'**. In this manner the center food container **105"** engages and maintains the outer containers **105'** in the position shown and prevents the containers **105'** from shifting out of position when in use.

Referring now to FIGS. **12**D and **12**E there is shown yet another embodiment of the food serving set, indicated generally at **110"**. In this configuration of the serving set, a single large food container **105'"** including a D-shaped peripheral flange **105***a"* and two smaller food containers **106** including integral peripheral flanges **106***a* are configured to fit the inner peripheral edge of the cooking liner **45'**. As can be seen in FIG. **12**E, the centermost edges **106***a'* of the flanges **106***a* of the containers **106** are bent at a predetermined offset and are positioned in overlapping relation with the adjoining lateral edge of the flange **105***a'"* of food container **105'"**. In this manner the food containers **106** engage and maintain the larger container **105'"** in the position shown and prevent the container **105'"** from shifting out of position. A locating protuberance **109** formed on the container **105'"** serves to center the containers **106** in position and to prevent side-to-side movement on the inner edge **45***b'* of the liner **45'** when in use.

Referring now to FIG. **13** there is shown therein another embodiment of a roasting oven in accordance with the present invention, indicated generally at **10'**. The roasting oven **10'** is comprised of an outer housing **22'** equipped with fixed external handles **24'** and feet **26'**. The roasting oven **10'** is also provided with a lid **28'** equipped with a handle **30'**.

The housing **22'** is constructed of sheet steel, heat resistant plastic, or other suitable material and is provided in different exterior finishes such as powder coating, stainless steel, or plated steel.

The present roasting oven **10'** also includes an internal heating well **36'** disposed within the housing **22'** as more clearly shown in FIGS. **14**A and **14**B. The heating well **36'** is constructed of enamel-coated steel, cast aluminum, cast iron or other suitable material.

The roasting oven **10'** also includes a removable cooking liner **45'** including a peripheral flange member **45***a'* which is seated on the upper edge of the housing **22'** as shown. The liner **45'** is constructed of stainless steel, enamel-coated steel, cast aluminum, ceramic, or other suitable material. The cooking liner **45'** is easily removed from the heating well **36'** for cleaning.

A layer of heat-resistant insulating material (not shown) is disposed in the air space as at **20'** between the housing **22'** and the cooking well **36'** as shown in FIGS. **14**A and **14**B.

Referring to FIG. **15**, the present embodiment of the roasting oven **10'** is generally rectangular in configuration. However, it will be appreciated that the roasting oven **10'** may be constructed in a circular, square, or oval configurations as described hereinabove with minor modifications to the heating element **40**.

Referring again to FIG. **13**, a power switch, indicated generally at **32'**, connected to a 120 Volt/60 Hz power source **65** via plug **66** (FIG. **16**) is provided on the lower front surface of the housing **22'** to carry out the functions of the present roasting oven **10'**. The power switch **32'** is electrically interconnected with the wrap-around heating element **40** via thermostat **60**, which serves to regulate the operation thereof. An indicator light **35'** is also provided on the housing **22'** and is electrically interconnected to the power circuit.

Referring now to FIG. **16**, there is shown a schematic representation of the electrical circuitry of the present roasting oven **10'**. It will be appreciated by those skilled in the art that the electrical functions of the wrap-around heater **40** are carried out by the use of an electromechanical thermostat **60** and a 150K resistor **67** interconnected as shown in FIG. **16**.

The present roasting oven **10'** is also designed for use with standard household electrical systems. In this embodiment the wrap-around heating element **40** is designed to operate in the range of 1000–1500 watts. Of course, this wattage rating may be varied for a given application and capacity of the oven. In this embodiment of the roaster oven **10'**, the wrap-around heating element **40** is constructed in the same manner as described hereinabove and illustrated in FIGS. **6**A and **6**B.

In summary, the present invention has been developed to provide a roasting oven having a large capacity (i.e. up to 26 quarts) that includes a flexible, wrap-around heating element which is disposed about the heating well for heating the sidewalls thereof and a top heating element for browning. In

an alternative construction the top heating element is omitted to reduce manufacturing costs.

The wrap-around heating elements **40**, **140** are provided in different configurations to facilitate manufacturing and heating. Both the wrap-around heating element **40** and top heating elements **150**, **150'** are electrically interconnected to a temperature control panel featuring a push-button control film interface for selectively energizing the heating elements. The roasting oven may include a detachable lid member having a top browning element featuring quick connect/disconnect electrical connectors to enhance food service and cleaning. The present roasting oven may also include an exterior ventilated compartment for housing the power supply circuit board for insulating the same from the high heat source necessary for a roasting oven of this capacity.

The present roasting oven is also provided with a food serving set for maintaining food in ready-to-eat condition and for re-heating leftover food items. The food serving set is available in alternative configurations

Although not specifically illustrated in the drawings, it should be understood that additional equipment and structural components will be provided as necessary, and that all of the components described above are arranged and supported in an appropriate fashion to form a complete and operative roasting oven incorporating features of the present invention.

It is also understood that variations may be made in the present invention without departing from the scope of the invention. For example, the present roasting oven may utilize double-sided and also single-sided heater elements as disclosed herein, which may be advantageous for specific applications.

Moreover, although illustrative embodiments of the invention have been described, a latitude of modification, change, and substitution is intended in the foregoing disclosure, and in certain instances, some features of the invention will be employed without a corresponding use of other features. Accordingly, it is appropriate that the appended claims be construed broadly and in a manner consistent with the scope of the invention.

What is claimed is:

1. A roasting oven comprising:

an outer housing having a lid member;

a heating well residing within said housing, said heating well having a bottom surface with integrally formed sidewalls and an open top defining an interior cavity;

a removable cooking liner conforming to said interior cavity and residing therein;

heating means including a wrap-around heating element disposed about said heating well, said heating element formed by wrapping heating wire about an insulating material having a plurality of notches formed in the lateral edges thereof at periodic intervals such that said heating wire is engaged within said notches in a repeating pattern, said heating wire being joined at the terminal ends thereof with a bundle of metallic conductors to form a heat sink; and

temperature controlling means electrically interconnected to said heating means for regulating the temperature of said heating element.

2. The roasting oven of claim **1** wherein said insulating material is constructed in the form of an elongated belt.

3. The roasting oven of claim **2** wherein said heating wire is alternately traversed across said insulating material between diagonally opposed pairs of said notches and then interlaced between adjacent pairs of said notches in a predetermined pattern such that at least 75% of said heating wire is disposed on a first side of said elongated belt.

4. The roasting oven of claim **2** wherein said heating wire is wrapped in continuous revolutions about said elongated belt between diagonally opposed pairs of said notches to produce said repeating pattern.

5. The roasting oven of claim **2** wherein said elongated belt including said heating wire is captured between interior and exterior sheets of heat insulating material to form a heater belt assembly.

6. The roasting oven of claim **5** wherein said heater belt assembly includes a plurality of slotted holes extending through said elongated belt and said interior and exterior sheets of heat insulating material, said slotted holes being formed in predetermined locations to simultaneously engage a plurality of mounting studs without binding when said heater belt assembly is wrapped around said heating well.

7. The roasting oven of claim **1** wherein said terminal ends of said heating wire and said conductors are provided with a terminal connector loop to form a lead wire assembly.

8. The roasting oven of claim **7** wherein said lead wire assembly further includes a plurality of ceramic insulation sleeves disposed thereon to insulate said temperature controlling means from said heating wire.

9. The roasting oven of claim **1** wherein said temperature controlling means includes a thermostat.

10. The roasting oven of claim **9** further including a food serving set comprising an array of food containers residing within said interior cavity of said cooking liner for heating food items.

11. The roasting oven of claim **10** wherein said cooking liner is generally rectangular in configuration.

12. The roasting oven of claim **11** wherein said food serving set comprises three generally rectangular food containers arranged in side-by-side relation including an outer pair of food containers each having a D-shaped peripheral flange and a central food container having a rectangular peripheral flange with lateral edges, said containers residing in overlying relation to an inner peripheral edge of said cooking liner.

13. The roasting oven of claim **12** wherein said lateral edges of said rectangular peripheral flange are formed at a predetermined angular offset to engage the adjacent edges of said D-shaped peripheral flanges to secure said outer pair of containers in position.

14. The roasting oven of claim **11** wherein said food serving set comprises three generally rectangular food containers including a single large container having a D-shaped peripheral flange and a pair of smaller containers each having a modified rectangular peripheral flange, said containers residing in overlying relation to an inner peripheral edge of said cooking liner.

15. The roasting oven of claim **14** wherein said single large container includes a locating protuberance formed on said D-shaped peripheral flange for aligning said pair of smaller containers in side-by-side relation on said cooking liner.

16. A roasting oven for use in combination with a food serving set comprising:

an outer housing having a lid member;

a heating well residing within said housing, said heating well having a bottom surface with integrally formed sidewalls and an open top defining an interior cavity;

a removable cooking liner conforming to said interior cavity and residing therein;

a wrap-around heating belt disposed about said heating well and positioned intermediate said housing and said heating well, said wrap-around heating belt formed by wrapping heating wire about an insulating material having a plurality of notches formed in the lateral edges thereof at periodic intervals such that said heating wire can be engaged within said notches in a repeating pattern, said heating wire being joined at the terminal ends thereof with a bundle of conductors to form a heat sink;

an thermostat electrically interconnected to said wrap-around heating belt for regulating cooking temperature; and

a plurality of food containers comprising said food serving set, said food containers residing within said interior cavity of said cooking liner for heating food items contained therein.

17. The roasting oven of claim **16** wherein said cooking liner is generally rectangular in configuration.

18. The roasting oven of claim **17** wherein said food serving set comprises three generally rectangular food containers of equal volume arranged in side-by-side relation including an outer pair of food containers each having a D-shaped peripheral flange and a central food container having a rectangular peripheral flange with lateral edges, said containers residing in overlying relation to an inner peripheral edge of said cooking liner.

19. The roasting oven of claim **18** wherein said lateral edges of said rectangular peripheral flange are formed at a predetermined angular offset to engage said D-shaped peripheral flanges to secure said outer pair of containers in position.

20. The roasting oven of claim **17** wherein said food serving set comprises three generally rectangular food containers including a single large container having a D-shaped peripheral flange and a pair of smaller containers each having a modified rectangular peripheral flange, said containers residing in overlying relation to an inner peripheral edge of said cooking liner.

21. The roasting oven of claim **20** wherein said single large container includes a locating protuberance formed on said D-shaped peripheral flange for aligning said pair of smaller containers in side-by-side relation on said cooking liner.

22. The roasting oven of claim **16** wherein said heating wire is alternately traversed across said insulating material between diagonally opposed pairs of said notches and then interlaced between adjacent pairs of said notches in a predetermined pattern such that at least 75% of said heating wire is disposed on a first side of said wrap-round heating belt.

23. The roasting oven of claim **16** wherein said heating wire is drawn in continuous revolutions about said insulating material between diagonally opposed pairs of said notches to produce said repeating pattern.

24. The roasting oven of claim **16** wherein said heating belt including said heating wire is captured between interior and exterior sheets of heat insulating material to form a heater belt assembly.

25. The roasting oven of claim **24** wherein said heater belt assembly includes a plurality of slotted holes extending through said elongated belt and said interior and exterior sheets of heat insulating material, said slotted holes being formed in predetermined locations to simultaneously engage a plurality of mounting studs without binding when said heater belt assembly is wrapped around said heating well.

26. The roasting oven of claim **16** wherein said terminal ends of said heating wire and said conductors are provided with a terminal connector loop to form a lead wire assembly.

27. The roasting oven of claim **26** wherein said lead wire assembly further includes a plurality of ceramic insulation sleeves disposed thereon to insulate said temperature controlling means from said heating wire.

* * * * *

US007012221B2

(12) **United States Patent**
Li

(10) **Patent No.: US 7,012,221 B2**
(45) **Date of Patent: *Mar. 14, 2006**

(54) **ROASTING OVEN WITH DUAL HEATING ELEMENTS**

(76) Inventor: **George T. C. Li**, 2533 N. Carson St., Suite #0 98, Carson City, NV (US) 89706

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **10/772,224**

(22) Filed: **Feb. 3, 2004**

(65) **Prior Publication Data**

US 2004/0188412 A1 Sep. 30, 2004

Related U.S. Application Data

(63) Continuation-in-part of application No. 10/302,202, filed on Nov. 22, 2002, now Pat. No. 6,686,569, which is a continuation-in-part of application No. 09/971,286, filed on Oct. 5, 2001, now Pat. No. 6,509,550.

(51) **Int. Cl.**

A47J 37/06	(2006.01)
A47J 37/00	(2006.01)
F27D 11/02	(2006.01)

(52) **U.S. Cl.** **219/433**; 219/386; 219/398

(58) **Field of Classification Search** 279/385, 279/386, 395–398, 414, 417, 429, 432, 433, 279/435

See application file for complete search history.

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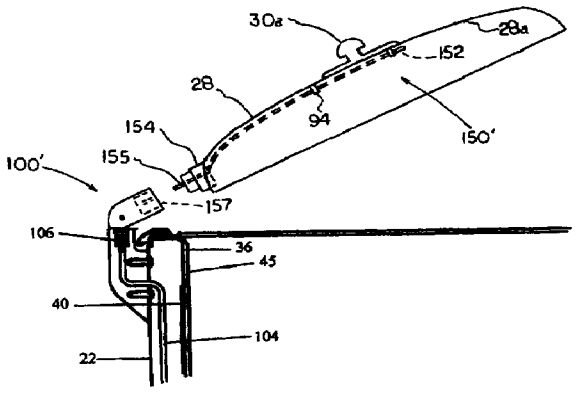
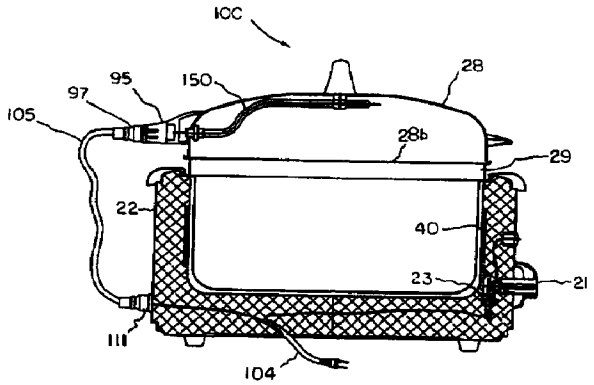
Primary Examiner—Joseph Pelham
(74) *Attorney, Agent, or Firm*—Clifford F. Rey

(57) **ABSTRACT**

A roasting oven having a large capacity heating well including a wrap-around heating element for heating the side walls thereof and a top heating element for browning is disclosed. A function control panel featuring a touch-film interface and digital display of cooking modes is provided for the user's convenience. In an alternative embodiments standard electromechanical switches and rheostatic temperature controls provide the functions of the present oven. The heating elements are also fabricated in alternative embodiments to provide single-sided or double-sided configurations for particular heating applications. A lid member including the top heating element is attached to the present oven by electrically conductive supporting structures, which incorporate the electrical circuit for the top heating element and also provide for convenient disconnection thereof for cleaning and storage.

19 Claims, 27 Drawing Sheets





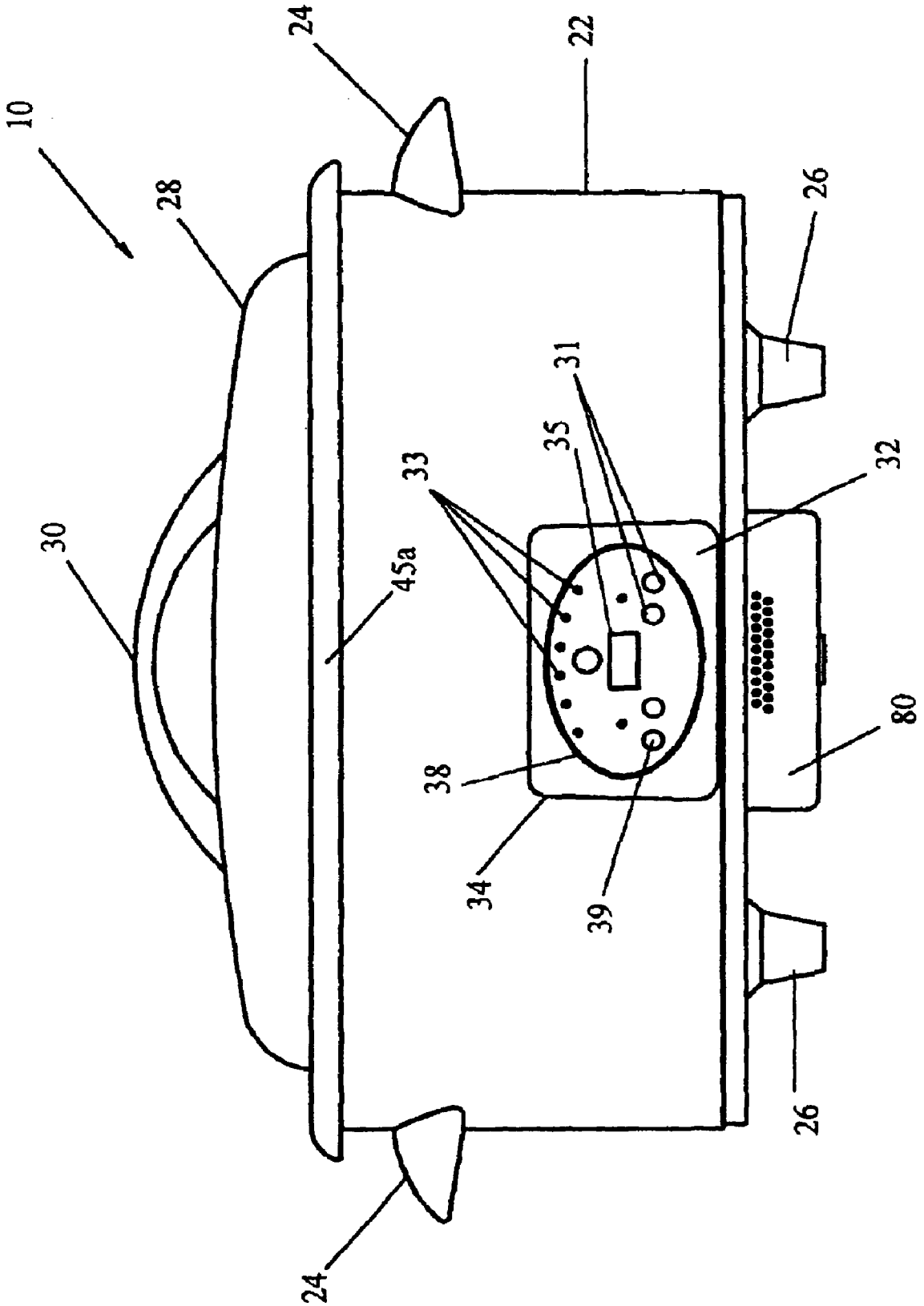


FIG. 1A

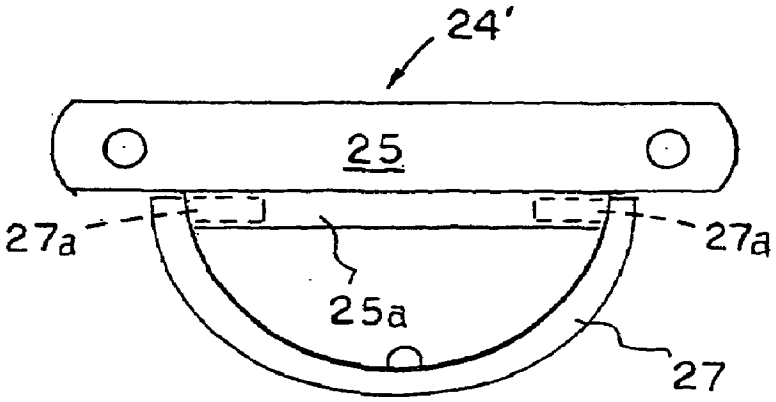


FIG. 1B

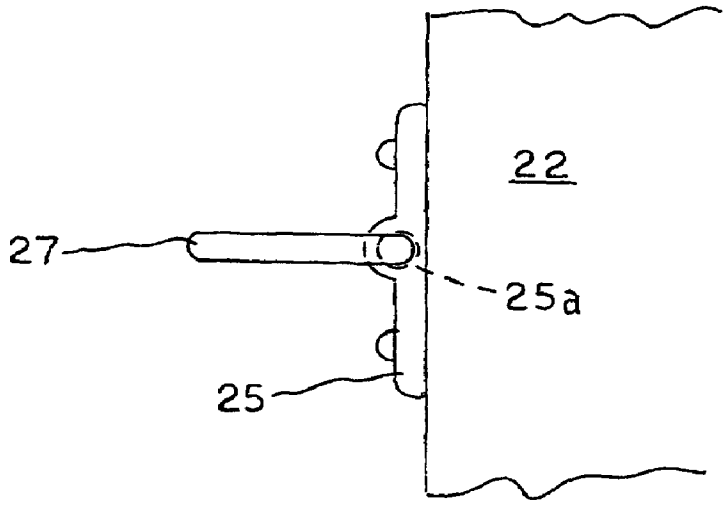


FIG. 1C

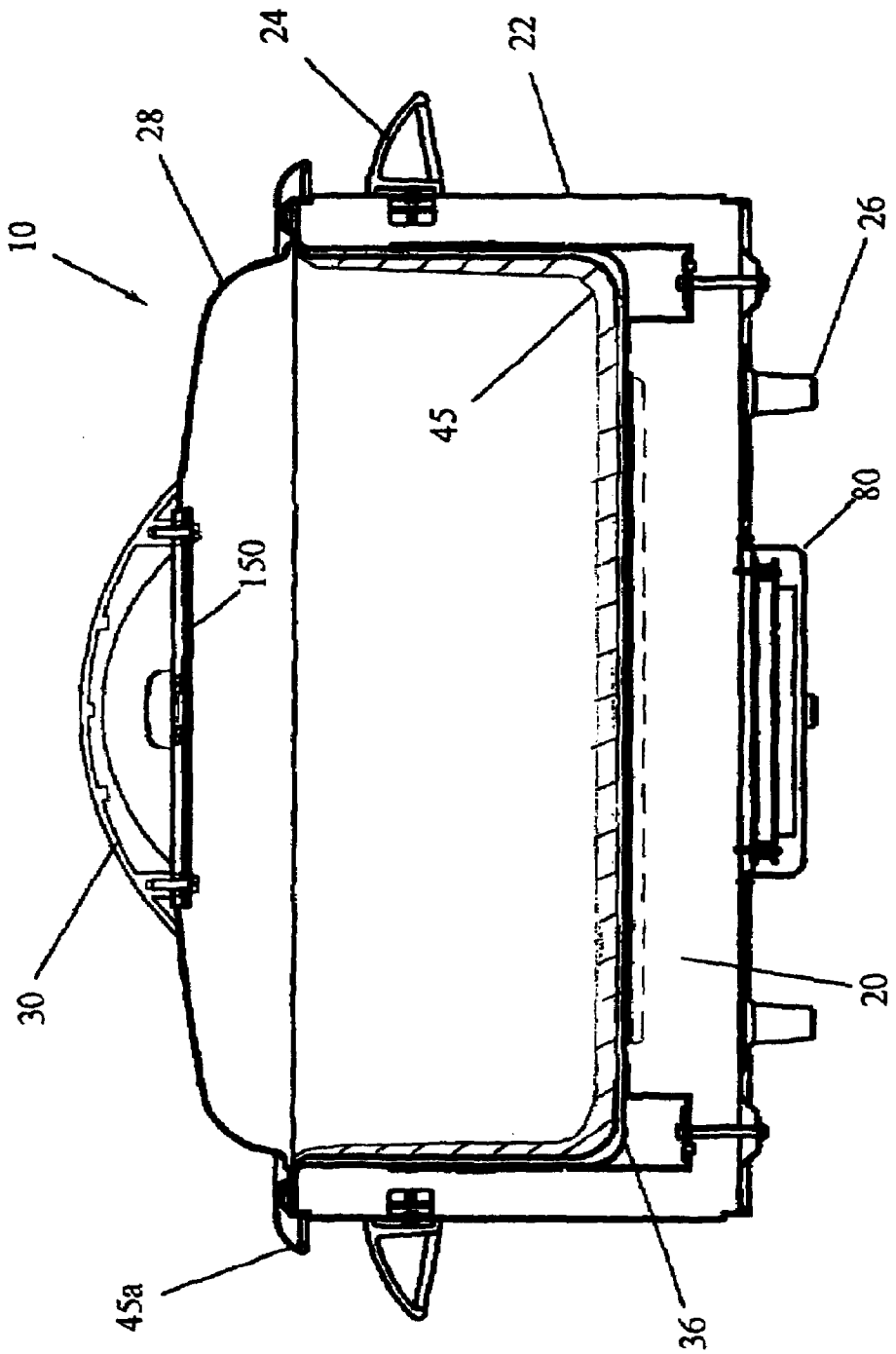


FIG. 2A

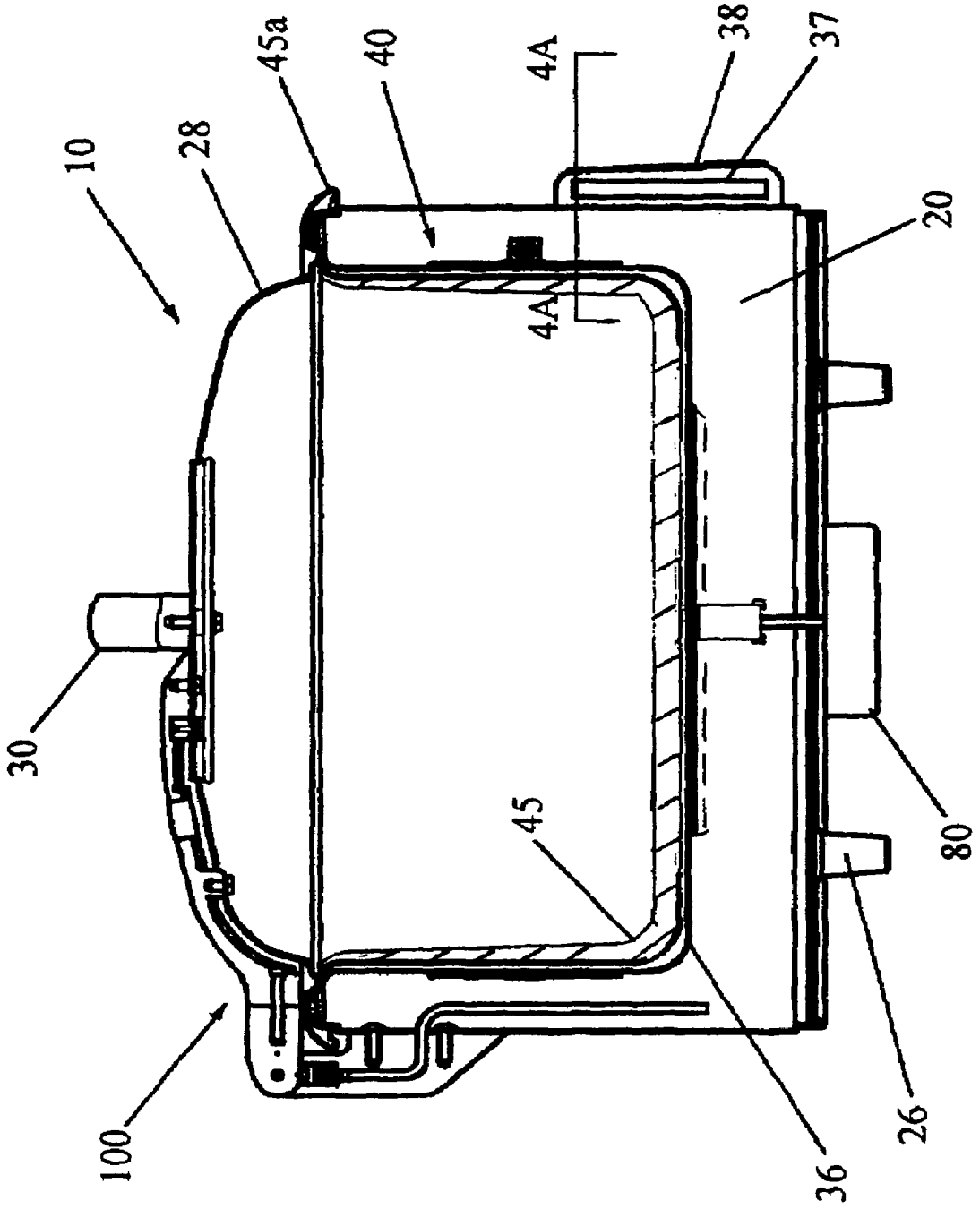


FIG. 2B

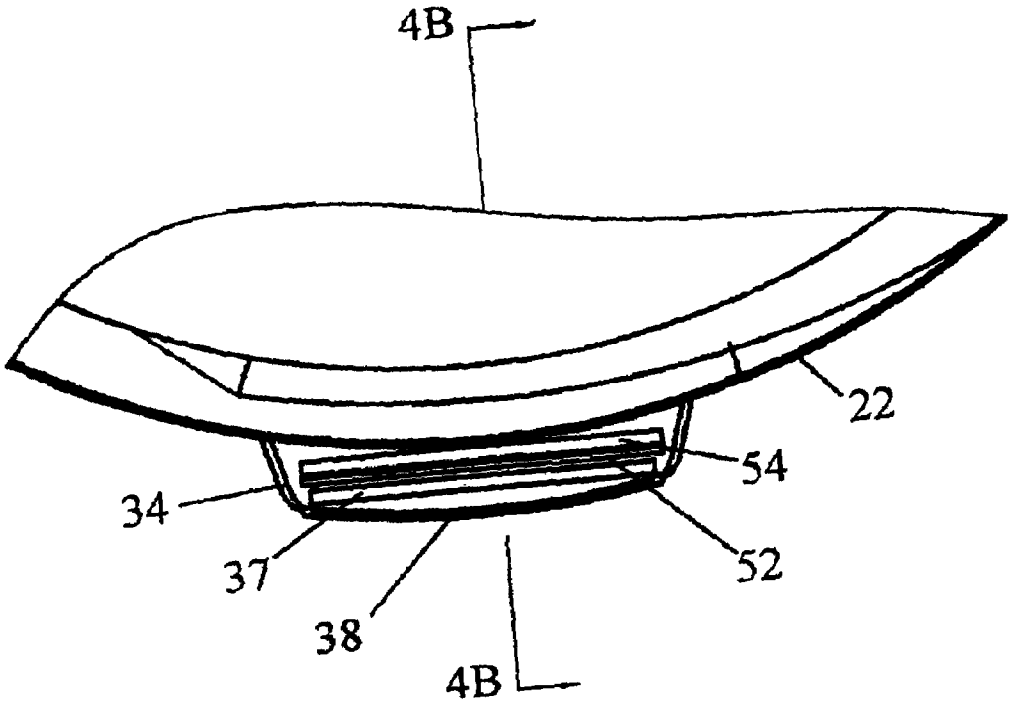


FIG. 4A

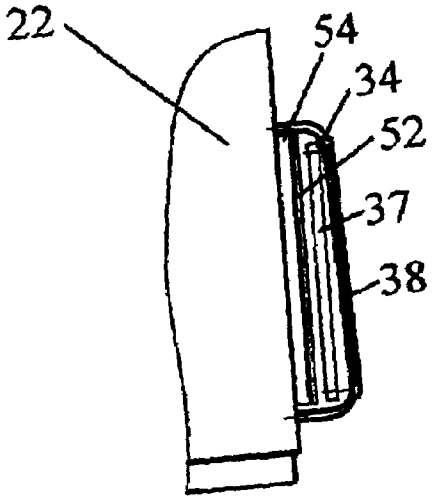


FIG. 4B

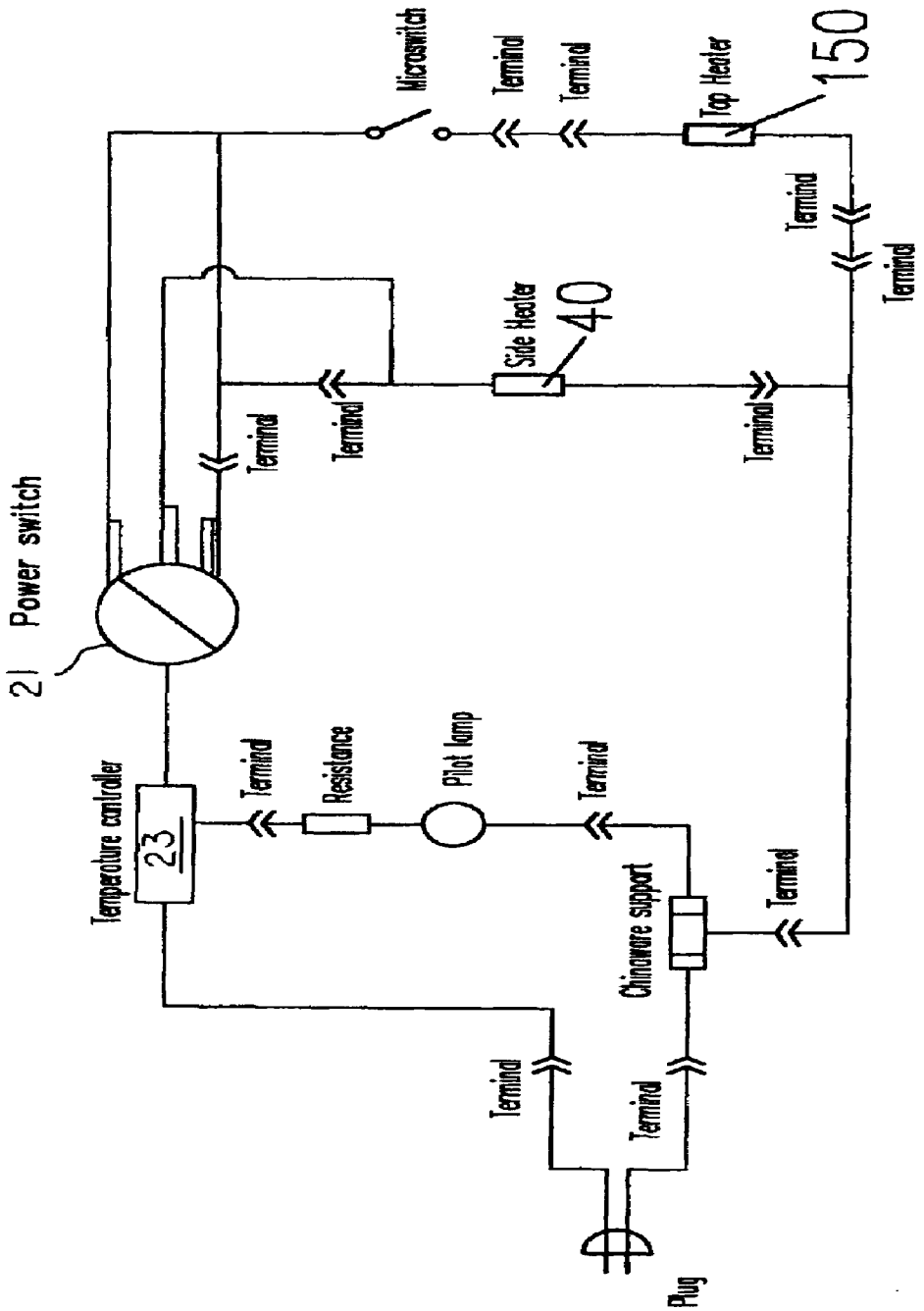
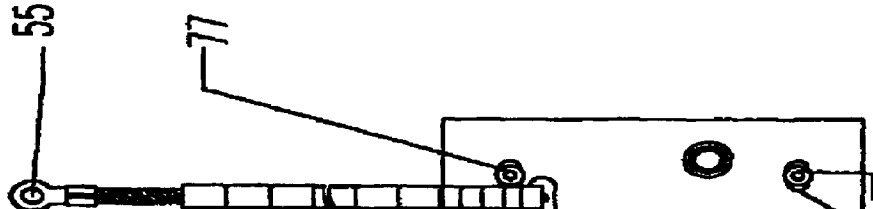

Microswitch
Terminal
Terminal
Top Heater
150
Terminal
Terminal
Side Heater
40
Terminal
Terminal
Terminal
Power switch
21
Temperature controller
23
Terminal
Resistance
Pilot lamp
Terminal
Chinaware support
Terminal
Terminal
Terminal
Plug

FIG. 5B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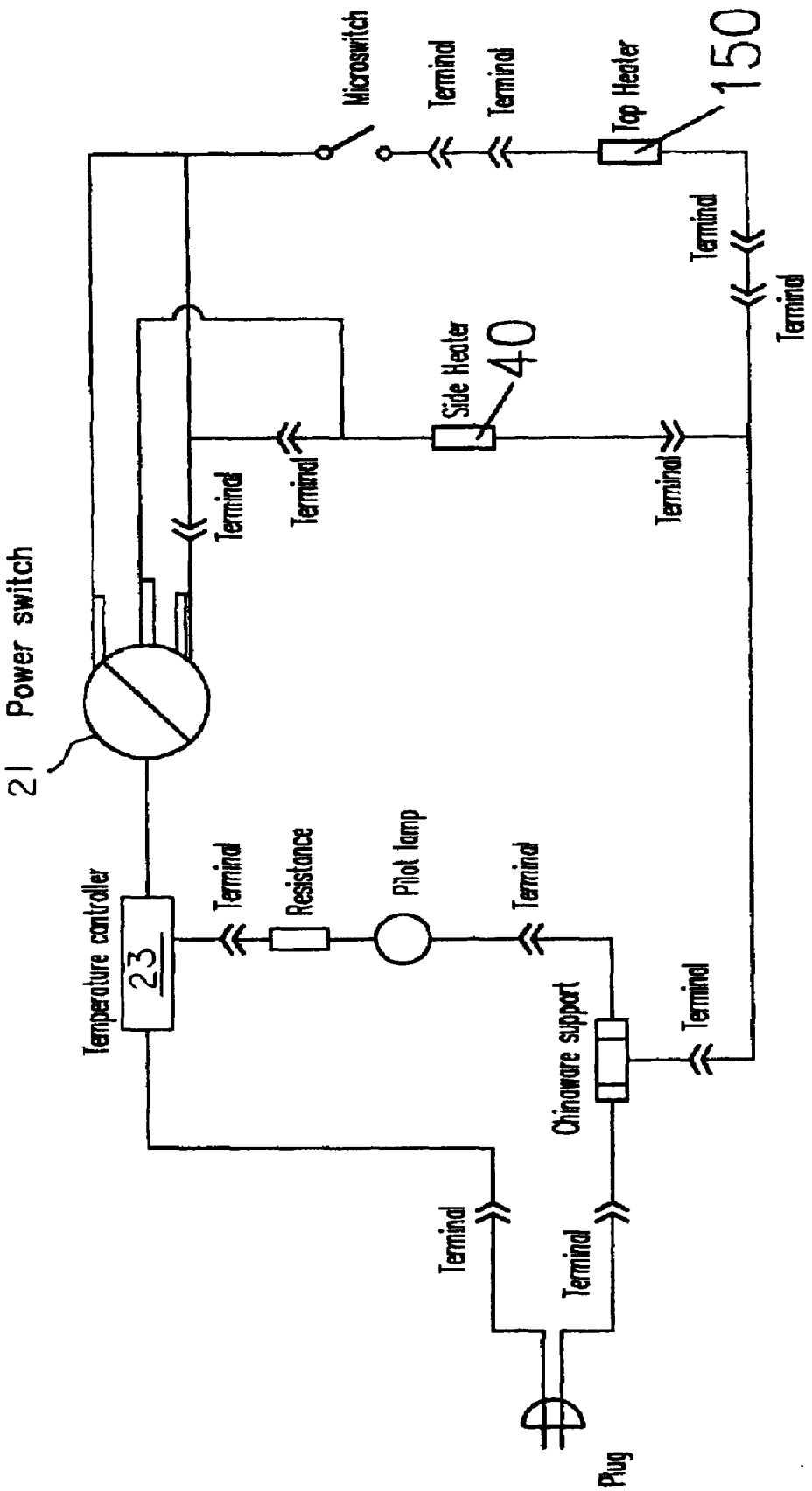
77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Terminal
Top Heater
150
Terminal
Terminal
Side Heater
40
Terminal
Terminal
Terminal
Terminal
21 Power switch
Temperature controller
23
Terminal
Resistance
Pilot lamp
Terminal
Chinaware support
Terminal
Terminal
Terminal
Plug

FIG. 5B

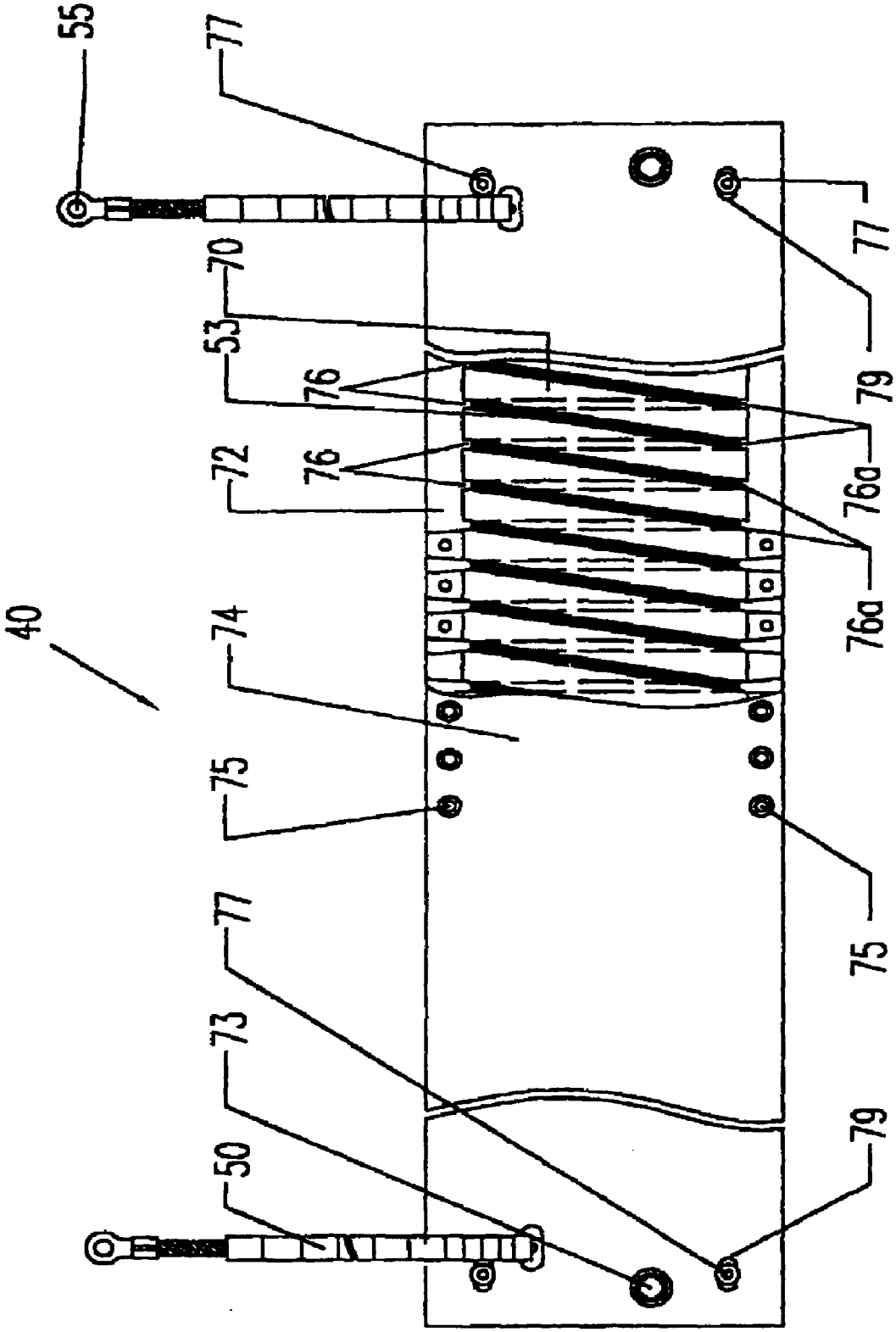


FIG.6A

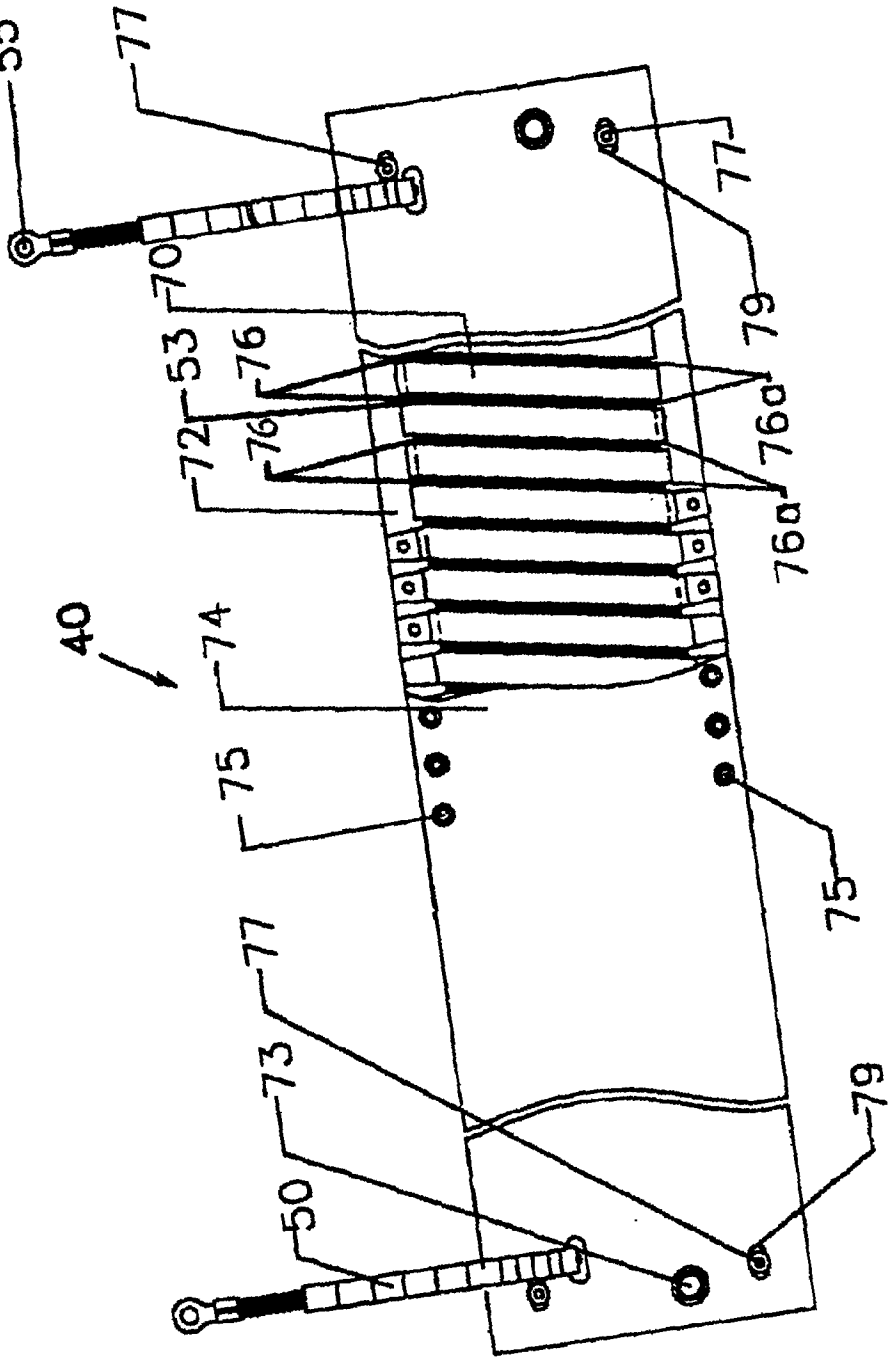


FIG.6B

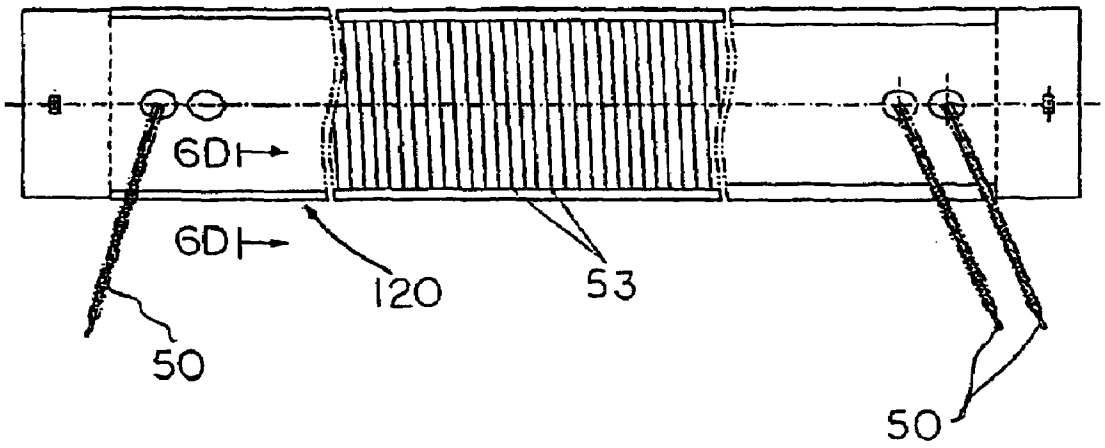


FIG. 6C

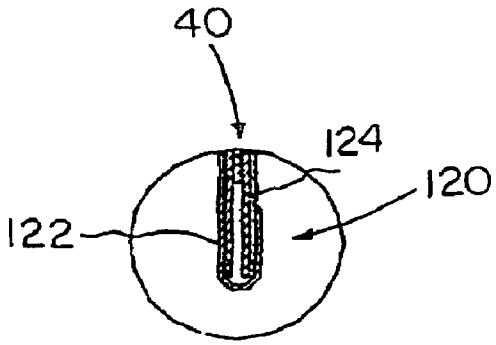
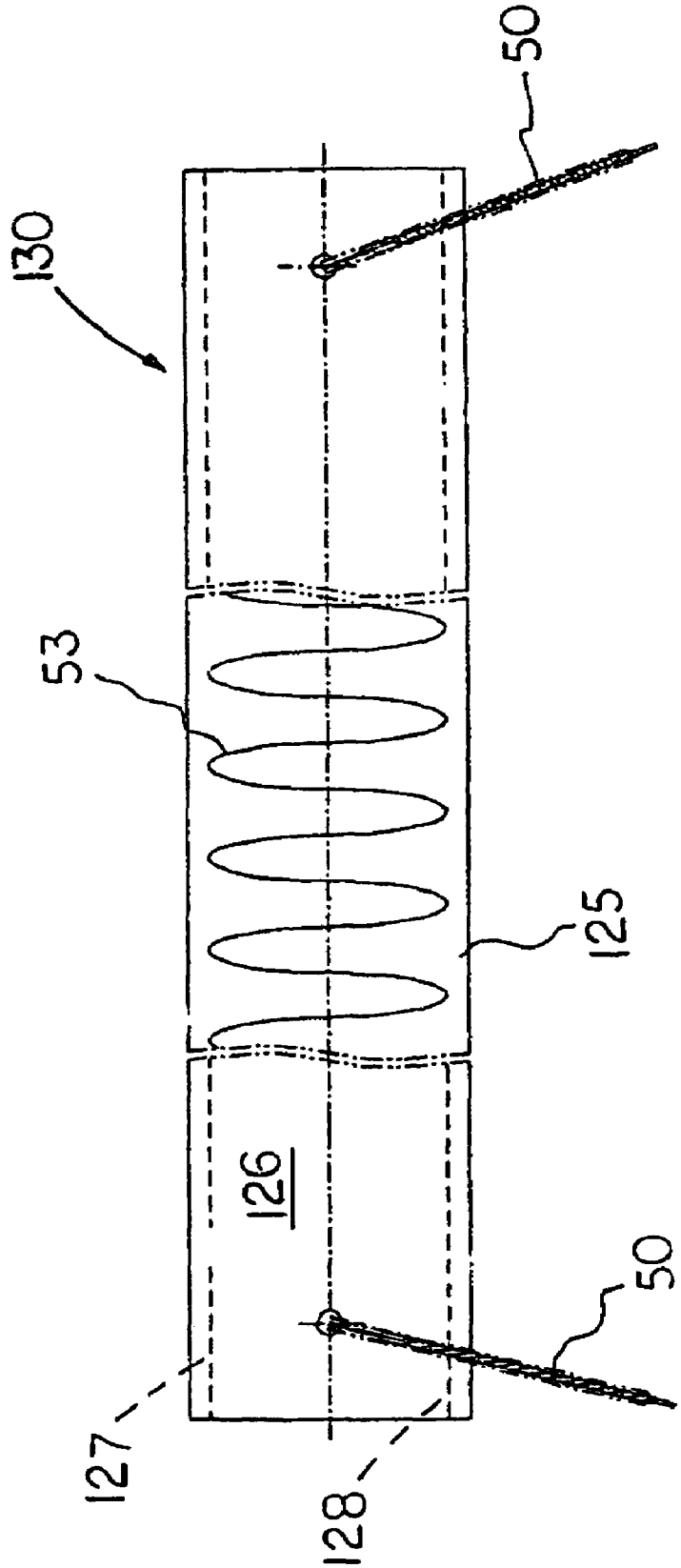


FIG. 6D


50
130
53
125
126
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127
128
REMARK: 1.Heater Wire Insuloted With Fiberglass Matted Sheath

FIG. 6E

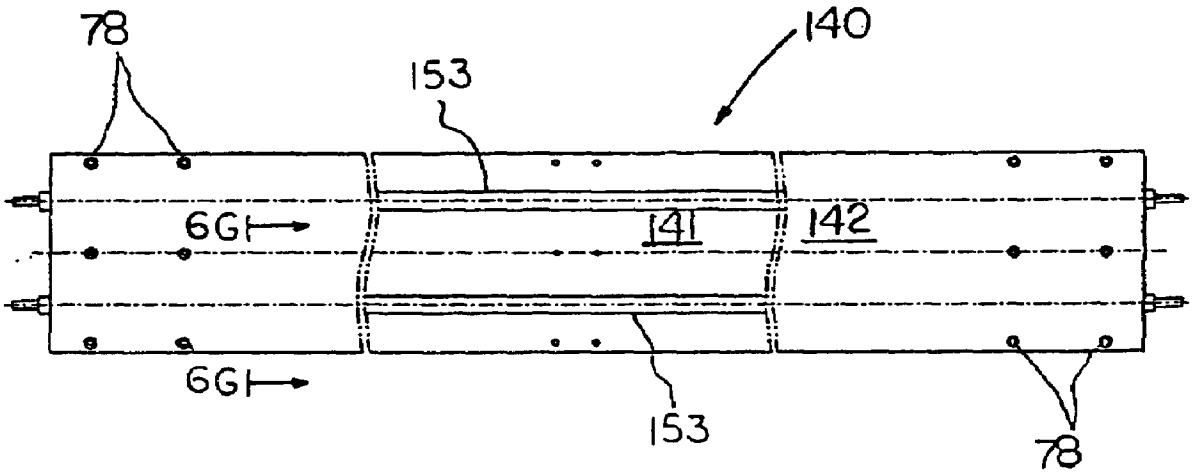

FIG. 6F

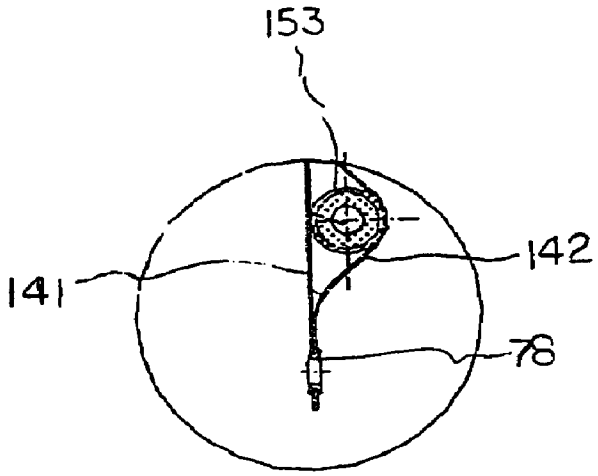

FIG. 6G

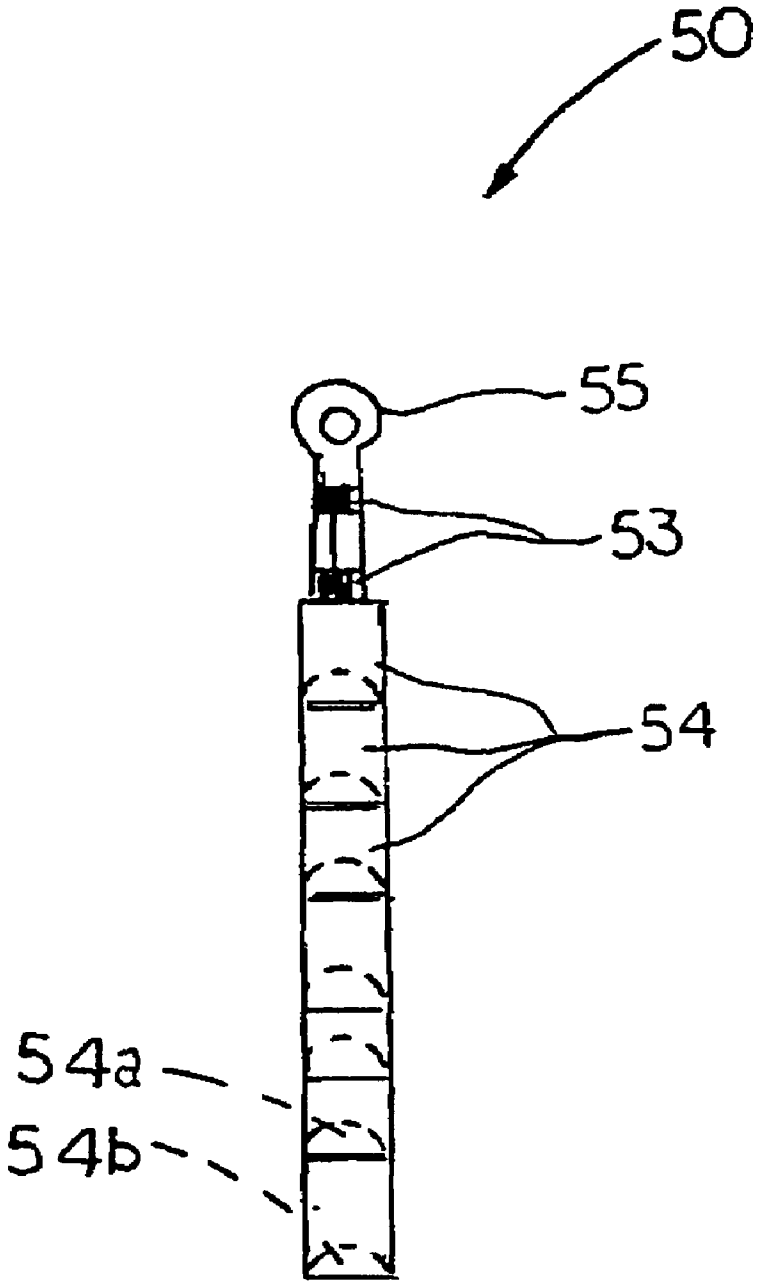

FIG. 7A

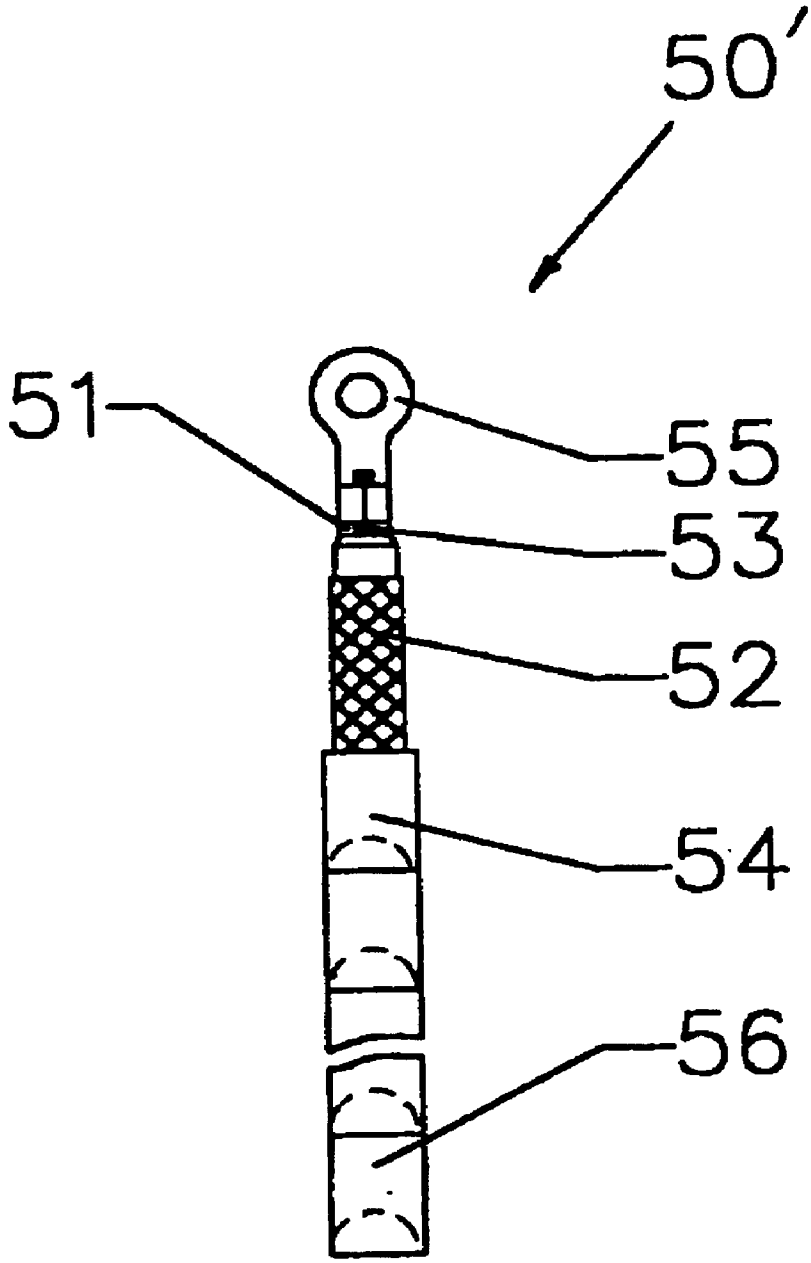

FIG. 7B

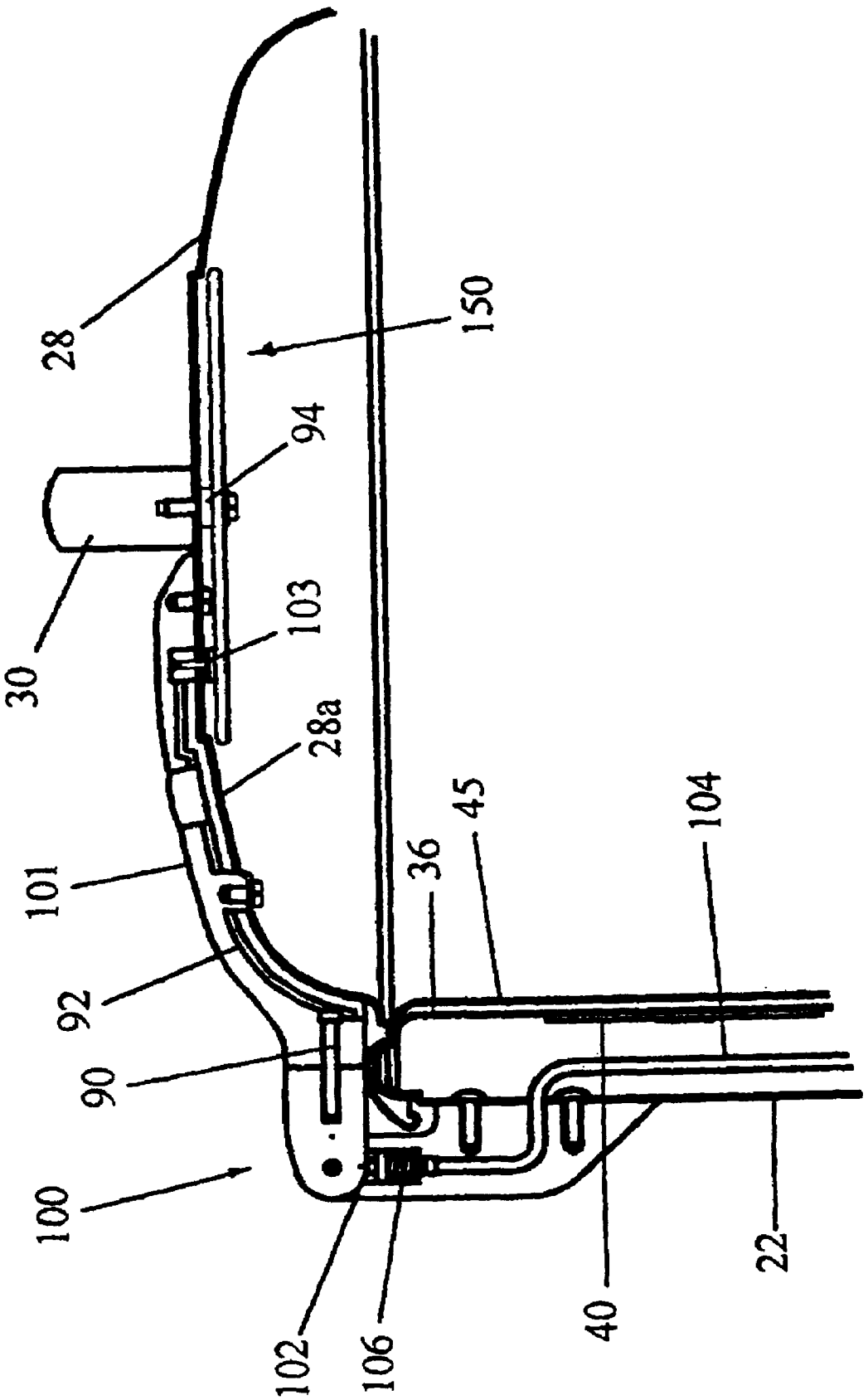

FIG. 8A

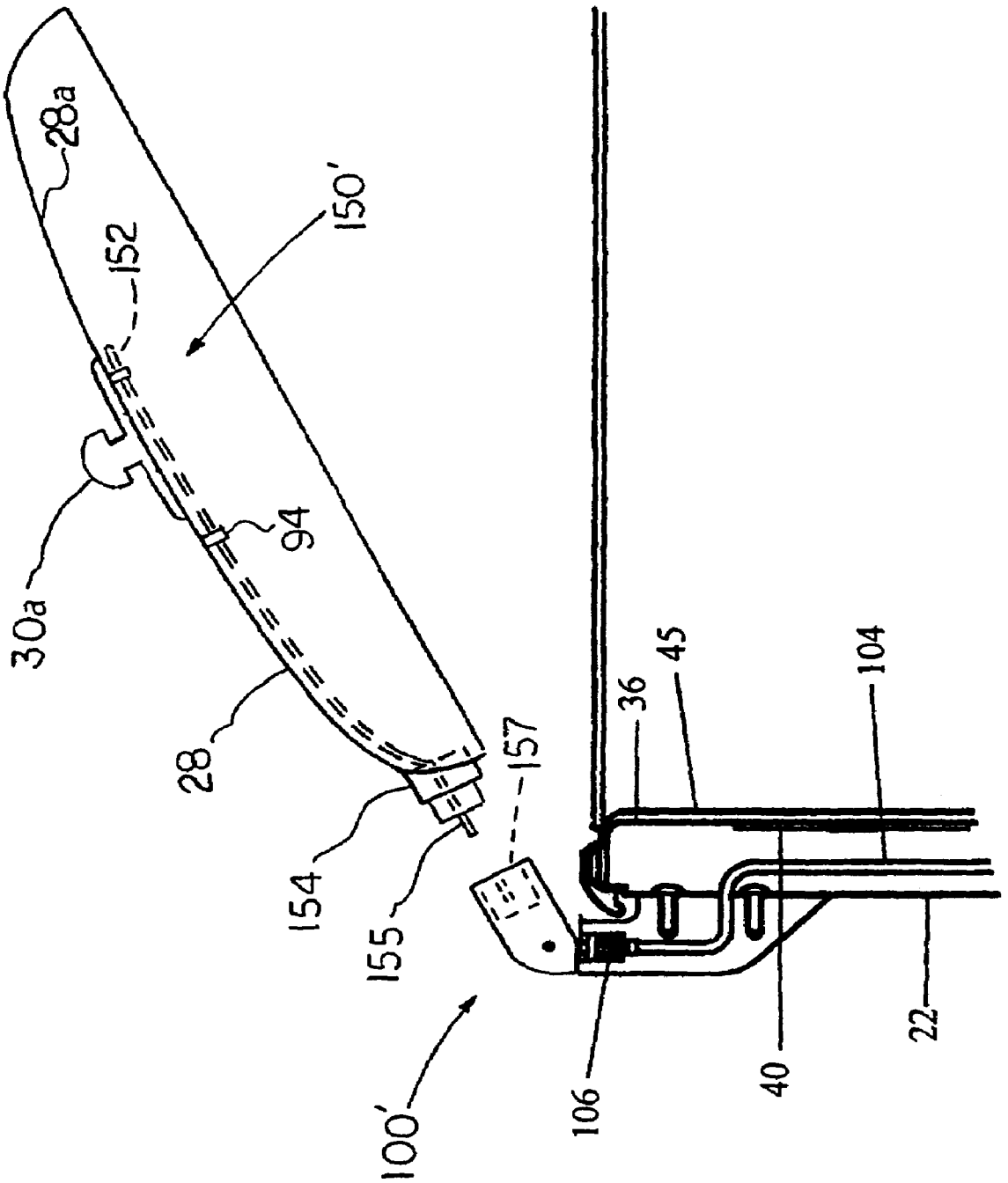

FIG. 8B

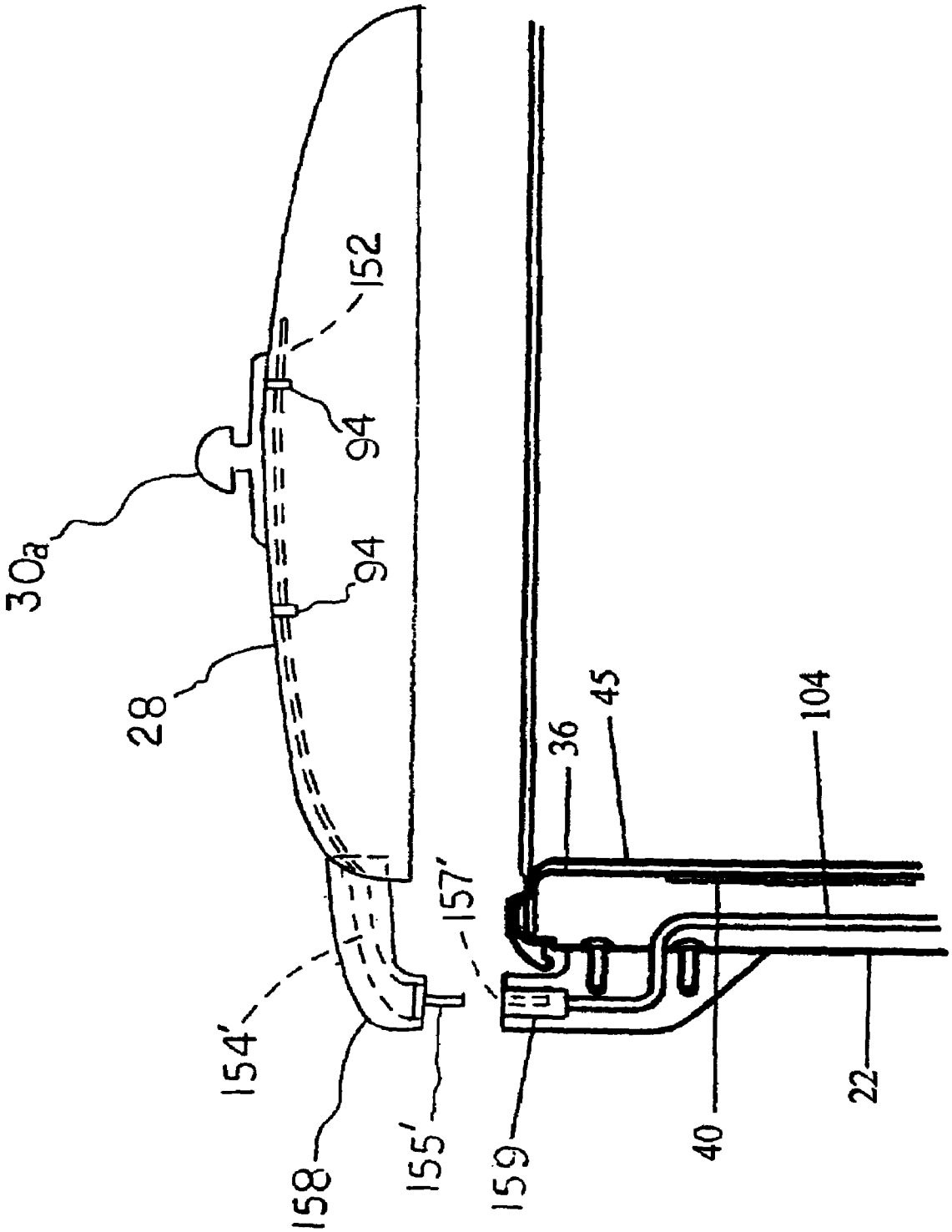

FIG. 8C

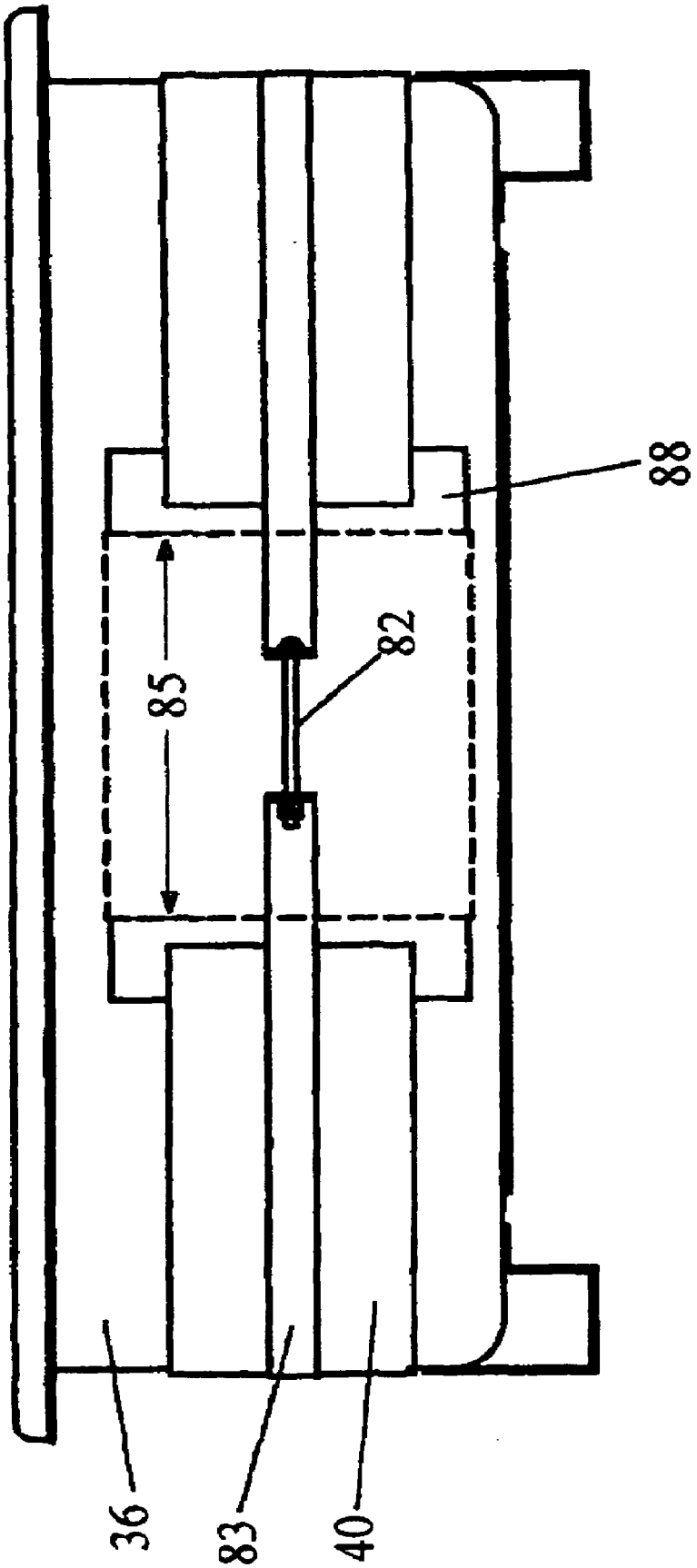

FIG. 9

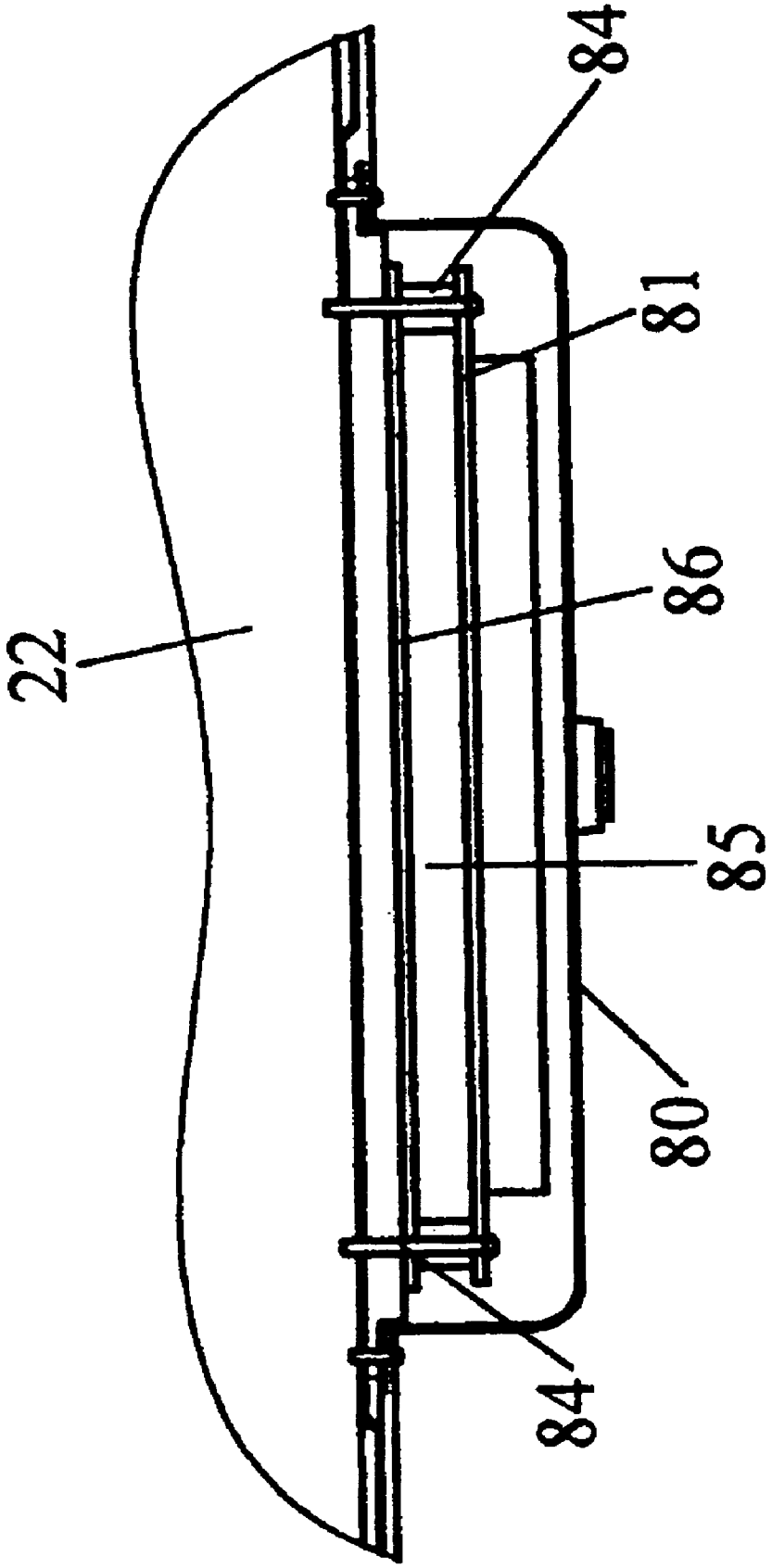

FIG. 10

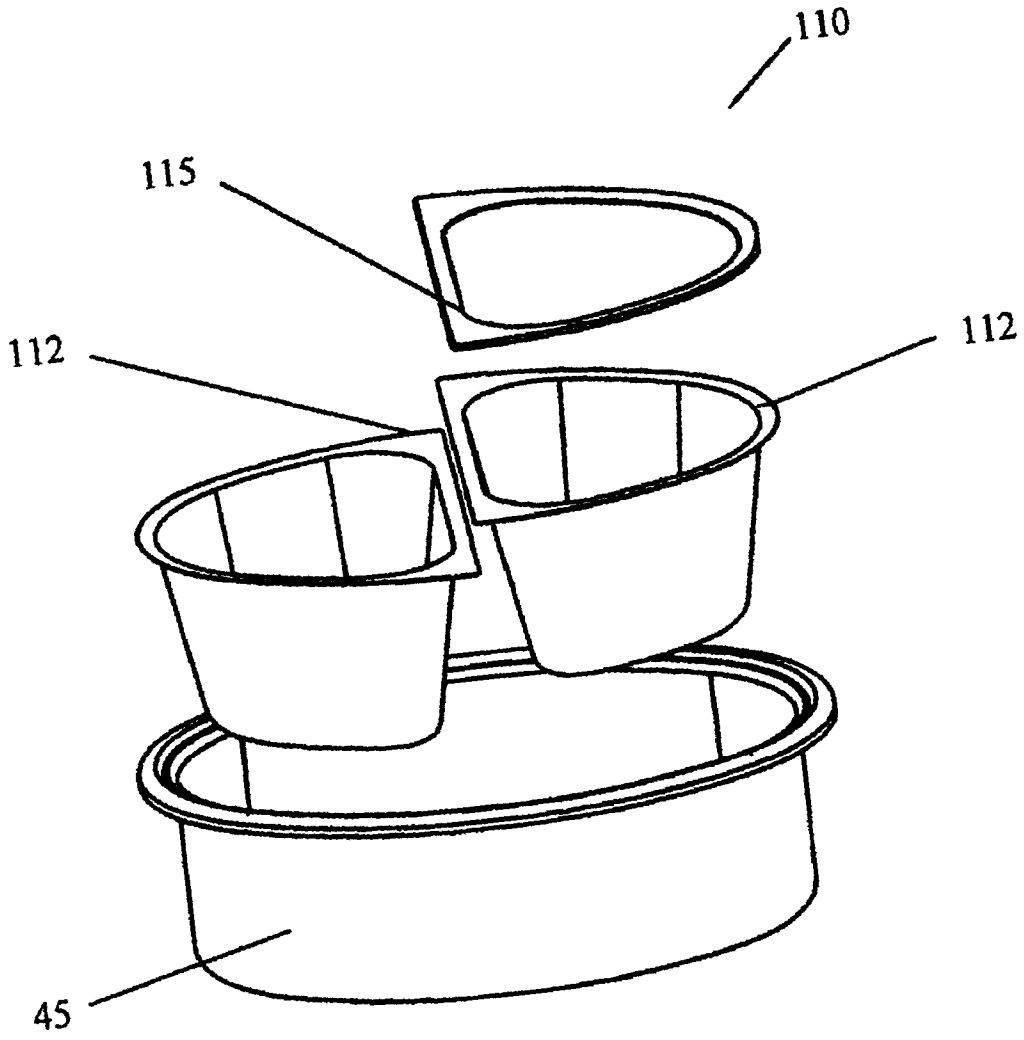

FIG. 11

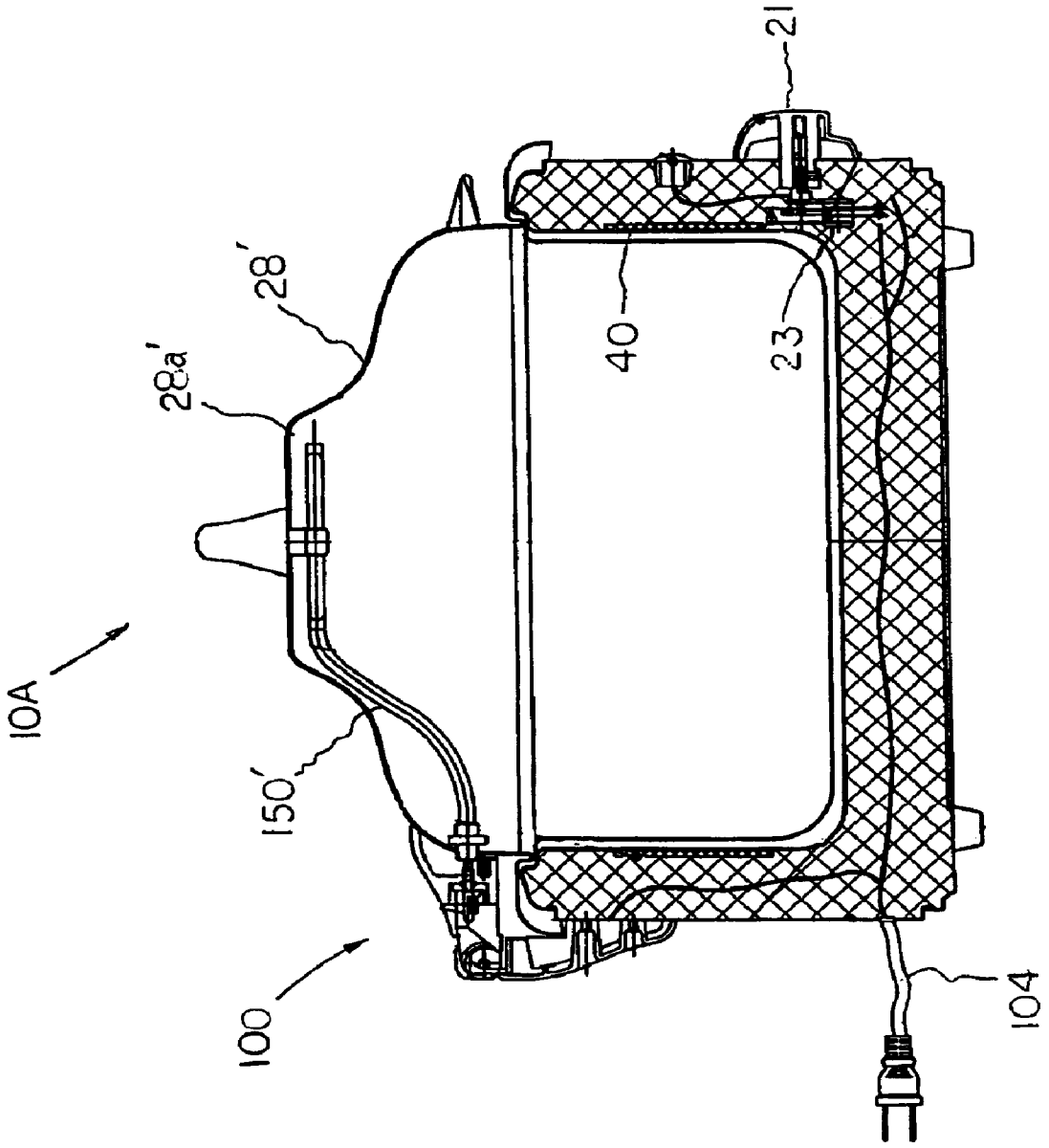

FIG. 12

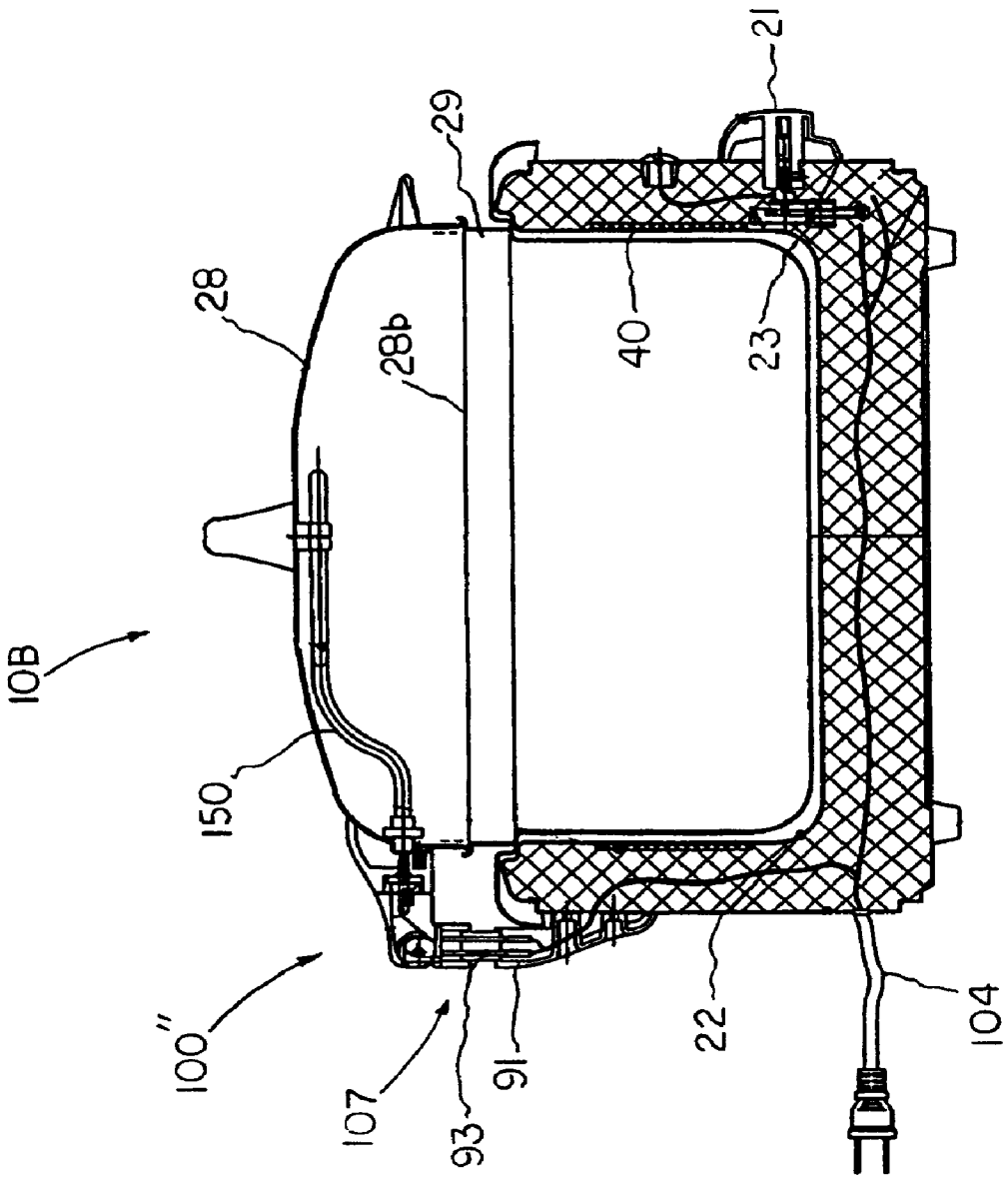

FIG. 13

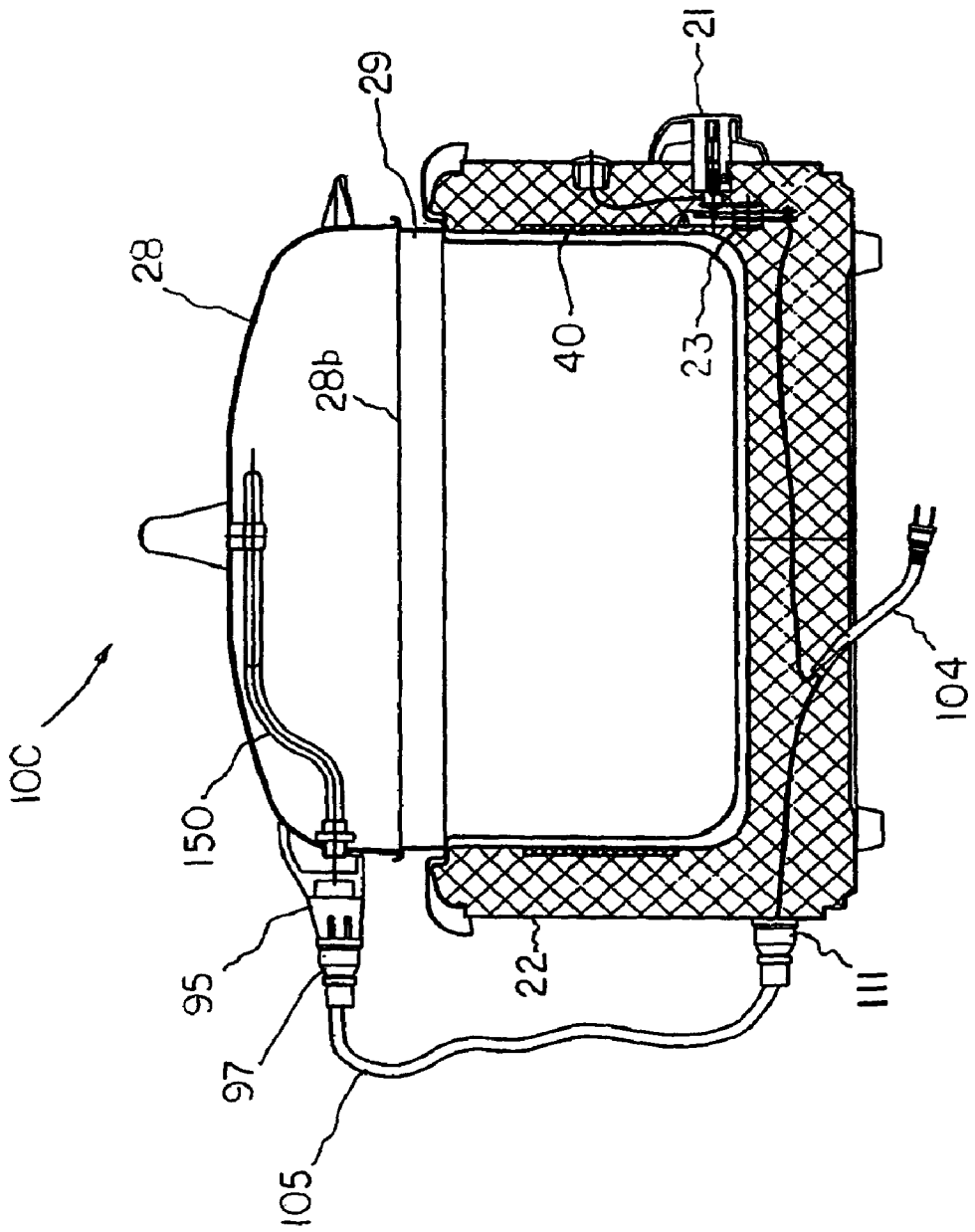

FIG. 14A

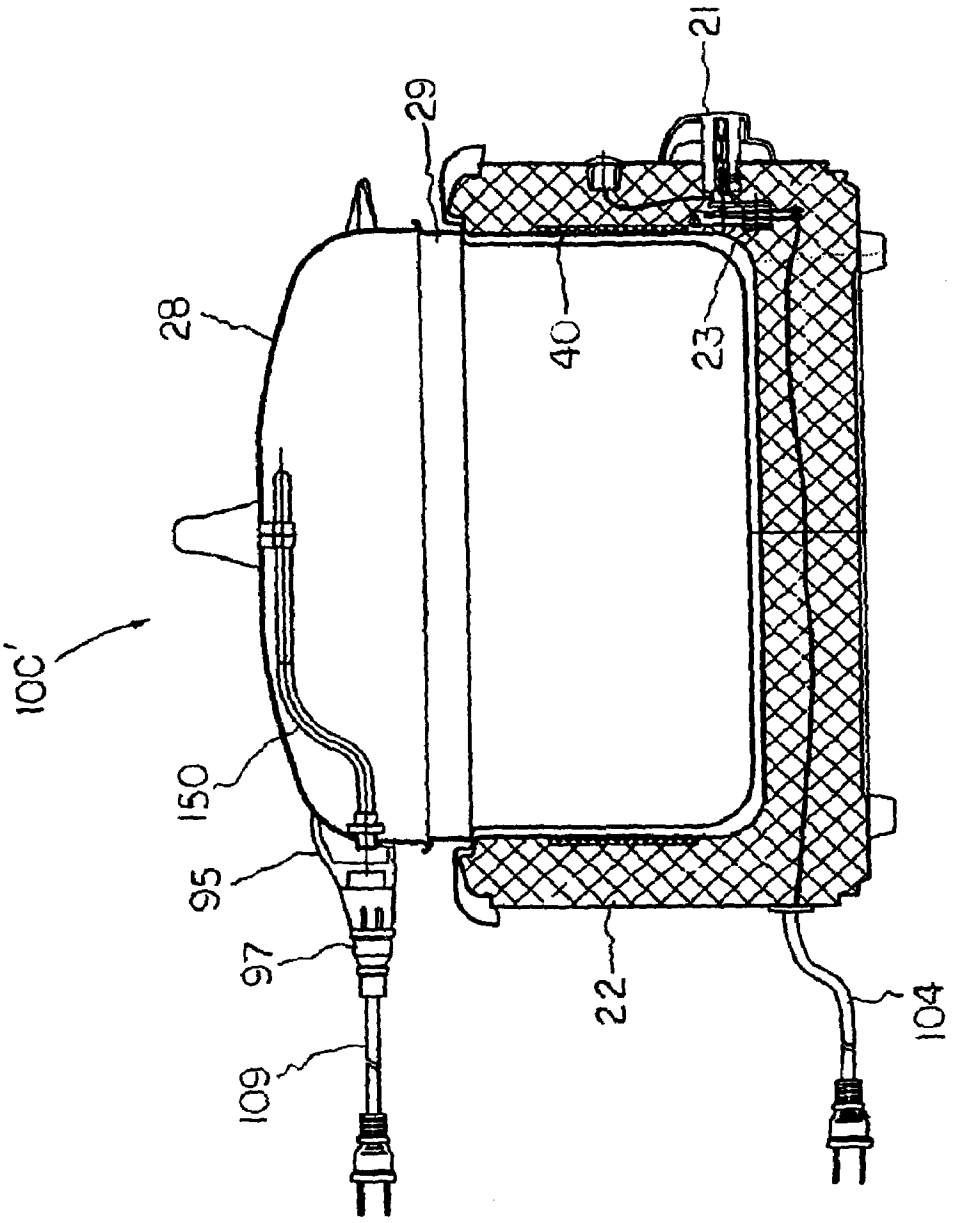

FIG. 14B

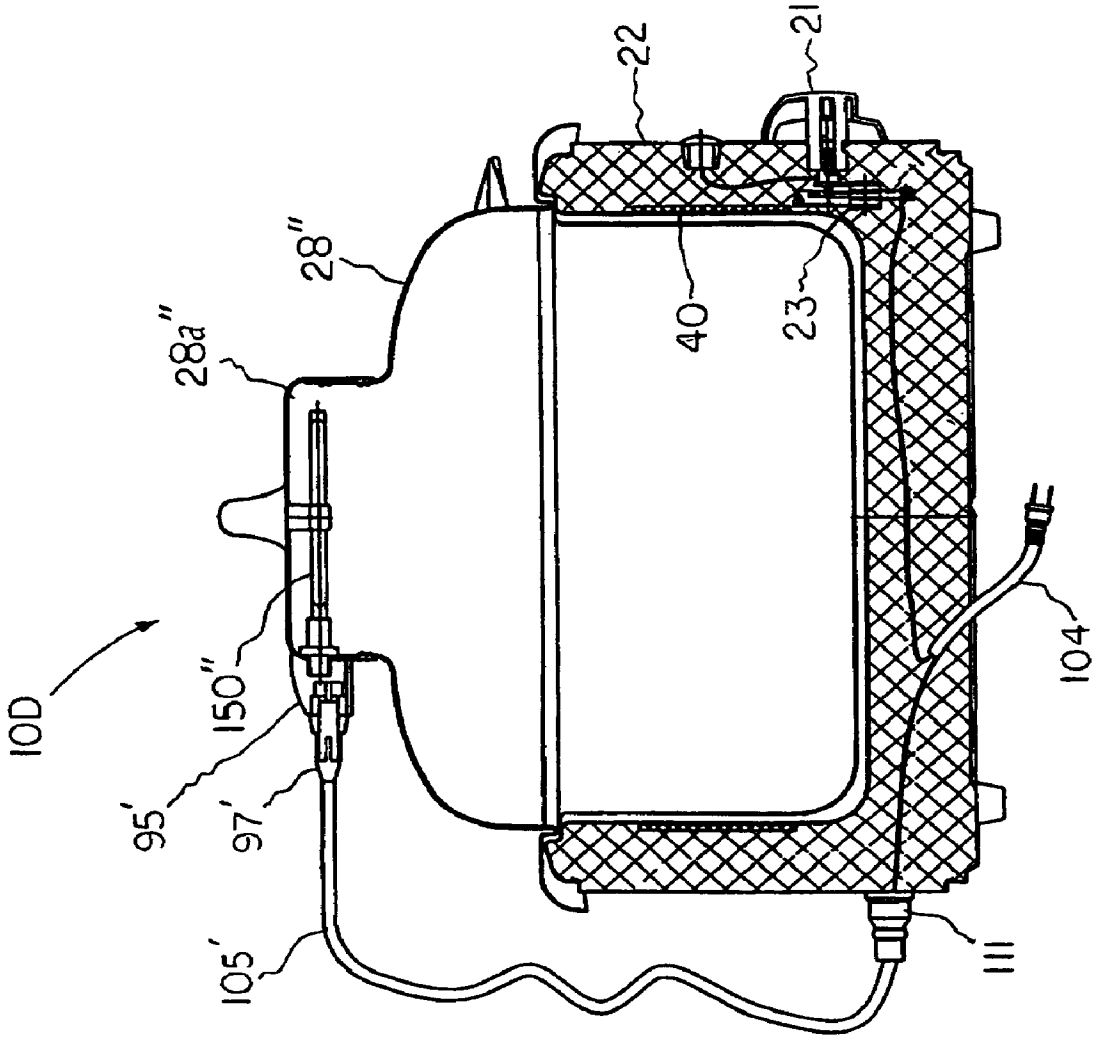

FIG. 15A

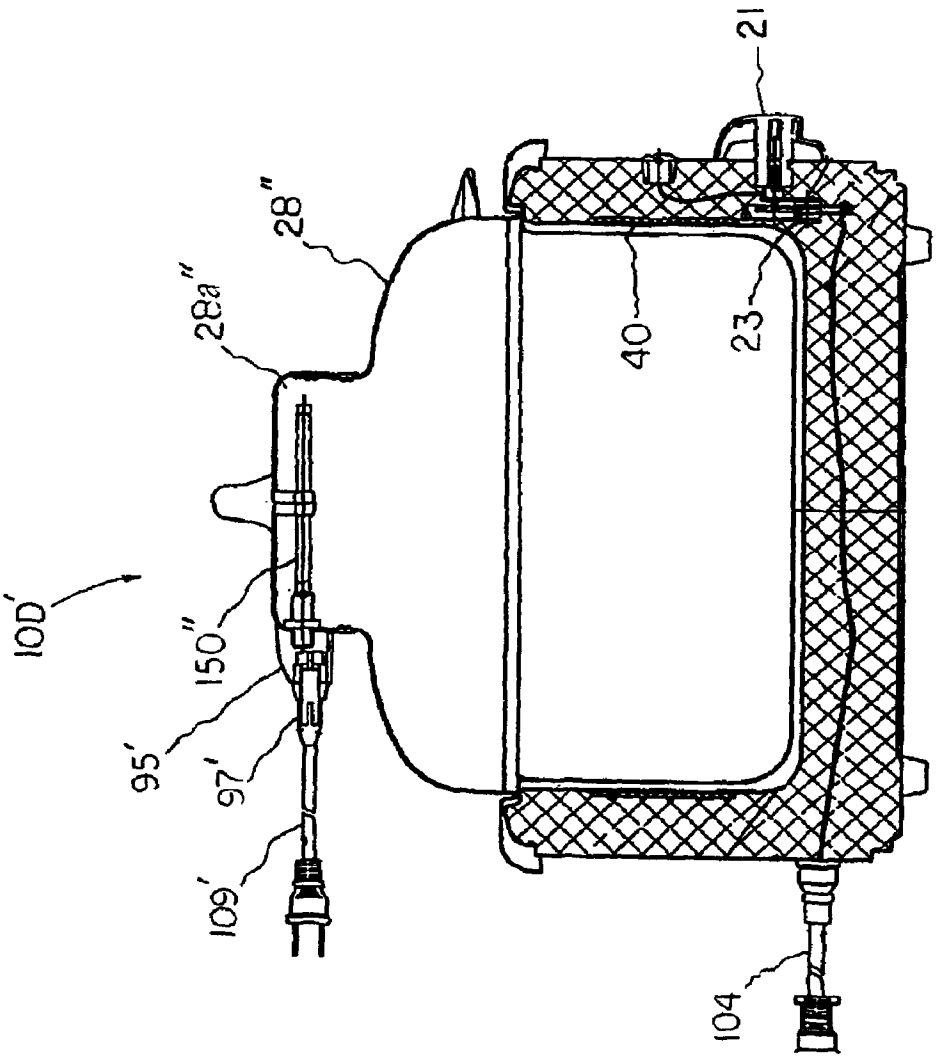

FIG. 15B

ROASTING OVEN WITH DUAL HEATING ELEMENTS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of U.S. patent application Ser. No. 10/302,202 entitled Roasting Oven with Dual Heating Elements filed Nov. 22, 2002 now U.S. Pat. No. 6,686,569, which is a continuation-in-part of U.S. patent application Ser. No. 09/971,286, now U.S. Pat. No. 6,509,550 entitled Roasting Oven with Dual Heating Elements filed Oct. 5, 2001 and claims the benefits provided under 35 USC § 120.

BACKGROUND OF INVENTION

The present invention relates to cooking appliances and, more particularly, to a large capacity, roasting oven having a wrap-around type heating element for applying heat to the cooking vessel and a top heater element for browning.

Electric cooking pots for preparing and serving hot foods are well known to those skilled in the art. Such electric cooking pots typically include a heating element arranged in functional relation underneath the bottom surface of the cooking well for supplying heat. Such cooking wells are often constructed of stainless steel or enameled steel for reasons of durability and sanitation. However, it is known that both stainless steel and enameled steel have relatively low coefficients of heat conductivity as compared with other metals.

This presents a particular problem for cooking vessels of large capacity (i.e. up to 26 quarts). Applying heat only to the bottom surface of such a large capacity cooking vessel, especially when constructed of stainless steel or enameled steel can result in the upper portion of the cooking vessel being insufficiently heated. Thus, the food in the upper portion of the cooking vessel may become too cool for serving purposes due to the loss of heat in combination with the low rate of heat conductivity and the slow rate at which heat is supplied to the upper portion of the cooking vessel.

The heat distribution problem is compounded in a roasting oven of large capacity and cannot be resolved by simply increasing the power output of the heating element. This is due to the fact that the increased heater output tends to overheat and to cause malfunction of the temperature control components and electronic circuitry, which are typically contained within the oven housing. Thus, the present roasting oven including a food serving system has been developed to solve these problems and other shortcomings of the prior art.

DESCRIPTION OF THE PRIOR ART

One example of a prior art deep well cooker is disclosed in U.S. Pat. No. 4,024,377 to Henke comprising a heat sink preferably formed of aluminum or another corrosion resistant metal having a relatively high coefficient of heat conductivity, which is positioned over the deep well member from below. The heat sink member is generally U-shaped and has a bottom part parallel to and spaced from the bottom of the well member and side parts parallel to and engaging the sides of the well member in heat exchanging relation. An electric heating element is disposed in the space between the bottom of the well member and the bottom part of the U-shaped heat sink member. When the electric heater is energized, heat is supplied to the bottom of the well member by direct radiation and by radiation from the bottom part of the U-shaped member and by convection due to the air in the space occupied by the heating element. Simultaneously, however, heat also flows from the bottom part of the U-shaped member, up side parts of the U-shaped member, and into the sides of the well member. The heat supplied by conduction to the sides of the well member provides for more uniform heating of the well member while also providing for more efficient utilization of the energy supplied to the heating element. However, this device is designed for use with a deep well cooker having a capacity of approximately 8–12 quarts based on the dimensions provided in the specifications. This device necessarily becomes less efficient when applied to a larger capacity cooker having increased side wall dimensions.

Another example of a prior art cooking device having multiple heating elements is disclosed in U.S. Pat. No. 3,393,295 to Jepson et. al. comprising a pan with a lower electric heating element supported on its underside and a deep cover with an upper heating element supported within. A thermostatic control is connected to the lower heating element for energization thereof. When the cover is closed, an electrical connection for energizing the upper heating element is completed. The control serves thermostatically to control the energization of either element in a repeating, alternating sequence and is capable of performing the functions of a frying pan, broiler, and oven. However, this invention is not directly applicable to deep well cookers nor does it disclose a wrap-around heating element for controlling heat distribution to the upper surfaces of a deep well member within such a cooker.

U.S. Pat. Nos. 2,265,295 to Layton; U.S. Pat. No. 6,170,388 to Shovick; U.S. Pat. No. 2,292,854 to Wilcox; U.S. Pat. No. 2,187,888 to Nachumsohn; and German Patent document 3606800 to Rederer disclose heating/cooking devices, which are cited in the Form PTO-892 as references in the parent case (application Ser. No. 09/971,286) and are pertinent to applicant's disclosure in the present application.

Thus, the present invention has been developed to provide various solutions to the problem of regulating the distribution of heat to all surfaces within a deep well cooker having a large capacity up to 26 quarts.

SUMMARY OF THE INVENTION

Accordingly, the present invention provides an roasting oven having a large capacity (i.e. up to 26 quarts) that includes a wrap-around heating element, which is disposed about the heating well for heating the sides thereof and a top heating element for browning (i.e. to scorch slightly in cooking) mounted within the oven lid.

Both the wrap-around heating element and the top heating element are provided in alternative embodiments utilizing different types of heating elements and power sources for versatility in manufacturing and heating. The wrap-around heating element and the top heating element are interconnected by temperature controls for heat regulation and a function control switch for selectively energizing the desired heating elements individually or in combination.

For convenience the roasting oven lid containing the top heating element is removable being provided with detachable electrical connectors, which form a portion of the electrical circuit for the top heating element. The present roasting oven also includes serving containers for maintaining the cooked food in ready-to-eat condition and for reheating leftover food items.

In various alternative embodiments of the roasting oven, the top heating element and the wrap-around heating element are provided with separate power supply circuits for independent operation.

Other features and technical advantages of the present invention will become apparent from a study of the following description and the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features of the present invention are set forth in the appended claims. The invention itself, however, as well as other features and advantages thereof will be best understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying figures wherein:

FIG. **1A** is a front elevational view of the roasting oven of the present invention;

FIG. **1B** is an elevational view of the folding handle assembly of an alternative embodiment the present invention;

FIG. **1C** is a side view of the handle assembly of FIG. **1B** showing the handle member in a raised position;

FIG. **2A** is a longitudinal cross-section of the roasting oven showing details of the construction thereof;

FIG. **2B** is a transverse cross-section of the roasting oven showing further details thereof including the hinge mechanism;

FIG. **3** is a top plan view of the roasting oven of the present invention;

FIG. **4A** is a partial horizontal section view taken along the section line **4A**—**4A** of FIG. **2B** showing the construction of the temperature control panel;

FIG. **4B** is a partial vertical section view taken along the section line **4B**—**4B** of FIG. **4A** showing the construction of the temperature control panel;

FIG. **5A** is a schematic diagram representing the circuitry of the present roasting oven wherein an electronic control panel is utilized;

FIG. **5B** is a schematic diagram representing an alternative embodiment of the circuitry wherein electromechanical switches and rheostatic temperature controls are utilized;

FIG. **6A** is a partially cutaway elevational view showing the details of the construction of the heating elements in a double-sided configuration;

FIG. **6B** is a partially cutaway elevational view showing the details of the construction of the heating elements in a single-sided configuration;

FIG. **6C** is a partially cutaway elevational view of an alternative embodiment of the wrap-around heating element;

FIG. **6D** is a sectional view taken along line **6D**—**6D** of FIG. **6C** showing details thereof,

FIG. **6E** is a partially cutaway elevational view of another embodiment of the wrap-around heating element;

FIG. **6F** is a partially cutaway elevational view of another embodiment of the wrap-around heating element;

FIG. **6G** is a sectional view taken along line **6G**—**6G** of FIG. **6F** showing details thereof;

FIG. **7** is a plan view of the wire lead assembly of the heating element of the present invention;

FIG. **8A** is a partial cross-section view showing the top heating element within the lid;

FIG. **8B** is an exploded, cross-section view showing an alternative embodiment of the lid including a tubular heating element and detachable plug connectors;

FIG. **8C** is a partial cross-section view showing an alternative embodiment of the lid including detachable magnetic connectors;

FIG. **9** is an enlarged front elevational view showing the wrap-around heating element installed about the deep well member of the present roasting oven;

FIG. **10** is a cross-sectional view taken along section line **10**—**10** of FIG. **2A** showing the power supply circuit board within the ventilated compartment; and

FIG. **11** is an exploded perspective view showing the optional serving set of the present invention

FIG. **12** is a transverse cross-section of another embodiment of the roasting oven showing a modified lid structure;

FIG. **13** is a transverse cross-section of another embodiment of the roasting oven featuring an extendable hinge mechanism and a lid spacer;

FIG. **14A** is a transverse cross-section of another embodiment of the roasting oven without a hinge mechanism and having a single power supply;

FIG. **14B** is a transverse cross-section of another embodiment of the roasting oven without a hinge mechanism and having dual power supplies;

FIG. **15A** is a transverse cross-section of another embodiment of the roasting oven without a hinge mechanism having a single power supply; and

FIG. **15B** is a transverse cross-section of another embodiment of the roasting oven without a hinge mechanism having dual power supplies.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

With further reference to the drawings, there is shown therein an embodiment of a roasting oven in accordance with the present invention, indicated generally at **10**, and illustrated in FIG. **1A**. The present roasting oven **10** is comprised of an outer housing **22** equipped with fixed external handles **24** and feet **26**. The roasting oven **10** is also provided with a lid **28** equipped with a handle **30**.

In an alternative embodiment the roasting oven **10** is provided with folding handle assemblies, indicated generally at **24'**, as shown in FIGS. **1B** and **1C**. Each handle assembly **24'** includes a mounting plate **25** conforming to the exterior contour of the housing **22**. Mounting plates **25** include a horizontally disposed groove **25***a* formed along the breadth thereof, which is configured to receive a generally D-shaped handle member **27**. The handle member **27** includes shank portions **27***a* (shown in broken outline) which engage the groove **25***a* to impart pivoting movement to the handle member **27** as shown in FIG. **1C**. Handle members **27** are designed to temporarily lock in the extended position shown in FIG. **1C**. Thereafter, handle members **27** pivot downwardly to the position shown in FIG. **1A** for convenient storage. This provides space savings for display on store shelves and cost savings on shipping carton size.

In the preferred embodiment the housing **22** is constructed of sheet steel, heat resistant plastic, or other suitable material and is provided in different exterior finishes such as powder coating, stainless steel, or plated steel.

The present roasting oven **10** also includes an internal heating well **36** disposed within the housing **22** as more clearly shown in FIGS. **2A** and **2B**. The heating well **36** is constructed of enamel-coated steel cast aluminum, cast iron or other suitable material. The present oven **10** features a wrap-around heating element, indicated generally at **40**, and

a top heating element, indicated generally at **150**, as described hereinafter in further detail.

The present roasting oven **10** also includes a removable cooking liner **45** including a peripheral flange member **45***a* which is seated on the upper edge of the housing **22** as shown. The liner **45** is also constructed of stainless steel, enamel-coated steel, cast aluminum or other suitable material. The cooking liner **45** is easily removed from the heating well **36** for cleaning for the convenience of the user.

A layer of heat-resistant insulating material (not shown) is disposed in the air space as at **20** between the housing **22** and the cooking well **36** as shown in FIGS. **2**A and **2**B. Numerous types of heat insulating materials having physical and chemical properties suitable for this application are commercially available. Since such heat insulating materials are well known to those skilled in the art, further detailed discussion of the same is not deemed necessary.

Referring to an embodiment illustrated in FIG. **3**, the present roasting oven **10** is oval-shaped in configuration. It has been determined that optimal heating of the side wall surfaces of the large capacity (i.e. up to 26 quarts) heating well **36** can be achieved at all times in the oval configuration. However, it will be appreciated that the roasting oven **10** may be constructed in a circular, square, or rectangular configurations with minor modifications to the heating elements.

Referring again to FIG. **1**, a control panel, indicated generally at **32**, is provided on the lower front surface of the housing **22** to carry out the functions of the present roasting oven **10**. The control panel **32** includes a plurality of temperature control switches **33** which are electrically interconnected with both the wrap-around and top heating elements **40**, **150** and serve to regulate the operation thereof. The control panel **32** also includes a digital display **35**, cooking mode switches **31**, and a power switch **39**.

In the embodiment shown the control panel **32** is comprised of a heat-resistant housing **34** including a flexible, push button film **38** which overlays an electronic control circuit board **37** (FIG. **2**B) that provides the user with fingertip control of the cooking functions. A key innovation of the present oven **10** is a ventilated compartment **80** wherein the power supply circuit board **81** (FIG. **10**) is protected from the heat source as explained hereinafter in further detail.

As more clearly shown in FIGS. **4**A and **4**B the electronic control circuit board **37** is insulated from the wrap-around heating element **40**, which is disposed around the outer circumference of the heating well **36**, by layers of mica sheet insulation board installed as at **52** and/or other suitable heat insulating material installed as at **54** adjacent the exterior of the housing **22**.

Referring now to FIGS. **5**A and **5**B, there are shown schematic representations of alternative embodiments of the present roasting oven **10**. It will be appreciated by those skilled in the art that the electrical functions may be carried out by the electronic control panel **32** as shown in FIG. **5**A or, in the alternative, by the use of standard electromechanical switches and rheostatic temperature control devices shown in FIG. **5**B.

The present roasting oven **10** is designed for use with standard household electrical systems. In the preferred embodiment the wrap-around heating element **40** is designed to operate in the range of 1000–1500 watts and the top heating element **150** to operate in the range of 25 to 150 watts. This wattage rating varies for a given application and capacity of the oven.

With reference to FIGS. **6**A and **6**B, the present invention provides structures which comprise heating means including, but not limited to, the following structures. In one embodiment both the wrap-around heating element **40** and the top heating element **150** are constructed as layered assemblies wherein a sheet of heat insulating material, indicated generally at **70**, such as mica insulation board is interposed between interior and exterior sheets **72**, **74** of similar heat insulating material. Since the physical and chemical properties of mica insulation board and other similar heat insulating materials are well known to those skilled in the art, further detailed discussion of this material is not deemed necessary.

Still referring to FIGS. **6**A and **6**B, it will be noted that the sheet of heat insulating material **70** is fabricated with a plurality of die-cut notches **76** and **76***a*, which are formed at predetermined intervals along the opposite lateral edges thereof Using a construction method of the present invention, the heater wire **53** is drawn across a pair of diagonally opposed notches as at **76** and **76***a*, wrapped in continuous revolutions around the heat insulating sheet **70**, and advanced in this manner along the entire length thereof as shown by directional arrows. It will be appreciated that using the aforementioned technique produces a so-called double-sided heating element (FIG. **6**A) having heating wire **53** disposed on both sides thereof.

Using an alternative construction technique shown in FIG. **6**B, a single-sided heating element can be produced by initially drawing the heater wire **53** across the heat insulating sheet **70** as described in the first step hereinabove. Next, the wire **53** is interlaced between adjacent notches **76** on the same lateral edge of the heat insulating sheet **70** as shown by directional arrows. Thereafter, the wire **53** is again drawn across the sheet **70** to the next diagonally opposed notch **76***a* on the opposite lateral edge thereof Next, the wire **53** is interlaced between adjacent notches **76***a* on the opposite lateral edge of the heat insulating sheet **70**.

In this manner, it will be understood that a single-sided heater element having at least 75% of the total amount of heater wire **53** used in its construction disposed on one surface of the sheet **70** may be produced. Such a single-sided heating element (FIG. **6**B) is advantageous in reducing the radially outward reflection of heat generated by the heating elements thereby improving heating efficiency and providing a cooler outer surface in the event of user contact for safety purposes.

In both of the above described embodiments, the sheet **70** is permanently captured between the interior and exterior sheets **72** and **74**, and secured at periodic intervals as shown by rivets **75** or other suitable fasteners to maintain alignment of the individual layers.

Various alternative materials and techniques may be employed in the fabrication of the heating elements as shown in FIGS. **6**C to **6**G. For example, in FIGS. **6**C and **6**D the wrap-around heating element **40** as described above is enclosed in a metallic sheath, indicated generally at **120**. Sheath **120** is comprised of inner and outer layers **122**, **124** respectively of light gauge sheet metal such as aluminum or galvanized steel, or a combination thereof, which is folded about the heating element **40** (FIG. **6**D) to form a protective enclosure.

In another embodiment shown in FIG. **6**E the heater wire **53** is provided in a serpentine pattern and permanently captured between opposed layers **125**, **126** of a matted fiberglass sheath, indicated generally at **130**, having exceptional chemical characteristics for heat resistance. Layers

125, 126 are sewn together along suture lines 127, 128 to form the protective sheath 130 about the heater wire 53.

In yet another embodiment shown in FIGS. 6F and 6G, a pair of tubular heating elements 153 are disposed between the opposed layers 141, 142 respectively of a metallic sheath, indicated generally at 140. In this embodiment the opposed layers 141, 142 are fabricated from aluminum sheet material and the tubular heater elements 153 are secured in position by installation of parallel rows of rivets 75 or grommets 78 as shown.

Referring now to FIG. 7A there is shown therein a heater lead wire assembly, indicated generally at 50, for installation on the terminal ends of the heater wire 53. In this embodiment the terminal ends of the heater wire 53 are insulated by a plurality of ceramic sleeves 54 to shield the temperature controls from exposure to heat from the wire 53. It can be seen that each ceramic sleeve 54 includes a convex tip 54*a* (shown in broken lines) which engages a concave end 54*b* on the adjacent sleeve to impart flexibility to the wire lead assembly. A terminal loop connector 55 is applied to the end of each heater lead wire assembly 50' as illustrated.

In an alternative construction of the heater lead wire assembly, indicated generally at 50', in FIG. 7B the terminal ends of the heater wire 53 are tightly twisted with a bundle of nickel conductors 51 or other suitable conductors to create a heat sink, which effectively insulates the heater wire 53 from the temperature controls. Further, the twisted bundle of nickel conductors 51 and heater wire 53 is covered with a fiberglass insulation sleeve 52 and insulated by the same ceramic sleeves 54 to insure that the temperature controls are accurate and not influenced by their proximity to the wrap-around heater element 40. A terminal loop connector 55 is applied to the terminal end of the heater lead wire assembly 50' as described hereinabove.

In the embodiment shown in FIG. 8A, the top heating element 150 conforms generally to the configuration of the lid 28 and is constructed using the single-sided wire wrapping technique described hereinabove. In the present invention the lid 28 is provided with structures, which comprise electrically conductive supporting means including, but not limited to, the following structures. As shown in FIG. 8A, the top heating element 150 is mounted on the inner surface 28*a* of the lid 28. The top heating element 150 is electrically connected to the power source by a pin connector 103 attached by electrical wiring (not shown) to an electrical plug assembly 90 within the hinge mechanism 100.

The wiring is disposed within a wire channel 92 formed in the body 101 of the hinge and extends through the hinge mechanism, indicated generally at 100, to a power cord 104, which extends from the housing 22 as shown. An electrical circuit for the top heating element 150 is completed at contact 102 when the hinge mechanism 100 is in the closed position as shown in FIG. 8A. A compression spring 106 maintains the electrical connection when the lid 28 is in the closed position.

Referring to FIG. 8B there is shown another embodiment of a top heating or browning element 150', which is generally U-shaped in configuration. In this embodiment a tubular type (e.g. Cal-rod) element 152 is mounted on the inner surface 28*a* of the lid 28 as shown. In this embodiment the lid 28 is fabricated from a heatproof glass material. The browning element 150' extends through the lid 28 within an insulating block 154 and terminates in a plug connector 155. Plug connector 155 is received in an electrical receptacle 157, which is integrated into the modified hinge mechanism 100'. Thus, the top browning element 150' is electrically connected to the power source via power cord 104 within the housing 22. Advantageously, the plug 155 and receptacle 157 may be disconnected for food service, cleaning, and storage purposes.

In another embodiment shown in FIG. 8C a tubular type browning element 150' extends through the lid 28 within a modified insulating block 154' and terminates in a right angle plug connector 155'. A cover 158 encloses the insulating block 154' and the plug connector 155'.

Plug connector 155' is received in an electrical receptacle 157', which includes a permanent magnet block 159. Magnet block 159 engages and retains plug connector 155' at the interface thereof to maintain electrical contact with the top browning element 150' and to secure the lid 28 in position on the oven. The plug connector 155' and receptacle 157' may be conveniently disconnected for food service, cleaning, and storage purposes.

In an assembly procedure of the present roasting oven 10, the wrap-around heating element 40 is secured to an outer surface of the heating well 36 by use of an adjustable band clamp, indicated generally at 83, as shown in FIG. 9. The band clamp 83 is constructed of sheet metal such as steel in the form of an elongated belt and includes a turnbuckle mechanism, indicated generally at 82, which is capable of securing the heating element 40 about the outer periphery of the heating well 36. The wrap-around heating element 40 is mounted onto studs 77 (FIGS. 6A and 6B) which are coupled to and project from the band clamp 83 in predetermined locations.

A plurality of elongated slots 79 (FIGS. 6A and 6B) are formed in the terminal ends of the wrap-around heater element 40 so as to be positioned in alignment with studs 77. Studs 77 engage the elongated slots 79 during assembly and provide for slight differences in length and movement between the interior and exterior insulation boards 72 and 74 and the sheet 70.

Referring to FIG. 9, it will be noted that the wrap-around heating element 40 is fabricated to a predetermined length. During assembly it is positioned so as to leave a gap as at 85 corresponding to the position of the temperature control panel 38 and the circuit board 37, which are subject to heat damage. In the construction process the gap 85 may be filled with fiberglass insulation material, mica insulation board, or other appropriate insulating materials to protect the temperature controls.

Referring again to FIGS. 8A–8C, the top heating elements 150, 150' are installed in spaced apart relation to the inner surface 28*a* of the lid 28 by the use of mounting brackets 94 which project downwardly from the lid 28 into the cooking vessel.

It will be appreciated that because the present invention omits the conventional bottom heating element of the prior art, the temperatures achieved on the undersurface of the heating well 36 and housing 22 in operation are relatively lower in comparison to prior art cookers. Accordingly, the roasting oven 10 includes a ventilated compartment 80 as shown in FIG. 10, which is located on the undersurface of the housing 22 and functions to protect the power supply circuit board 81 from heat damage. This design isolates the power supply circuit board 81 from the rising heat of the oven and facilitates the use of the relatively high wattage heating elements 40 and 150 required for the large capacity of the present roasting oven.

The power supply circuit board 81 is mounted in space to-part relation to the undersurface of the housing 22 by the use of spacers 84 so as to create an air gap as at 85 to further isolate the circuit board 81 from the housing 22 and the heat source. In addition, a layer of mica insulation board or other

suitable insulating material is installed as at **86** to further insulate and protect the power supply circuit board **81**.

Referring to FIG. **11** the present oven is provided with an optional serving set, indicated generally at **110**. In the preferred embodiment the serving set is comprised of a plurality of serving containers **112** which closely conform to the shape and dimensions of the cooking liner **45** and are inserted therein. The serving containers **112** are provided with lids **115** to maintain the cooked food in warm condition. The serving set **110** is provided in a variety of materials and/surface finishes at the option of the consumer.

Referring to FIG. **12** there is shown another embodiment of the present roasting oven, indicated generally at **10A**. The roasting oven **10A** is substantially similar in its overall construction to the embodiments disclosed hereinabove with reference to FIGS. **2A** and **2B** except that the roasting oven **10A** is provided with a modified electrical circuit including a standard electromechanical power switch **21** and a rheostatic temperature controller **23** (see FIG. **5B**) to carry out the functions of the oven. The embodiment shown in FIG. **12** features a wrap-around heating element, indicated generally at **40**, and a modified top heating element, indicated generally at **150'**.

It can be seen in FIG. **12** that the top heating element **150'** resides in an inverted recess **28***a'* formed within a modified lid **28'** to provide increased capacity within the oven **10A** to accommodate oversize food items such as a large turkey, for example. The heating element **150'** is configured to follow the contour of the modified lid **28'** and is mounted within the uppermost portion of recess **28***a'* within lid **28'** as shown.

With reference to FIG. **13** there is shown another embodiment of the present roasting oven, indicated generally at **10B**. The present roasting oven **10B** is also substantially similar in its overall construction to the embodiments previously disclosed hereinabove. The roasting oven **10B** is also provided with a standard electromechanical power switch **21** and a rheostatic temperature controller **23** to carry out the electrical functions of the oven. The embodiment shown in FIG. **13** also features a wrap-around heating element, indicated generally at **40**, and a top heating element, indicated generally at **150** as disclosed hereinabove. Advantageously, the roasting oven **10B** includes a modified hinge mechanism **100"**, which permits the lid **28** to be raised upwardly to accommodate an oversize food item in the Up or extended position illustrated (FIG. **13**).

In this embodiment the top heating element **150** is electrically connected to the power source via an extensible hinge assembly, indicated generally at **107**, including telescoping pin connectors **93**, which are received in an electrical plug assembly **91**. Electrical wiring interconnnects the plug assembly **91** to a power cord **104**, which extends from the housing **22** as shown to a 110V power source.

In the extended position of the hinge assembly **107**, a lid extension or spacer **29** is provided which engages the lower peripheral edge **28***b* of the lid **28** and extends to the housing **22** as shown. Spacer **29** is a sheet metal construction, which is temporarily installed into lid **28** by the user when needed to cook an oversize food item and is conveniently removed by the user when the hinge assembly **107** is used in the Down position at the opposite extent of its travel. In the alternative, the spacer **29** may be permanently affixed to the lid **28** by any suitable means and utilized to cook oversize food items exclusively.

Referring now to FIG. **14A** there is shown another embodiment of the present roasting oven, indicated generally at **10C**. The present roasting oven **10C** is similar in its overall construction to the embodiments previously disclosed in that the roasting oven **10C** is provided with a standard electromechanical power switch **21** and rheostatic temperature controller **23** to carry out the electrical functions of the oven. The embodiment shown in FIG. **14A** also features a wrap-around heating element, indicated generally at **40**, and a top heating element, indicated generally at **150**. In this version a lid spacer **29** may also be provided which engages the lower peripheral edge **28***b* of the lid **28** and rests on the upper edge of the housing **22** as shown.

However, it can be seen that this embodiment represents a substantial departure in that it lacks a hinge mechanism between the housing **22** and the lid **28**. The top heating element **150** is electrically connected to a secondary power cord **105** including plug **97**, which is electrically connected to the main power cord **104** as shown. Power cord **105** is connected to an auxiliary power outlet as at **111** at a first end thereof and received within plug receptacle **95** at an opposite end, which is attached to lid **28** and electrically connected to top heating element **150**. In this configuration a single power source supplies both heating elements **40, 150**, but the top heating element **150** can be used selectively by detaching the plug **97**.

In another embodiment of the roasting oven, indicated generally at **10C'** and shown in FIG. **14B**, the top heating element **150** is independently connected to a source of power via a separate power cord **109** including a plug **97**. As in the previous embodiment shown in FIG. **14A**, plug **97** is received in a plug receptacle **95** which is attached to lid **28** and electrically connected to top heating element **150** and, thus, it can be used selectively, if at all.

Referring now to FIG. **15A** there is shown another embodiment of the roasting oven, indicated generally at **10D**. The present roasting oven **10D** is similar in its overall construction to the embodiments previously disclosed in that the roasting oven **10D** is also provided with a standard electromechanical power switch **21** and rheostatic temperature controller **23** to carry out the electrical functions of the oven. The embodiment shown in FIG. **15A** also features a wrap-around heating element, indicated generally at **40**, and a modified top heating element **150"**. It can be seen in FIG. **15A** that the top heating element **150"** is installed in a modified lid **28"** having an even taller cross-sectional profile than the previously disclosed modified lid **28'** (FIG. **12**) to accommodate oversize food items such as a large turkey, for example. The heating element **150"** is configured to reside within the modified lid **28"** and is mounted within the uppermost portion of the inverted recess **28***a"* of the lid **28"** as shown.

It can be seen that the roasting oven **10D** also lacks a hinge mechanism between the housing **22** and the lid **28"**. The top heating element **150"** is electrically connected to a secondary power cord **105'** including plug **97'**, which is connected at a first end thereof to an auxiliary power outlet as at **111** located in housing **22**. Power cord **105'** is received at an opposite end thereof in plug receptacle **95'**, which is attached to lid **28"**. In this configuration a single power source feeds both heating elements **40, 150"**, but the top heating element can be used selectively and the lid **28"** removed for convenient cleaning.

In another embodiment of the roasting oven, indicated generally at **10D'** and shown in FIG. **15B**, the top heating element **150"** is independently connected to a 110V power source via a separate power cord **109'** including a plug **97'**. As in the previous embodiment shown in FIG. **15A**, plug **97'** is received in a plug receptacle **95'** which is attached to lid **28"** and electrically connected to top heating element **150"** for selective use, if at all.

In summary, the present invention has been developed to provide a roasting oven having a large capacity (i.e. up to 26 quarts) that includes a flexible, wrap-around heating element which is disposed about the heating well for heating the sidewalls thereof and a top heating element for browning.

The wrap-around heating elements **40, 140** are provided in different configurations to facilitate manufacturing and heating. Both the wrap-around heating element **40** and top heating elements **150, 150', 150"** are electrically interconnected to a temperature control panel featuring a push-button control film interface for selectively energizing the heating elements or standard electromechanical temperature controls. The present roasting oven includes a detachable lid member having a top browning element featuring quick connect/disconnect electrical connectors to enhance food service and cleaning. In at least one embodiment, the present roasting oven also features an exterior ventilated compartment for housing a power supply circuit board for insulating the same from the high heat source necessary for a roasting oven of this capacity.

In various alternative embodiments the present roasting oven is provided in simplified versions using electromechanical controls and wherein the electroconductive hinge mechanism is omitted. In these embodiments the top and bottom heating elements utilize both single and dual power supply configurations, which can be employed selectively by the user based on the cooking mode required.

Although not specifically illustrated in the drawings, it should be understood that additional equipment and structural components will be provided as necessary, and that all of the components described above are arranged and supported in an appropriate fashion to form a complete and operative roasting oven incorporating features of the present invention.

It is also understood that variations may be made in the present invention without departing from the scope of the invention. For example, the present roasting oven may utilize double-sided and also single-sided heater elements as disclosed herein, which may be advantageous for specific applications.

Moreover, although illustrative embodiments of the invention have been described, a latitude of modification, change, and substitution is intended in the foregoing disclosure, and in certain instances, some features of the invention will be employed without a corresponding use of other features. Accordingly, it is appropriate that the appended claims be construed broadly and consistent with the scope of the invention.

What is claimed is:

1. A roasting oven comprising:

an outer housing having a lid member including electrically conductive supporting means for attaching said lid member to said housing;

a heating well residing within said housing, said heating well having a bottom surface with integrally formed sidewalls and an open top;

heating means including a top heating element disposed in said lid member, said top heating element being electrically connected to a power source via said electrically conductive supporting means, and a wrap-around heating element radially disposed about said heating well and positioned intermediate said housing and said heating well;

temperature controlling means electrically interconnected to said heating means for regulating the temperature of said heating elements; and

function controlling means electrically interconnected to said temperature controlling means and to said heating elements enabling said top heating element and said wrap-around heating element to be selectively energized to provide variable cooking modes.

2. The roasting oven of claim **1** wherein said electrically conductive supporting means comprises an extensible hinge mechanism wherein an electrical circuit supplying said top heating element is integrated in the body of said extensible hinge mechanism.

3. The roasting oven of claim **2** wherein said top heating element is electrically connected to a power source by telescoping pin connectors engaging an electrical plug assembly within said extensible hinge mechanism, said extensible hinge mechanism providing increased capacity within said oven to accommodate an oversize food item.

4. The roasting oven of claim **3** wherein said lid member is provided with a lid extension attached to a lower peripheral edge of said lid member and extending to an upper edge of said housing to enclose said increased vertical space.

5. The roasting oven of claim **1** wherein said temperature controlling means comprises a rheostatic temperature controller.

6. The roasting oven of claim **5** wherein said function controlling means comprises a standard electromechanical power switch.

7. A roasting oven comprising:

an outer housing having a lid member including electrically conductive supporting means for attaching said lid member to said housing, said lid member including an inverted recess formed therein to provide increased volume within said oven to accommodate oversize food items;

a heating well residing within said housing, said heating well having a bottom surface with integrally formed sidewalls and an open top;

heating means including a top heating element disposed within inverted recess formed in said lid member, said top heating element being electrically connected to a power source via said electrically conductive supporting means, and a wrap-around heating element radially disposed about said heating well and positioned intermediate said housing and said heating well;

temperature controlling means electrically interconnected to said heating means for regulating the temperature of said heating elements; and

function controlling means electrically interconnected to said temperature controlling means and to said heating elements enabling said top heating element and said wrap-around heating element to be energized.

8. The roasting oven of claim **7** wherein said electrically conductive supporting means comprises a hinge mechanism wherein an electrical circuit supplying said top heating element is integrated into the body of said hinge mechanism.

9. The roasting oven of claim **8** wherein said top heating element is electrically connected to a power source by a pin connector attached by electrical wiring to an electrical plug assembly within said hinge mechanism wherein the electrical circuit is completed when said hinge mechanism is in a closed position.

10. The roasting oven of claim **7** wherein said temperature controlling means comprises a rheostatic temperature controller.

11. The roasting oven of claim **10** wherein said function controlling means comprises a standard electromechanical power switch.

12. A roasting oven comprising:
an outer housing having a lid member;
a heating well residing within said housing, said heating well having a bottom surface with integrally formed sidewalls and an open top;
heating means including a top heating element disposed in said lid member and a wrap-around heating element radially disposed about said heating well and positioned intermediate said housing and said heating well;
temperature controlling means electrically interconnected to said heating means for regulating the temperature of said heating elements; and
function controlling means electrically interconnected to said temperature controlling means and to said heating elements enabling said top heating element and said wrap-around heating element to be selectively energized to provide variable cooking modes.

13. The roasting oven of claim 12 wherein said top heating element and said wrap-around heating element are electrically connected to a single power source by a main power cord, said top heating element being connected via a secondary power cord to an auxiliary power outlet integrated within said housing.

14. The roasting oven of claim 13 wherein said lid member is provided with a lid extension attached to a lower peripheral edge of said lid member, wherein said lid extension is disposed intermediate said lid member and an upper edge of said housing to provide increased capacity within said oven.

15. The roasting oven of claim 12 wherein said top heating element and said wrap-around heating element are both electrically connected to remote power sources by separate power cords.

16. The roasting oven of claim 15 wherein said lid member is provided with a lid extension attached to a lower peripheral edge of said lid member, wherein said lid extension is disposed intermediate said lid member and an upper edge of said housing to provide increased capacity within said oven.

17. A roasting oven comprising:
an outer housing including a lid member having an inverted recess formed therein to provide increased vertical clearance within said oven to accommodate oversize food items;
a heating well residing within said housing, said heating well having a bottom surface with integrally formed sidewalls and an open top;
heating means electrically connected to a power source, wherein said heating means includes a top heating element disposed in said inverted recess of said lid member, and a wrap-around heating element radially disposed about said heating well and positioned intermediate said housing and said heating well;
temperature controlling means electrically interconnected to said heating means for regulating the temperature of said heating elements; and
function controlling means electrically interconnected to said temperature controlling means and to said heating elements enabling said top heating element and said wrap-around heating element to be energized to provide variable cooking modes.

18. The roasting oven of claim 17 wherein said top heating element and said wrap-around heating element are electrically connected to a singular power source by a main power cord, said top heating element being connected via a secondary power cord to an auxiliary power outlet integrated into said housing.

19. The roasting oven of claim 17 wherein said top heating element and said wrap-around heating element are both electrically connected to remote power sources by separate power cords.

* * * * *

US006927365B2

(12) **United States Patent**
Li

(10) **Patent No.: US 6,927,365 B2**
(45) **Date of Patent: *Aug. 9, 2005**

(54) **FOOD SERVING SET FOR ROASTING OVEN**

(76) Inventor: **George T. C. Li**, 2533 N. Carson St. Suite #0 98, Carson City, NV (US) 89706

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **10/706,520**

(22) Filed: **Nov. 12, 2003**

(65) **Prior Publication Data**

US 2004/0094532 A1 May 20, 2004

Related U.S. Application Data

(63) Continuation-in-part of application No. 10/124,686, filed on Apr. 19, 2002, now Pat. No. 6,653,602.

(51) **Int. Cl.**[7] **A47J 27/12**; A47J 37/06

(52) **U.S. Cl.** **219/432**; 219/433; 219/386; 99/413; 99/416

(58) **Field of Search** 219/386, 429, 219/432, 433; 99/413, 416; 220/23.2, 23.4, 23.88

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D358,292	S		5/1995	Goad	D7/366
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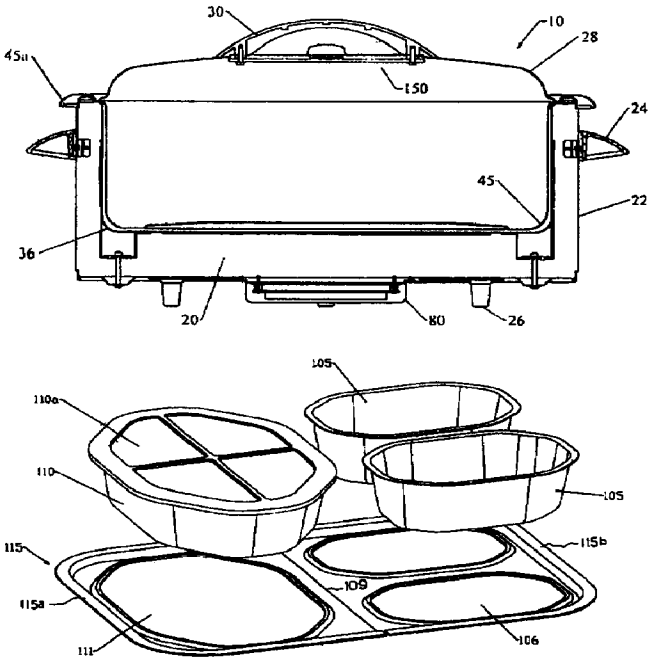
Primary Examiner—Joseph Pelham
(74) *Attorney, Agent, or Firm*—Clifford F. Rey

(57) **ABSTRACT**

A food serving set for use in combination with a roasting oven or similar deep well cooker is disclosed. The present food serving set is comprised of a plurality of individual containers with sealable lids for maintaining food items in a ready-to-eat condition. The present serving set features collapsible supporting racks, which position the food containers within the deep well cooker while in use. In one embodiment the supporting rack is foldable for convenient storage or packaging of the serving set within the interior space of the roasting oven. In another embodiment the supporting rack may be easily disassembled for storage using a latching mechanism or other suitable quick connect/disconnect fasteners. In another embodiment the food containers include integral peripheral flanges, which are fitted to the inner edge of the cooking vessel and the supporting rack is unnecessary. The food serving set features folding lift out handles for user convenience.

24 Claims, 30 Drawing Sheets



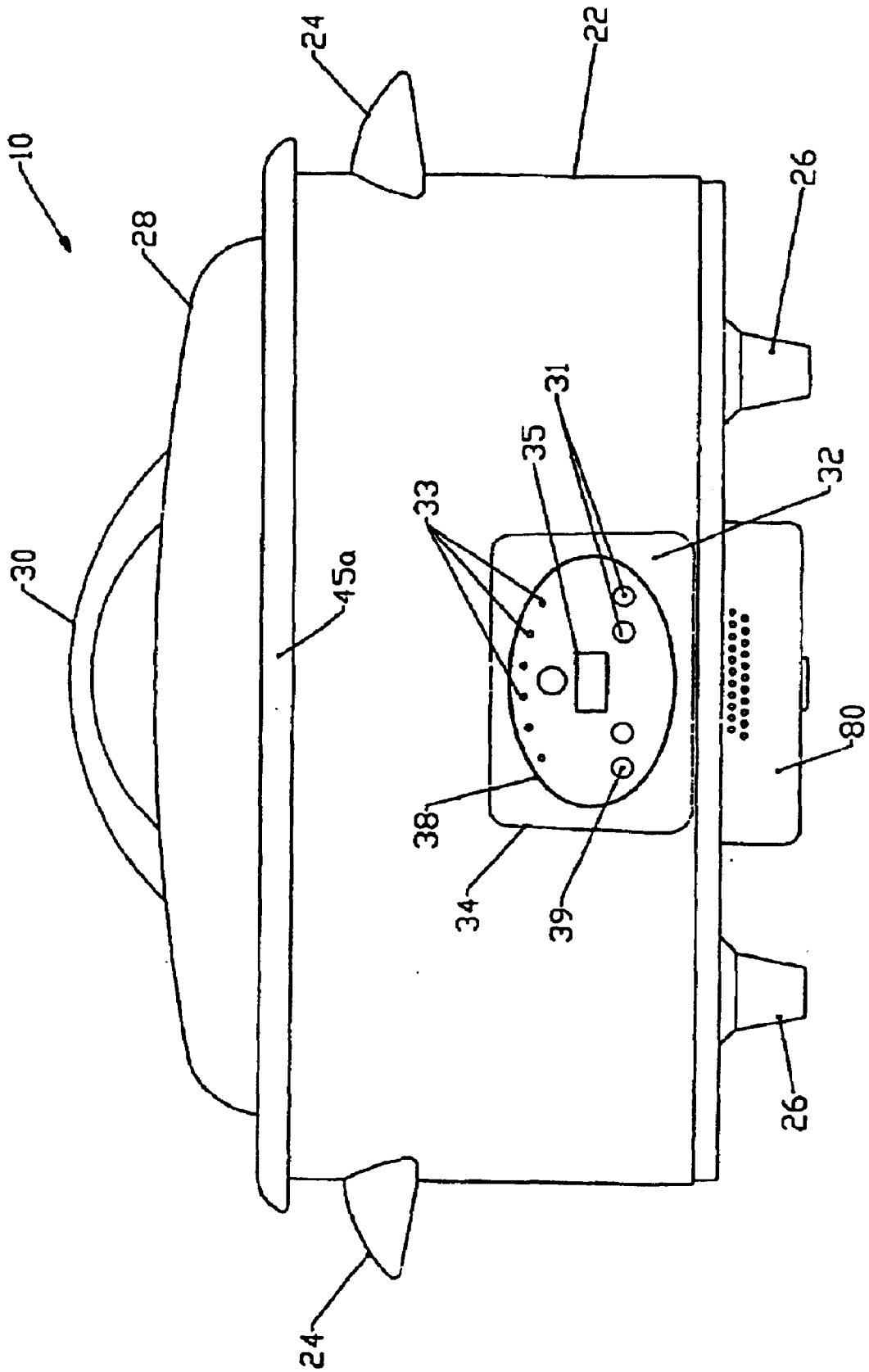


FIG. 1

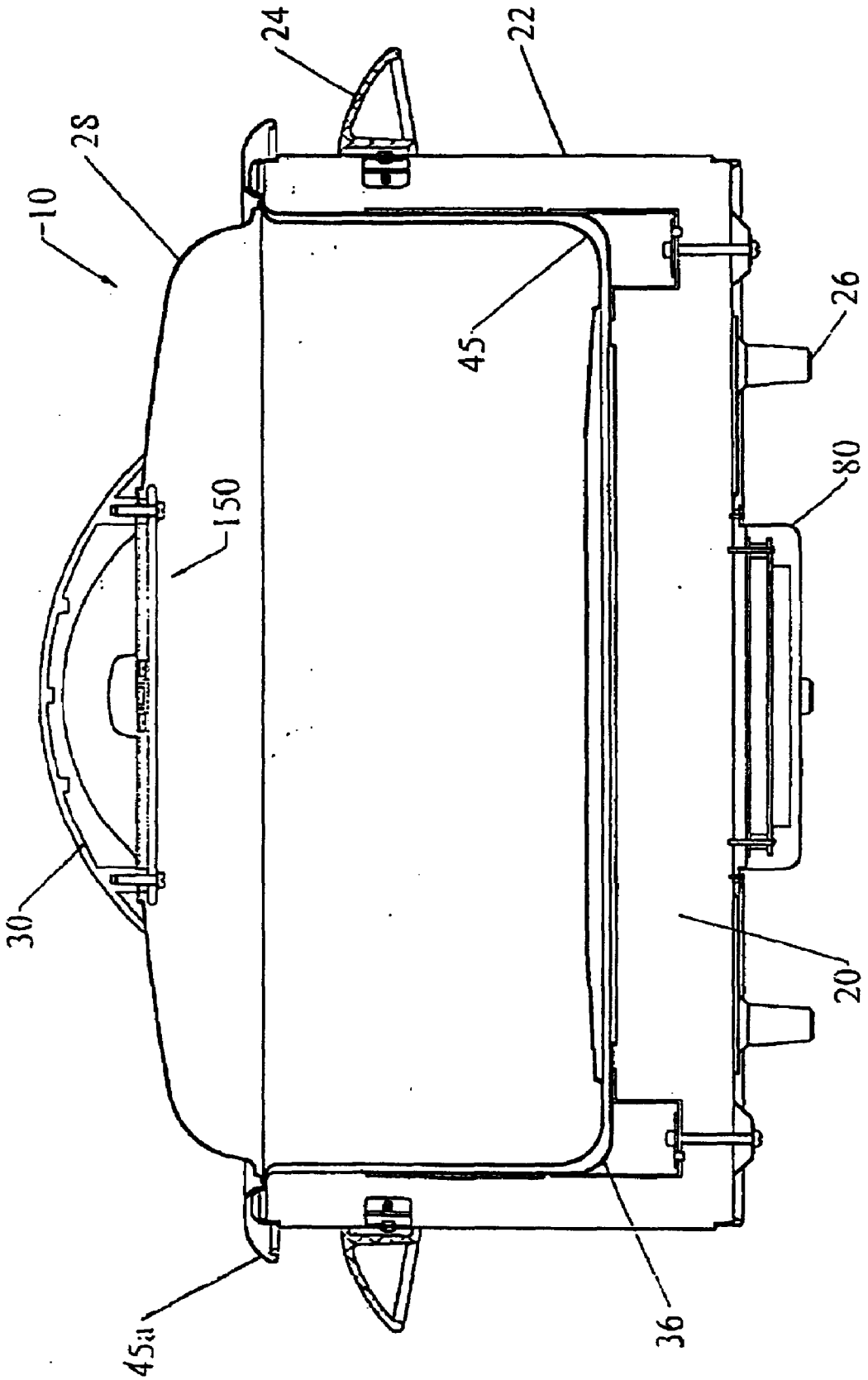


FIG.2A

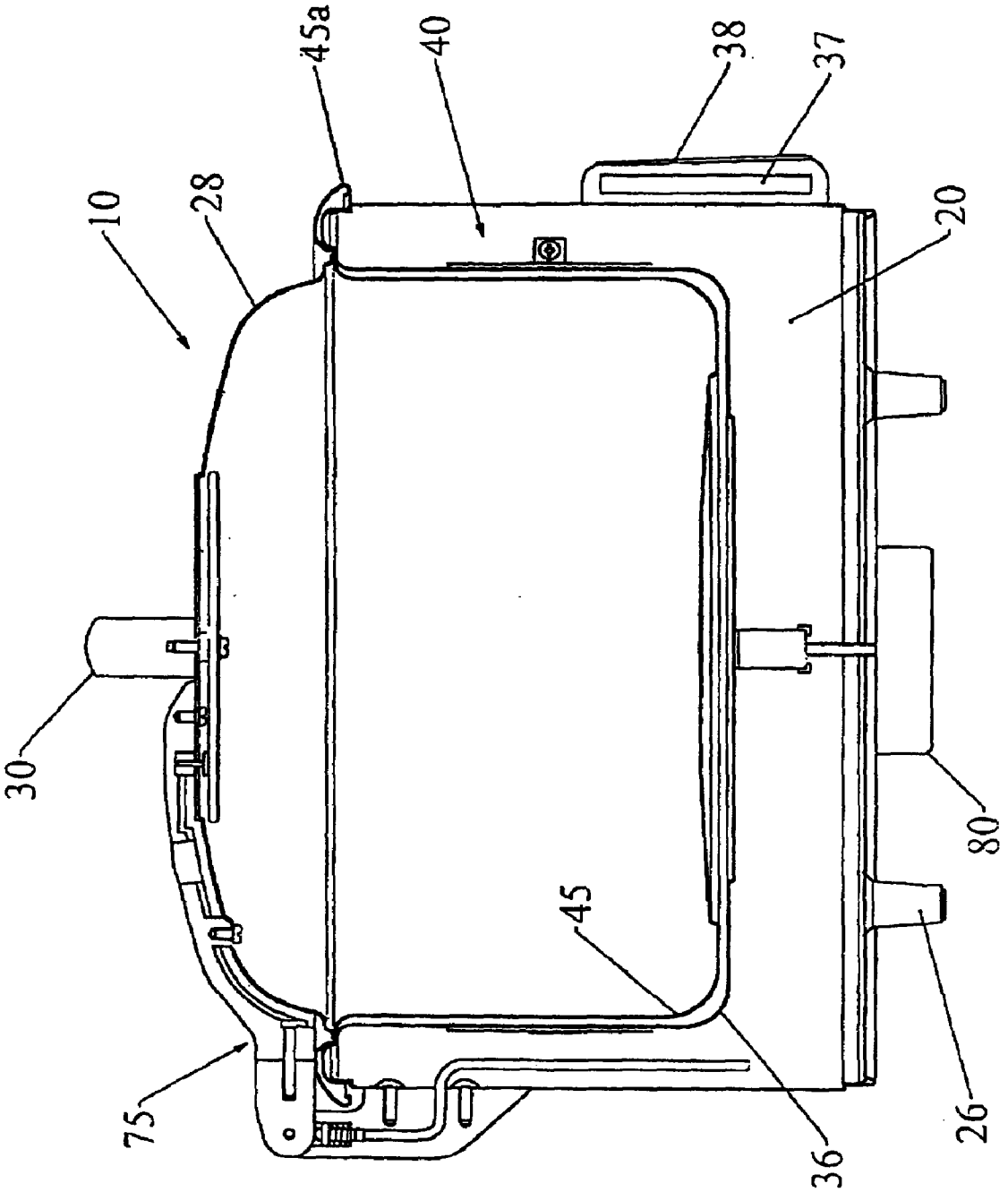


FIG.2B

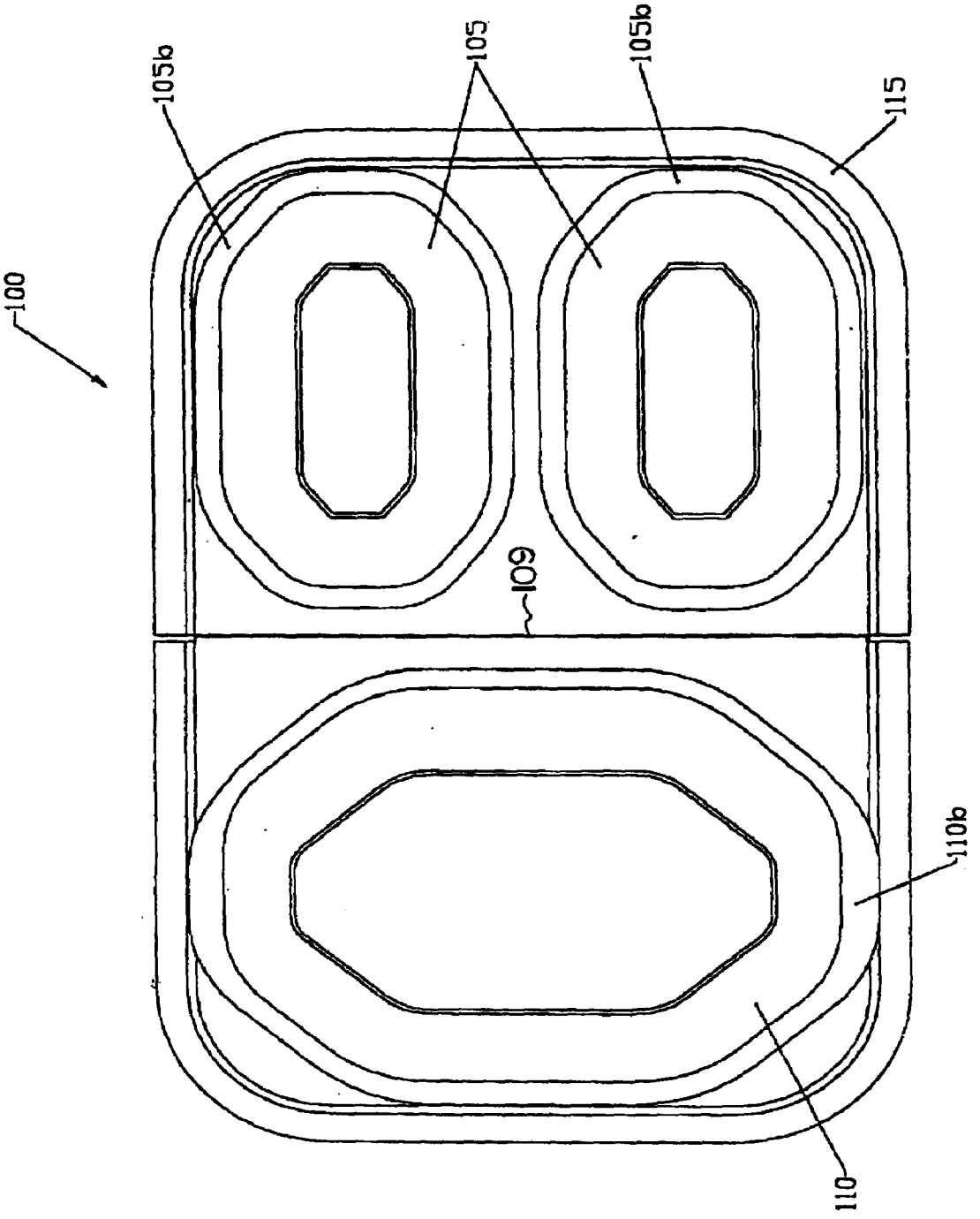


FIG.3A

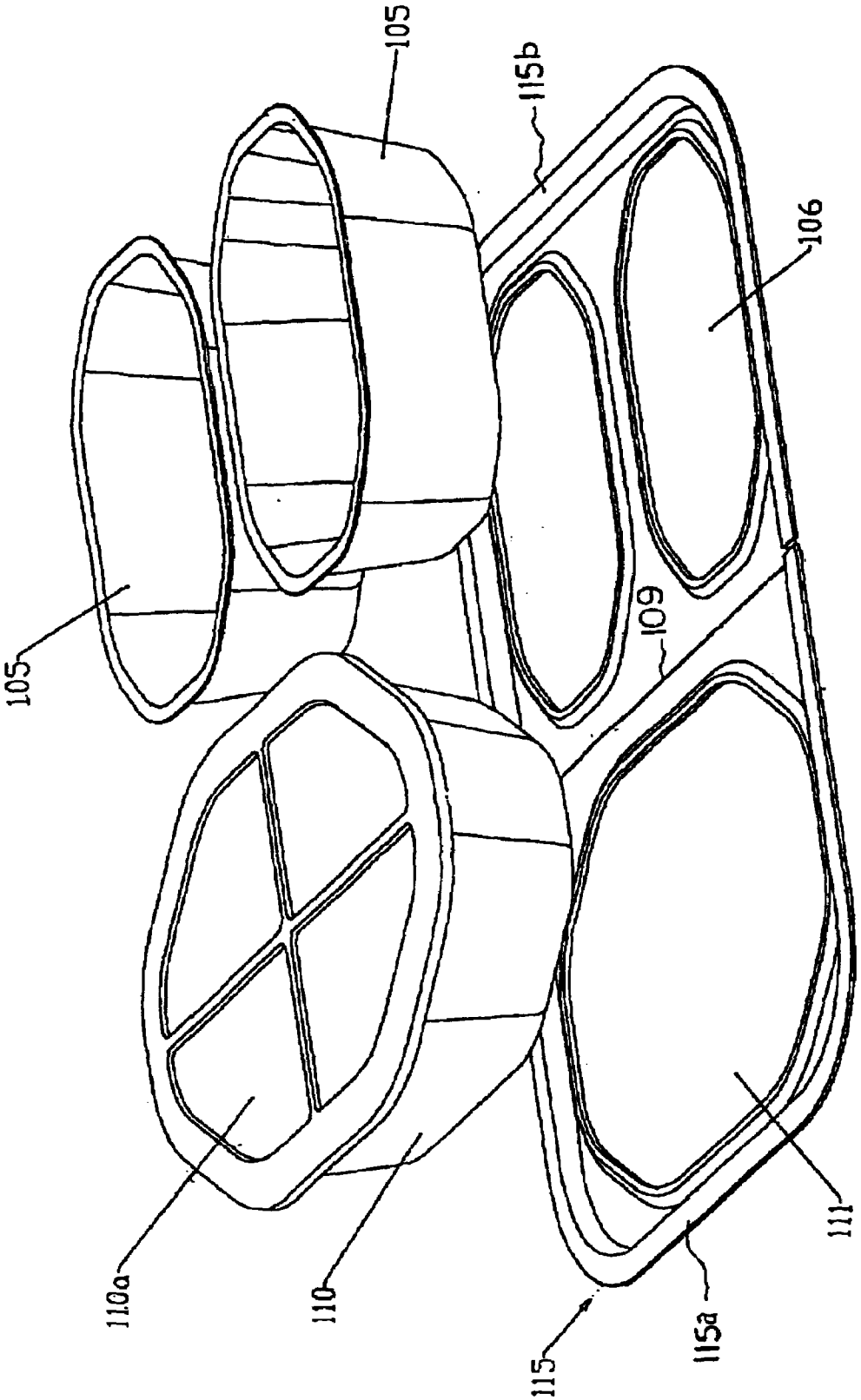


FIG.3B

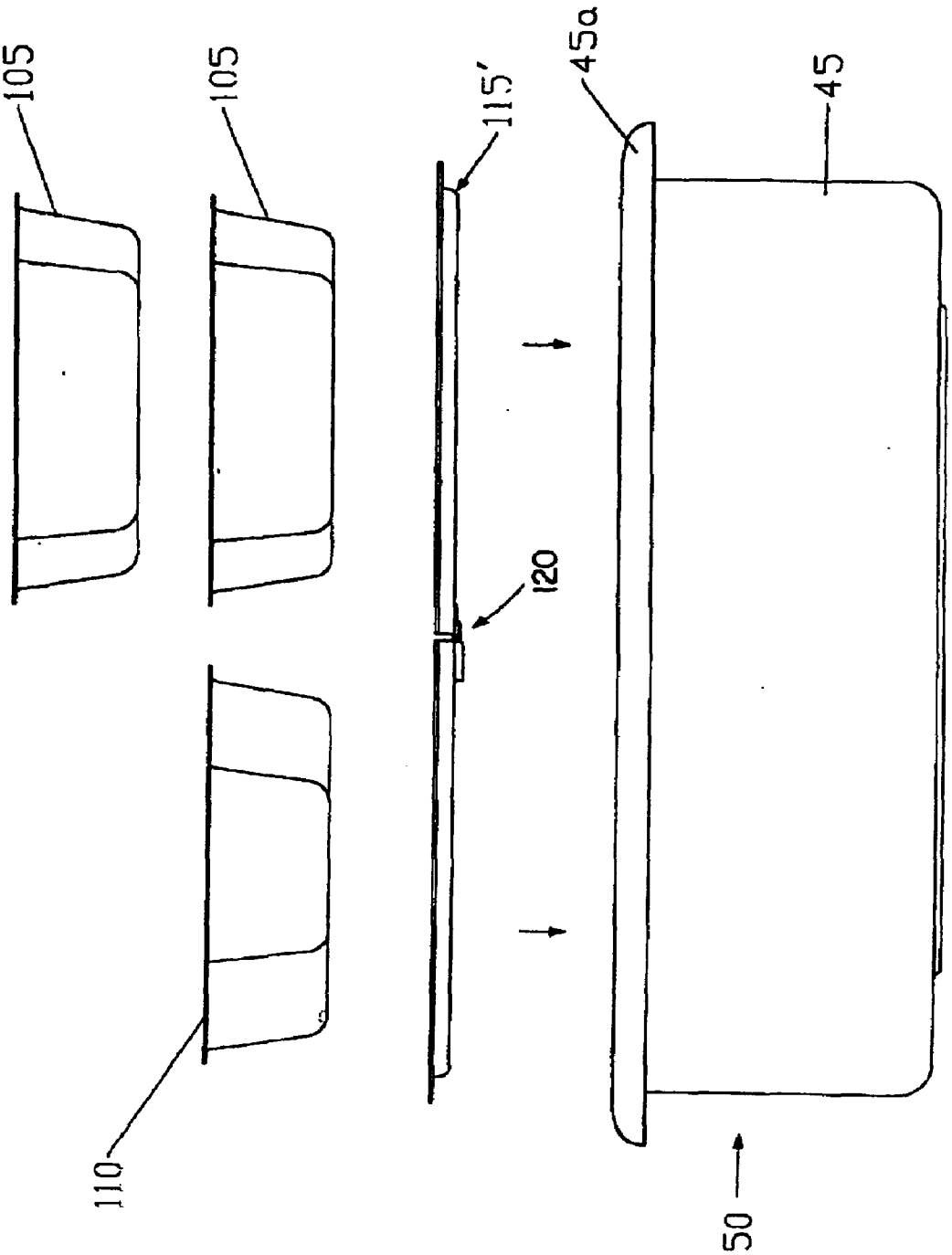


FIG.3C

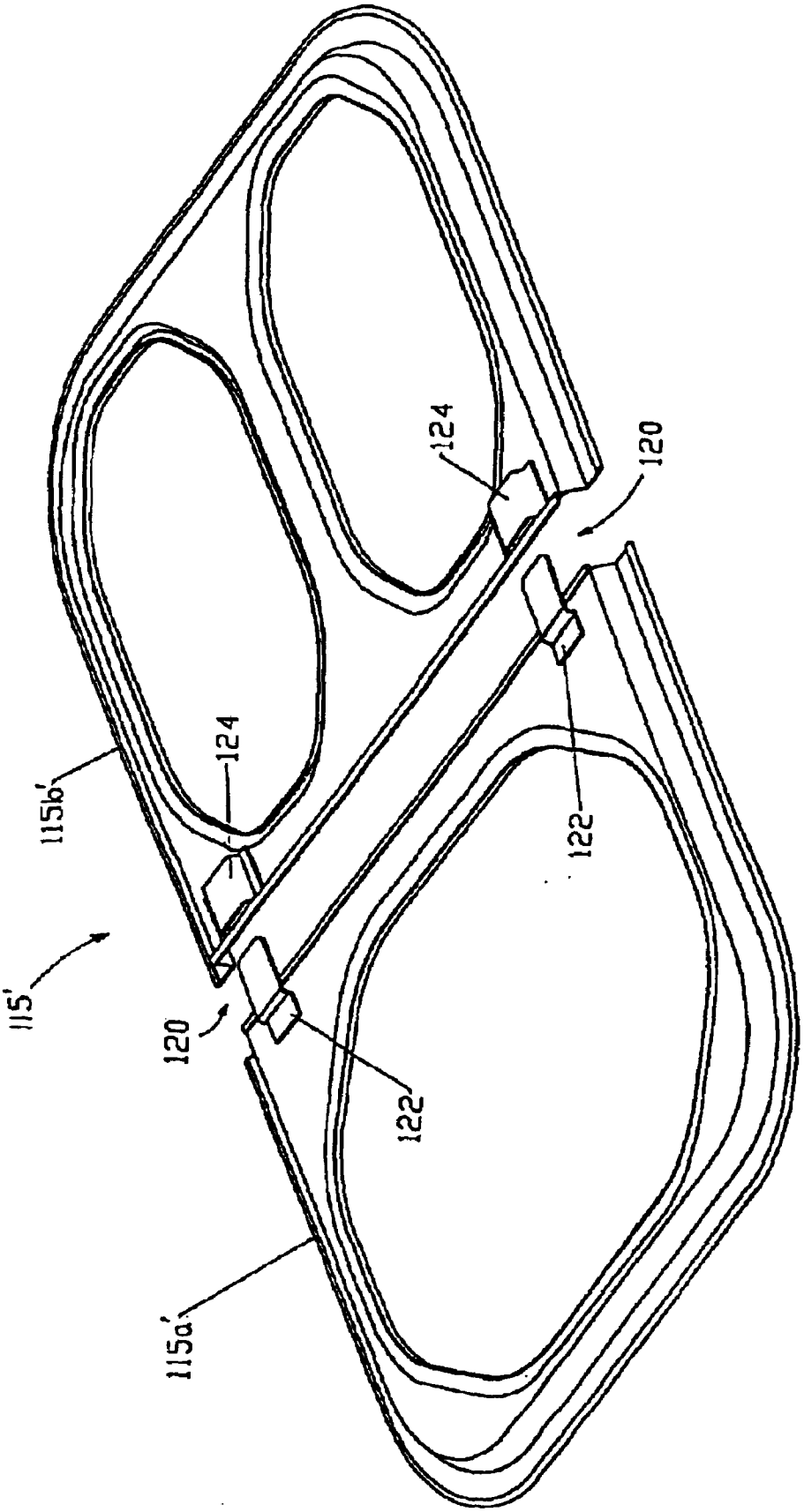


FIG. 3D

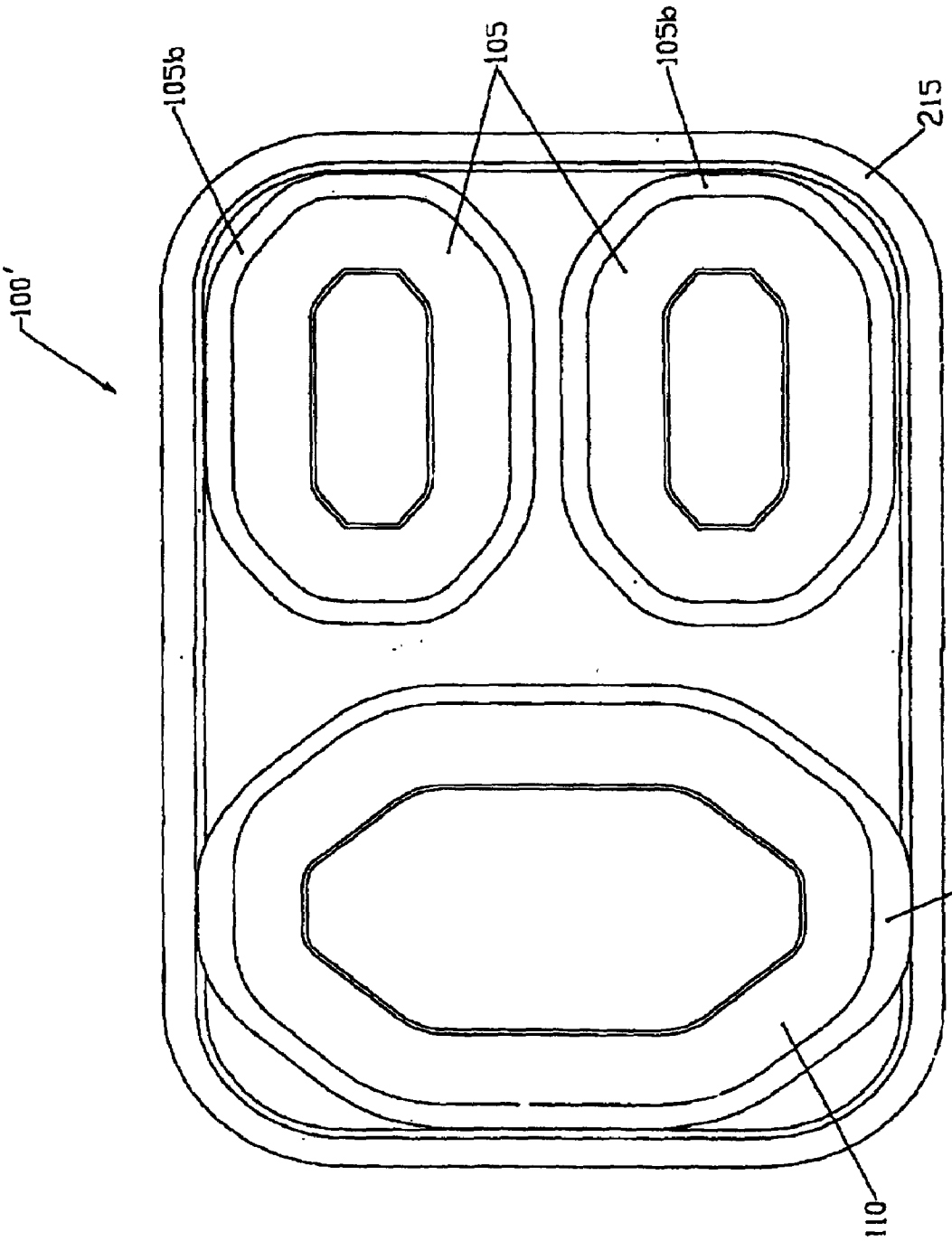


FIG. 4A

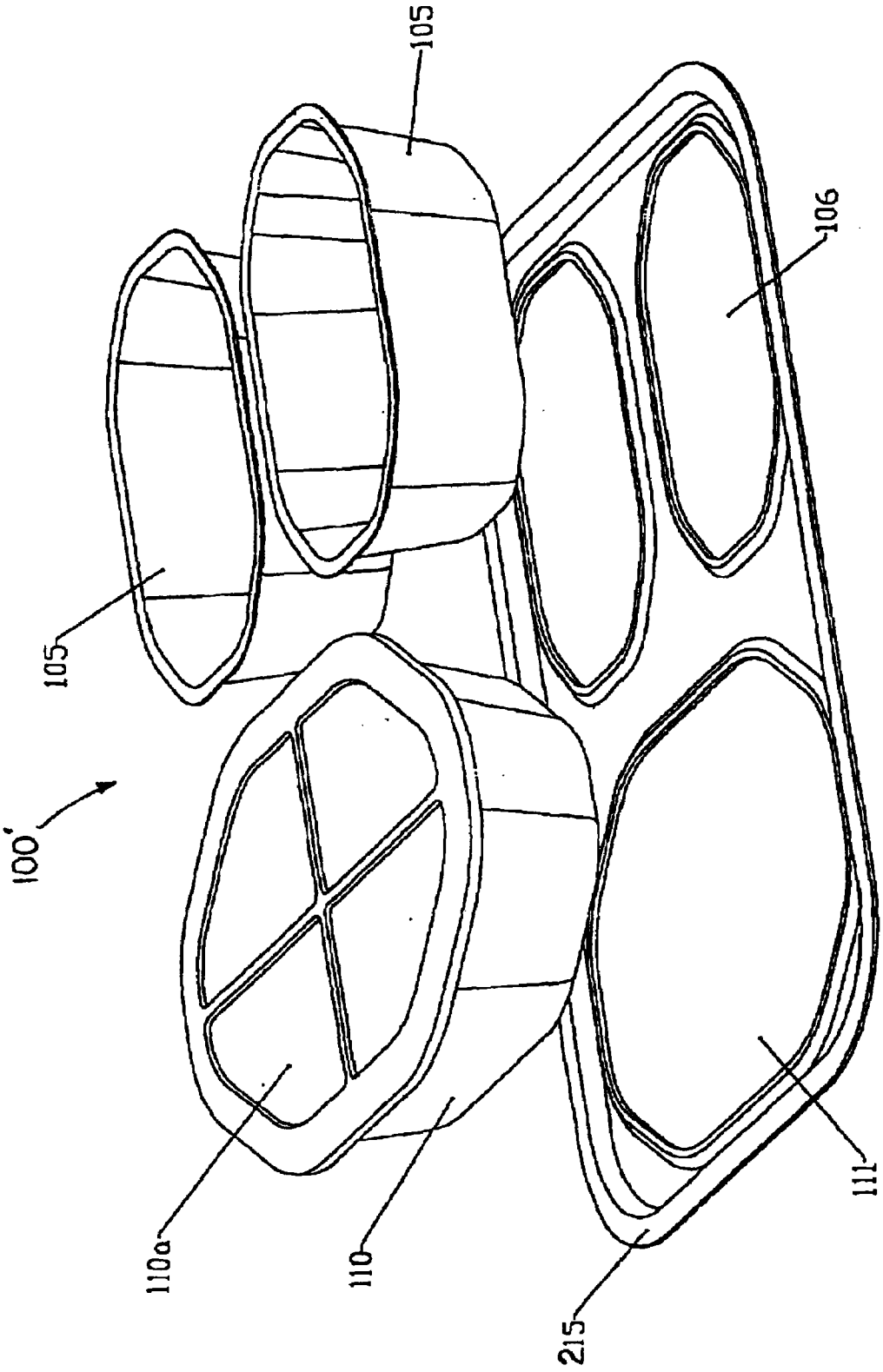


FIG. 4B

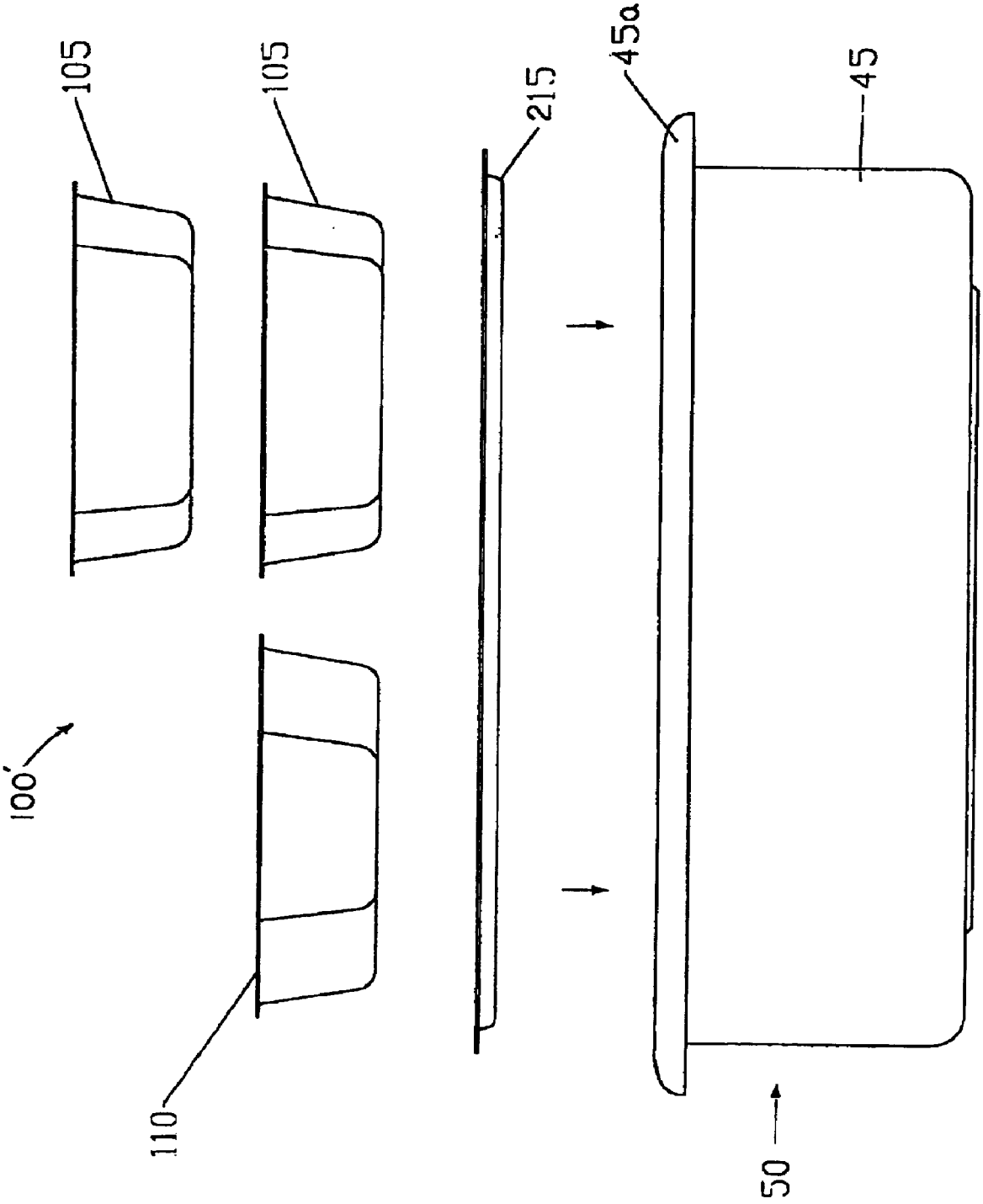


FIG. 4C

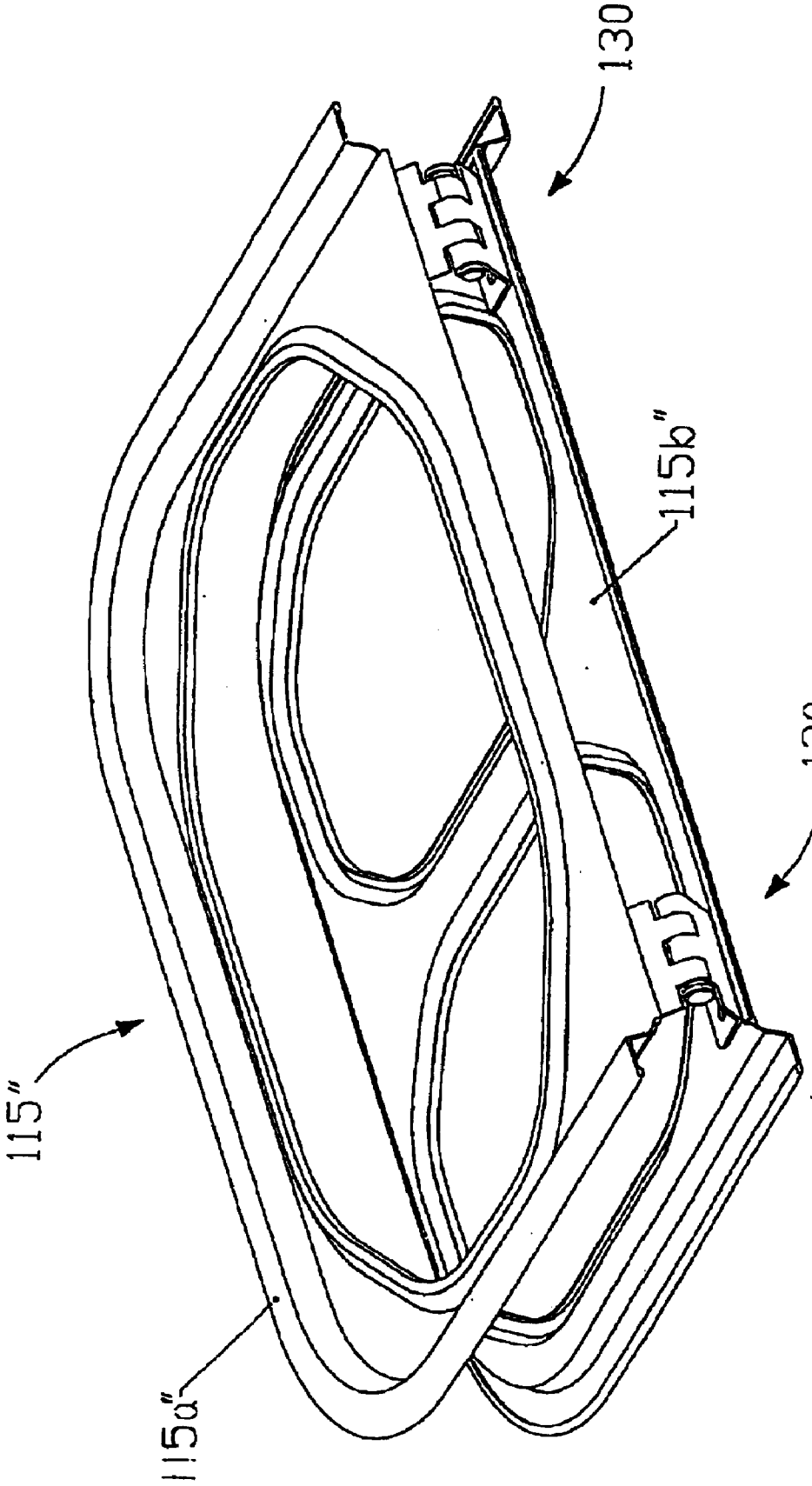


FIG.5

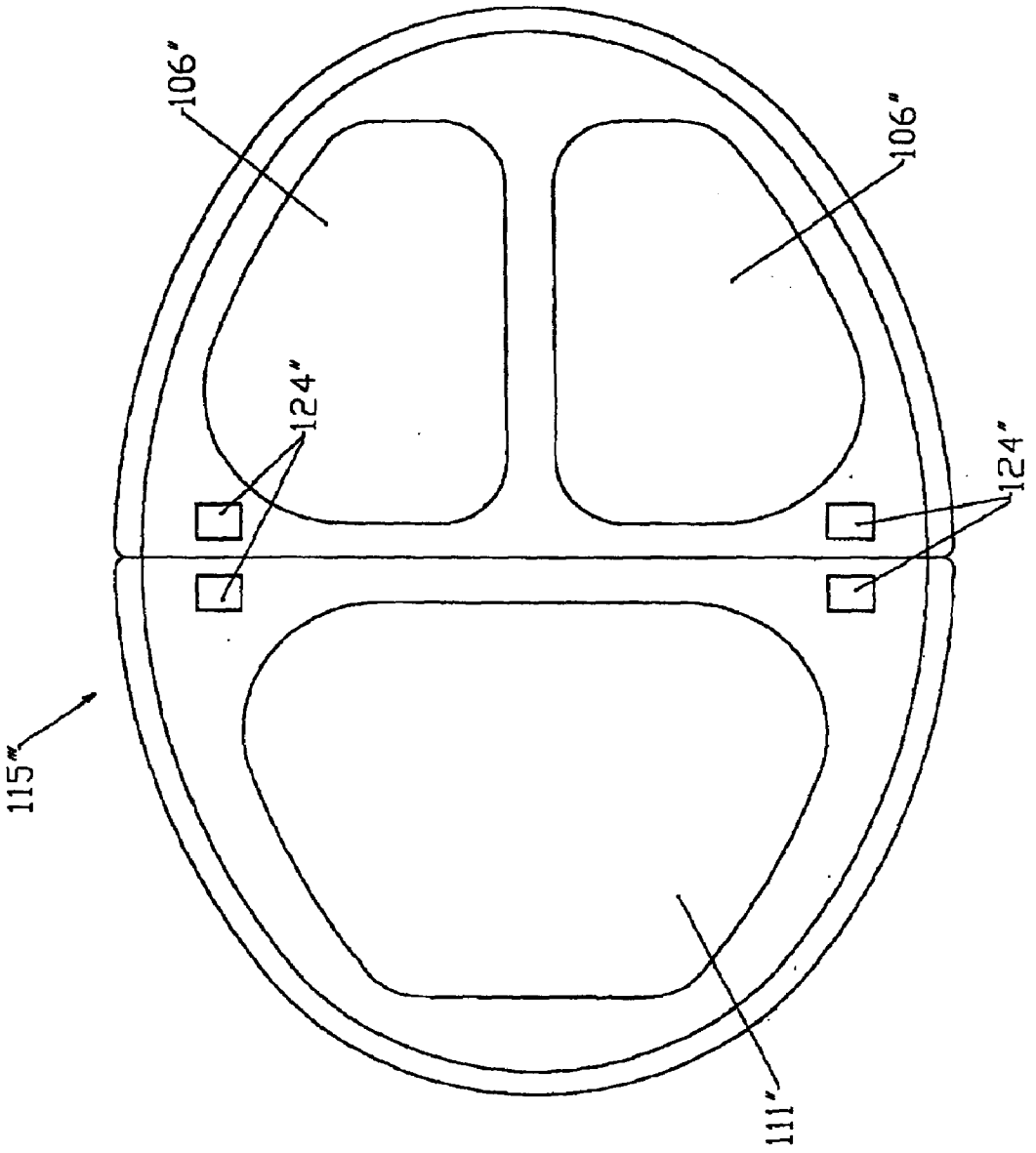


FIG.6A

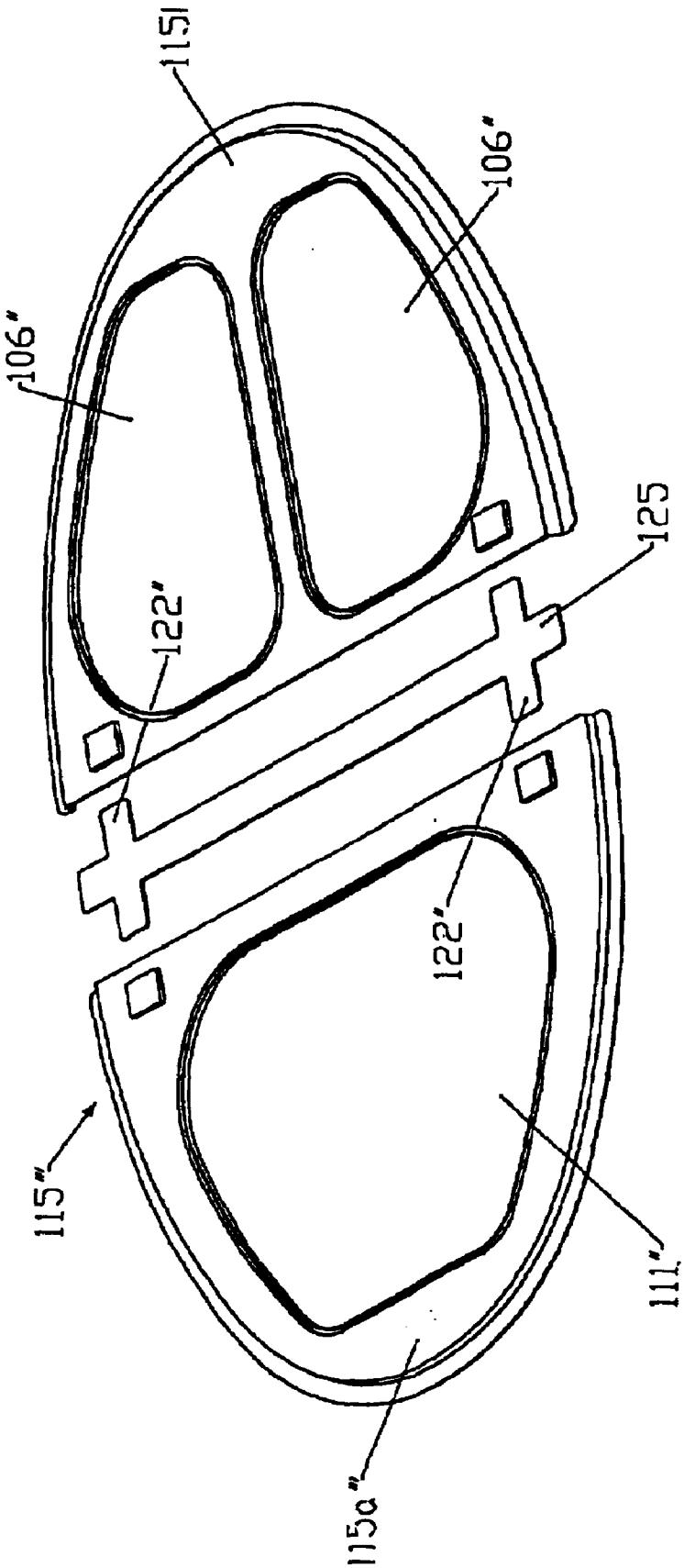


FIG.6B

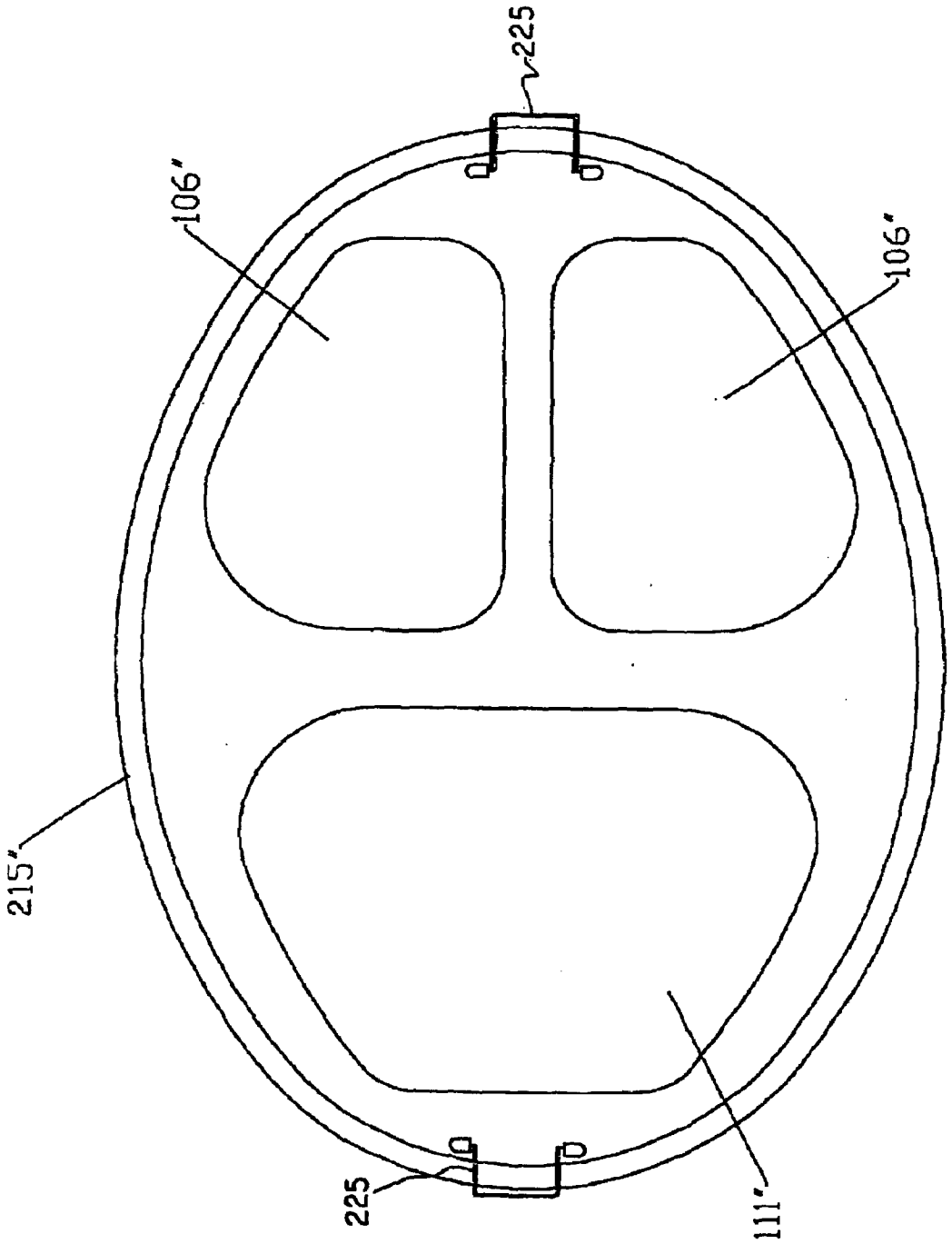


FIG.6C

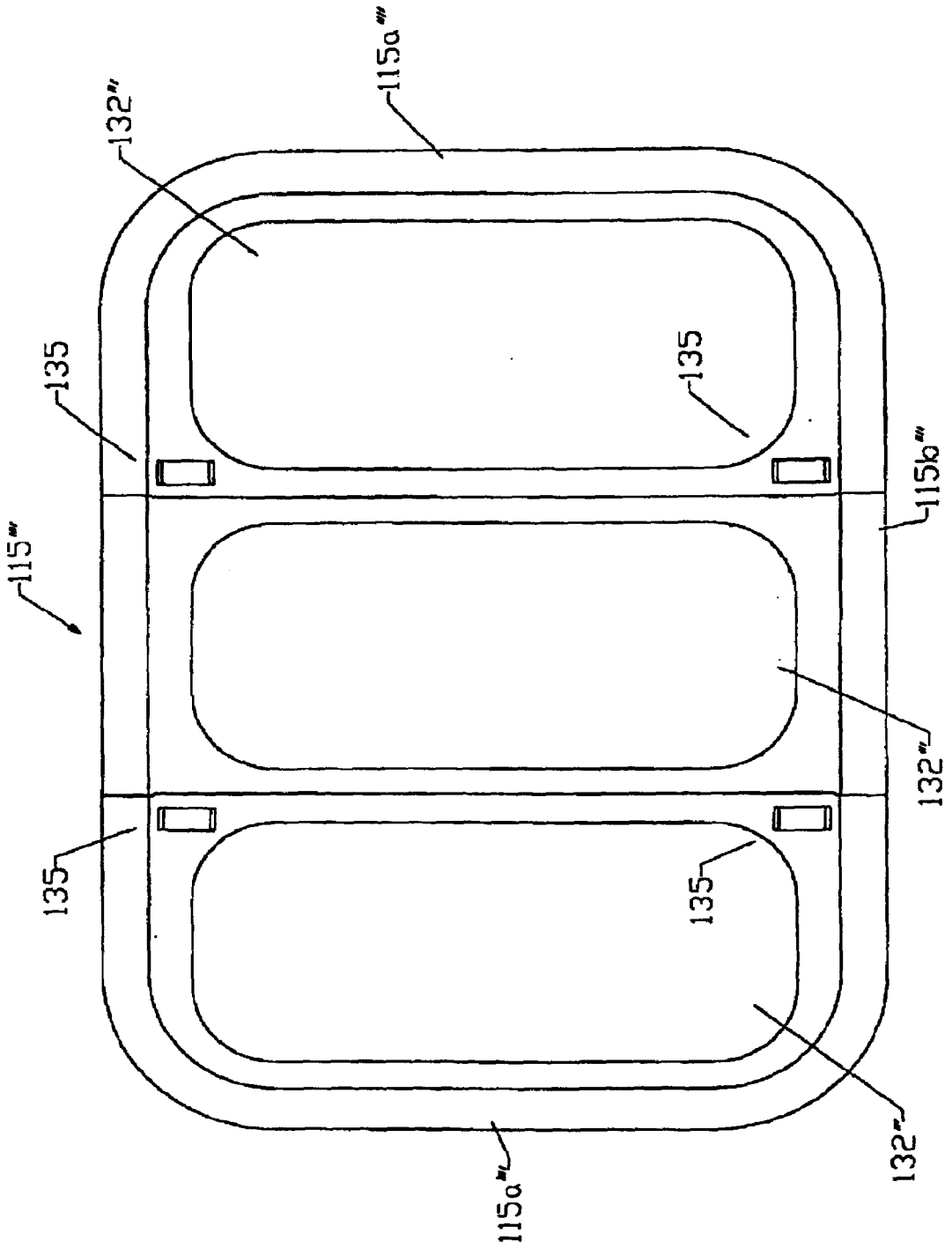


FIG.7

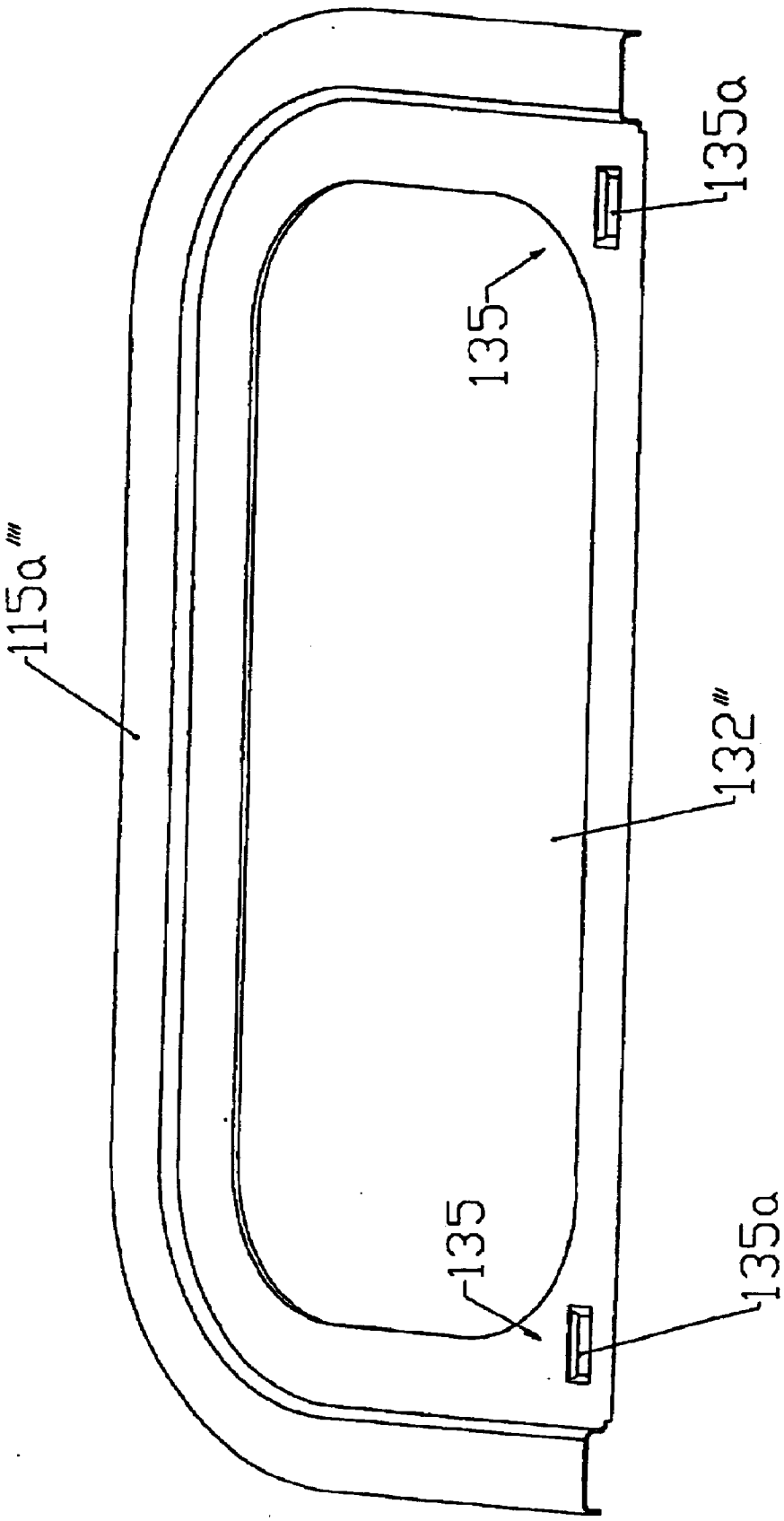


FIG.8A

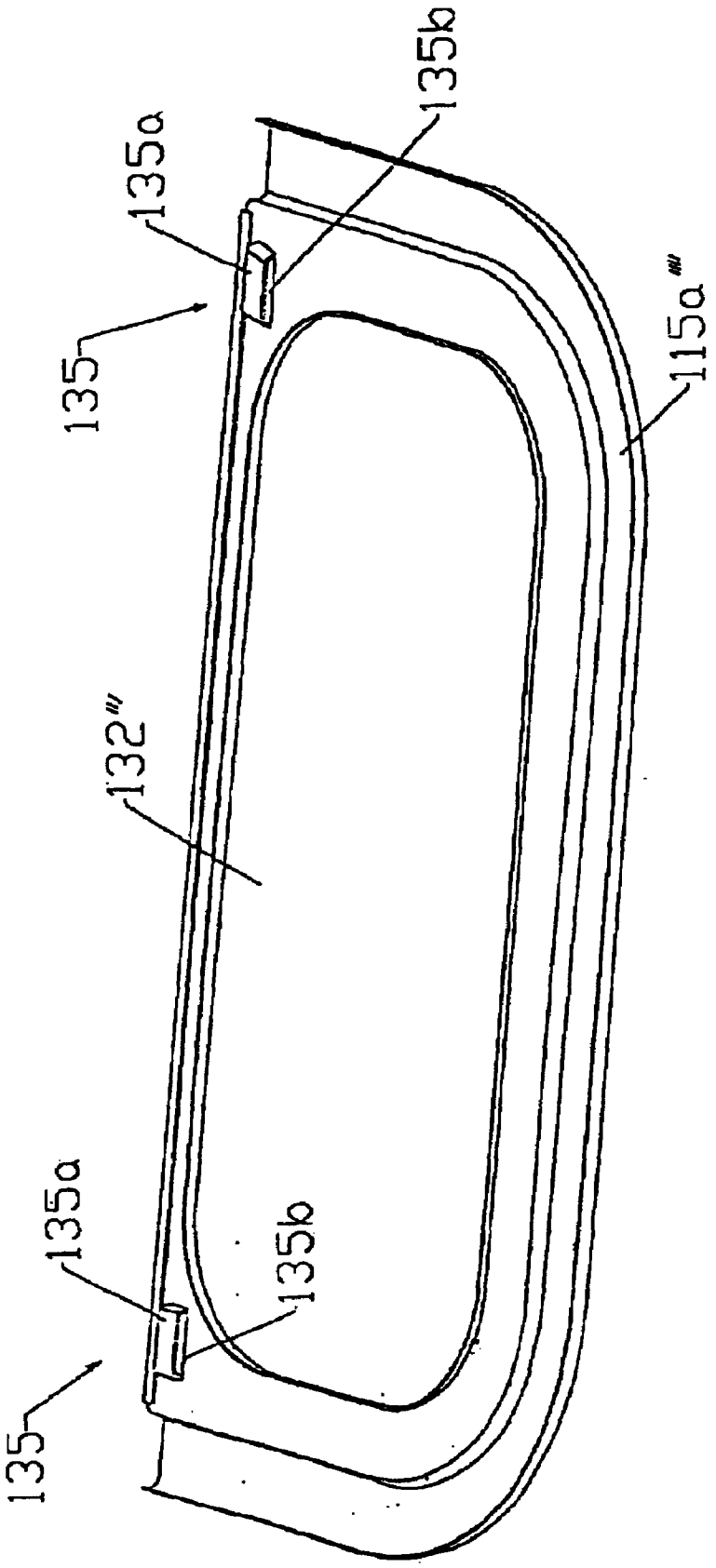


FIG.8B

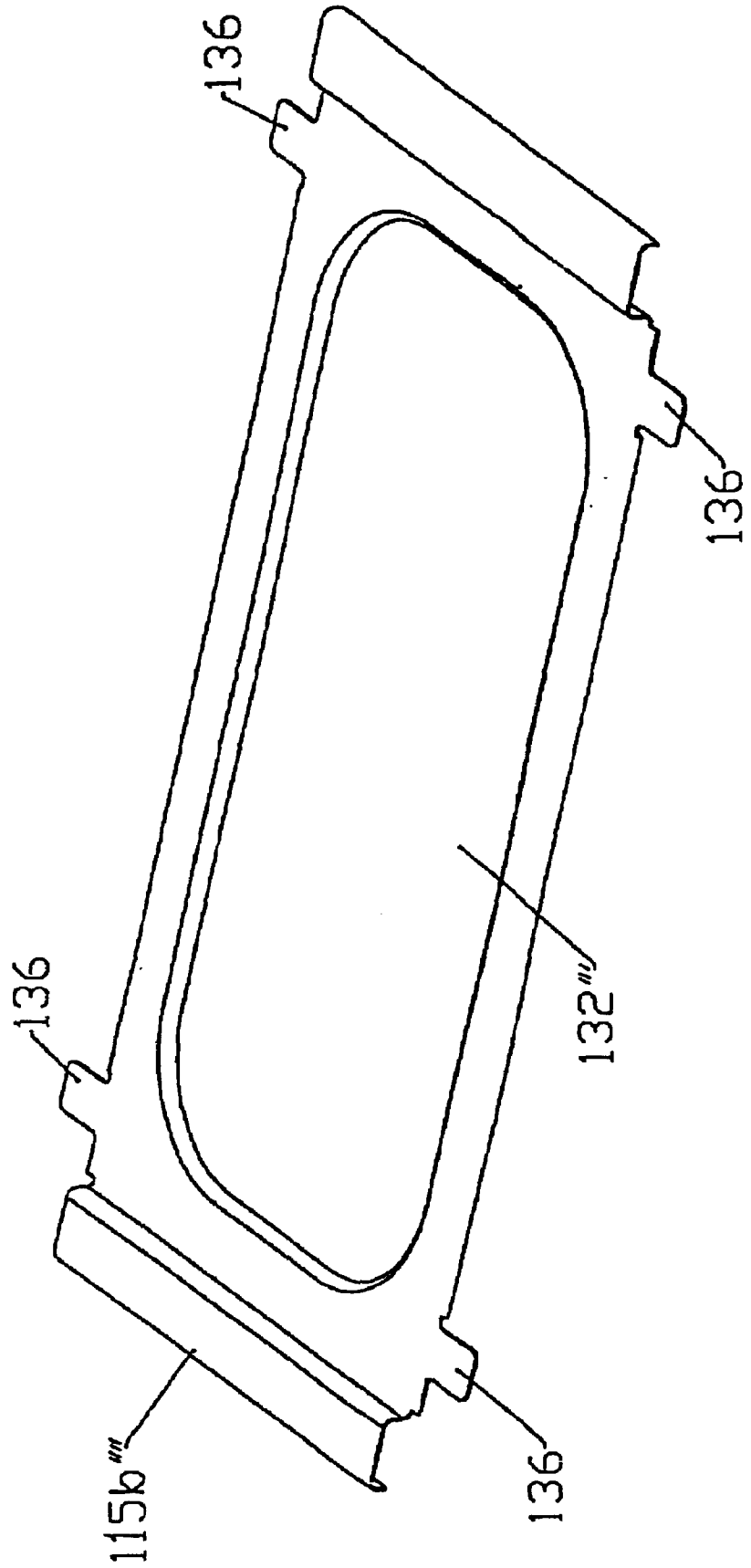


FIG.9A

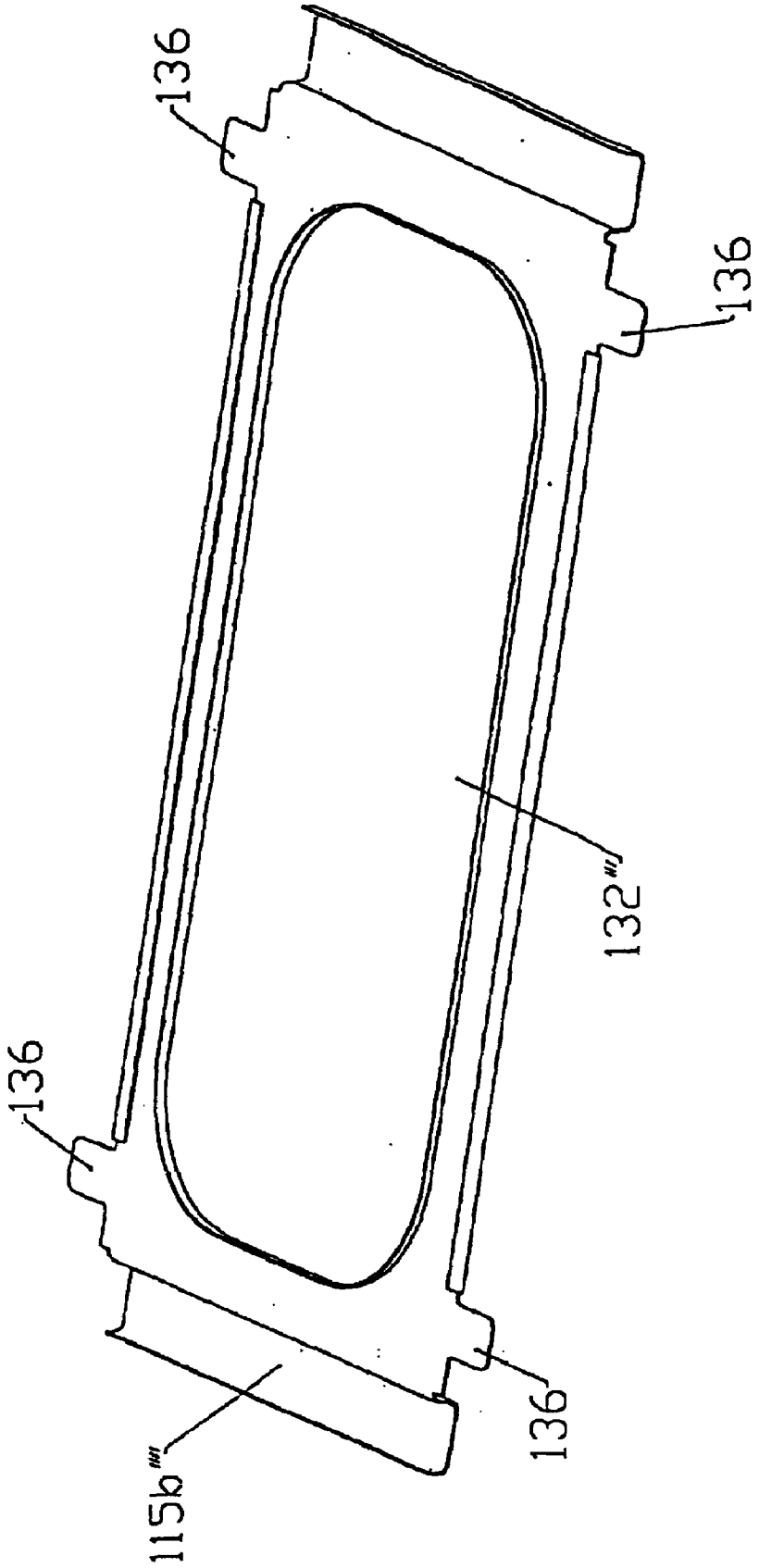


FIG.9B

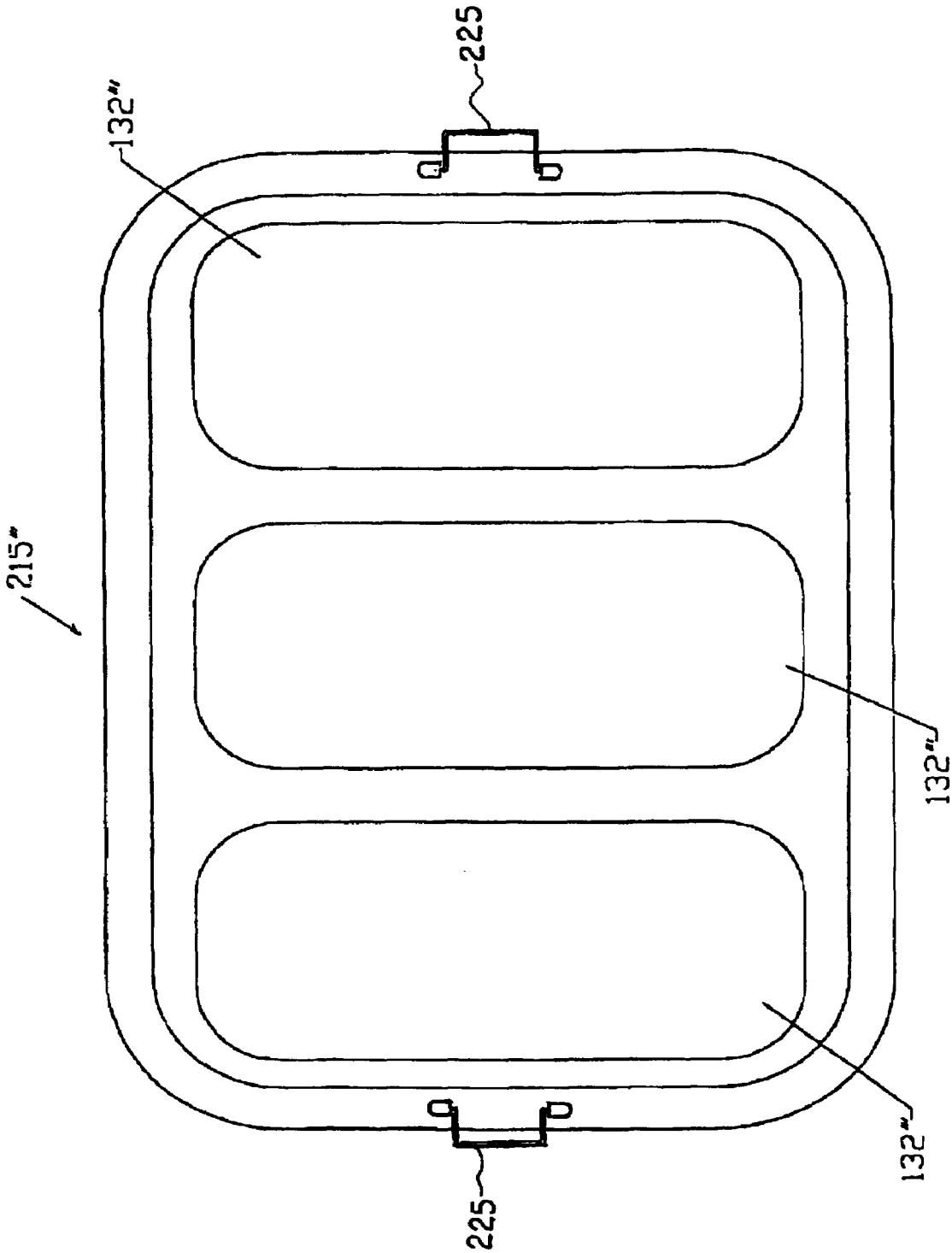


FIG.9C

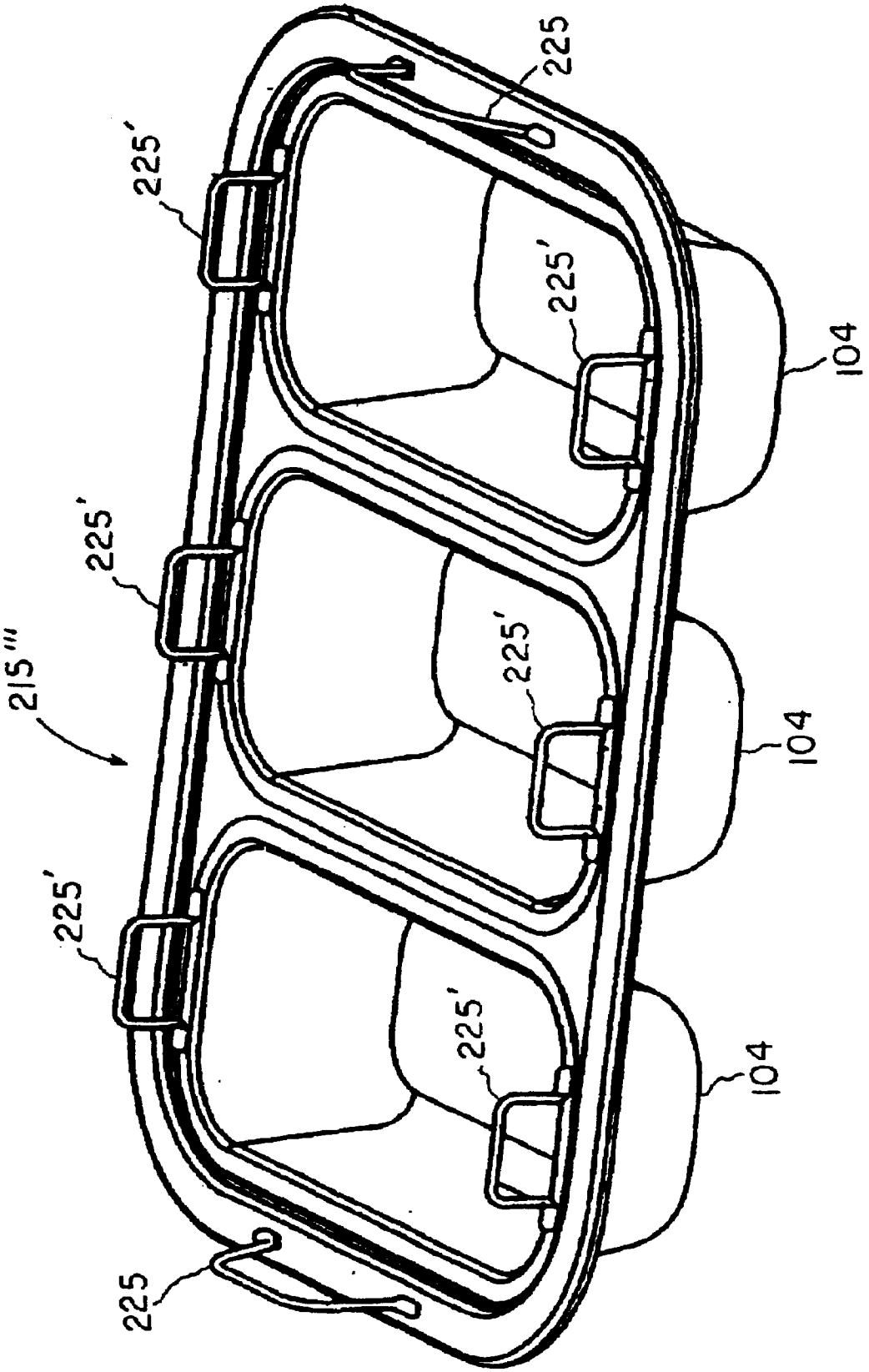


FIG. 9D

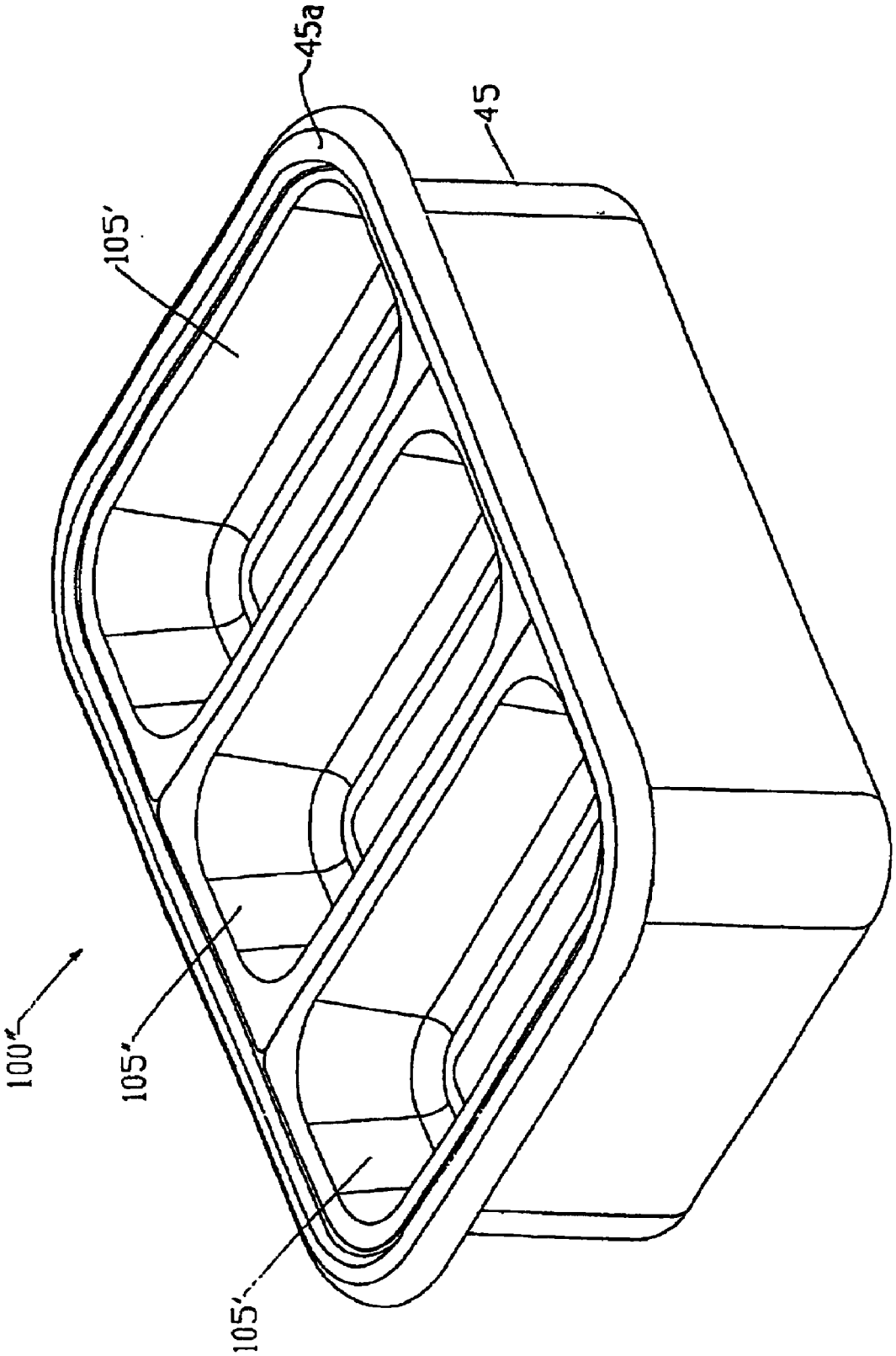


FIG.10A

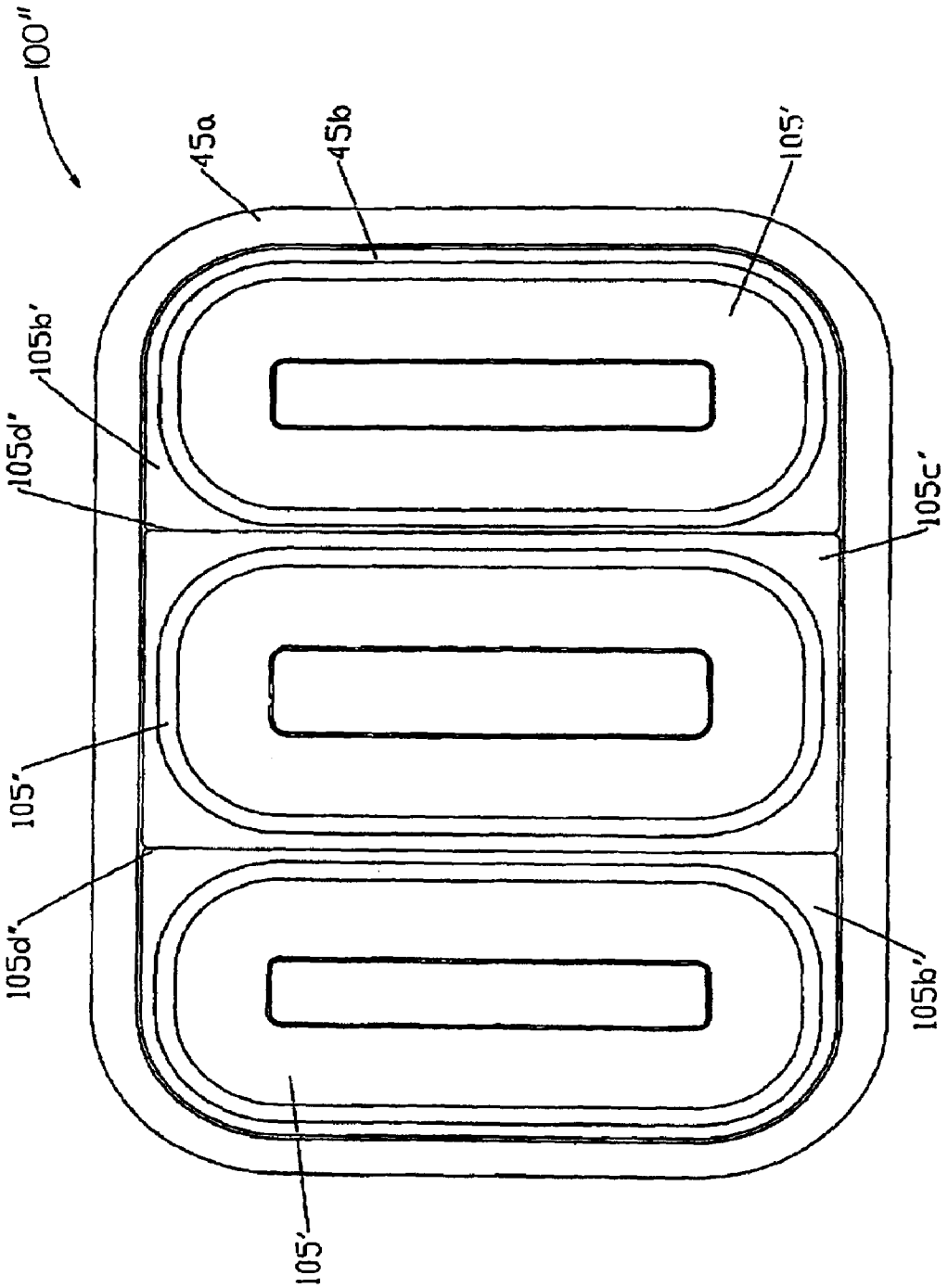


FIG.10B

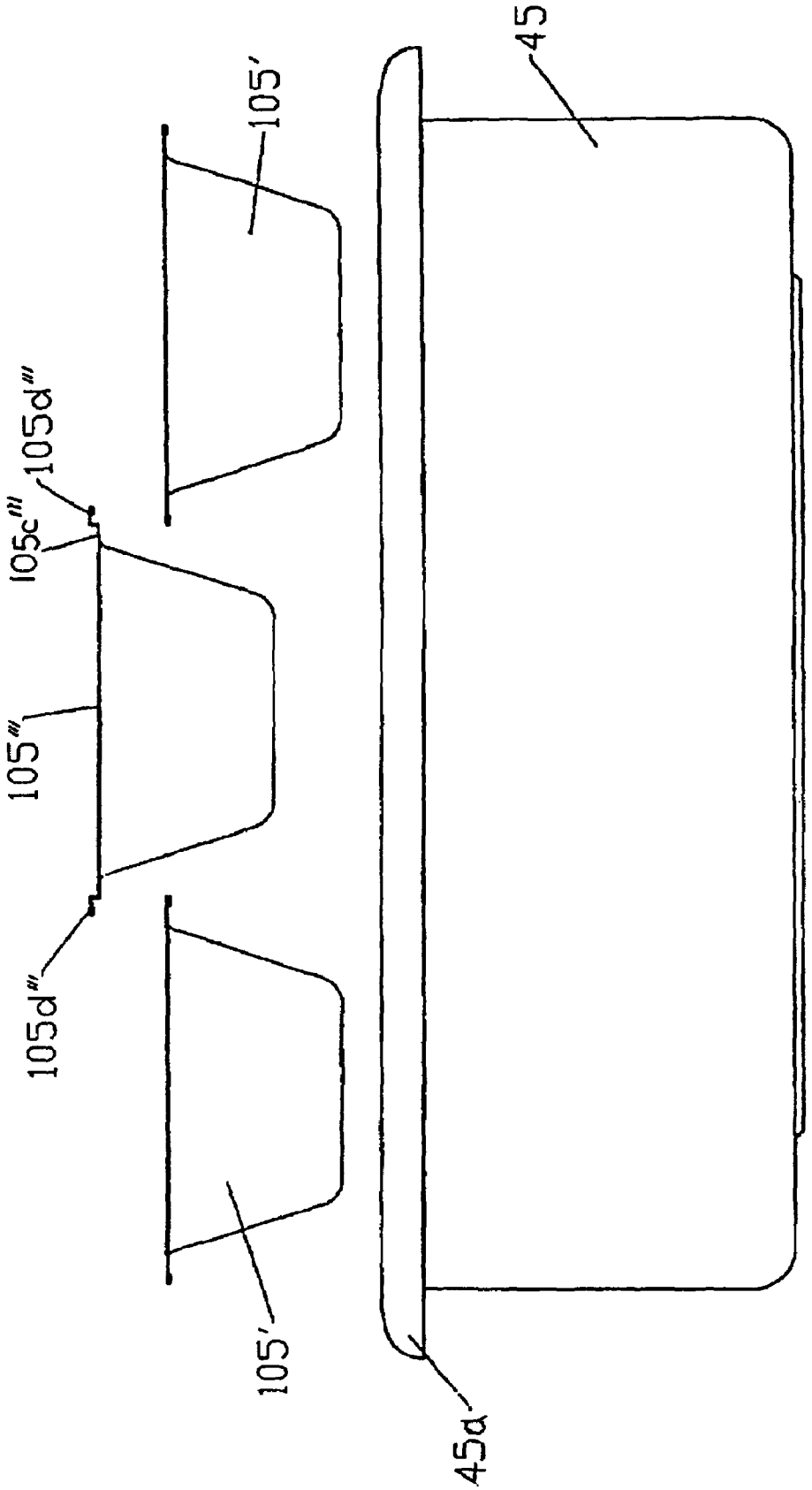


FIG.10C

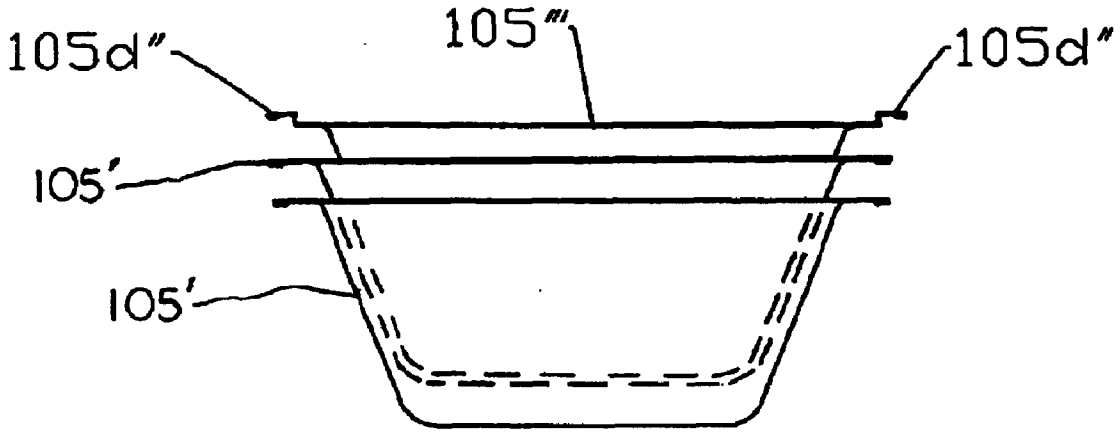


FIG. 10D

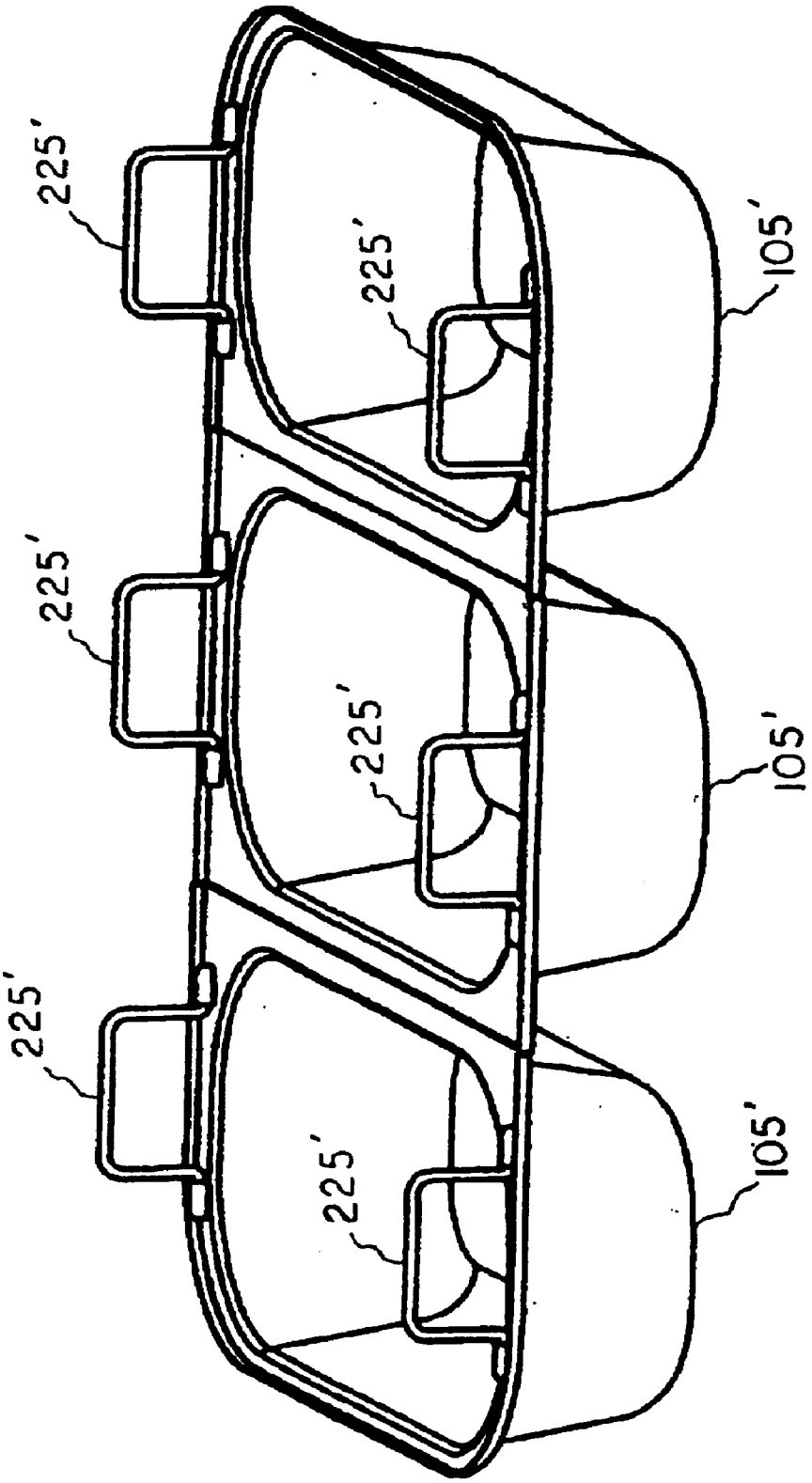


FIG. 10E

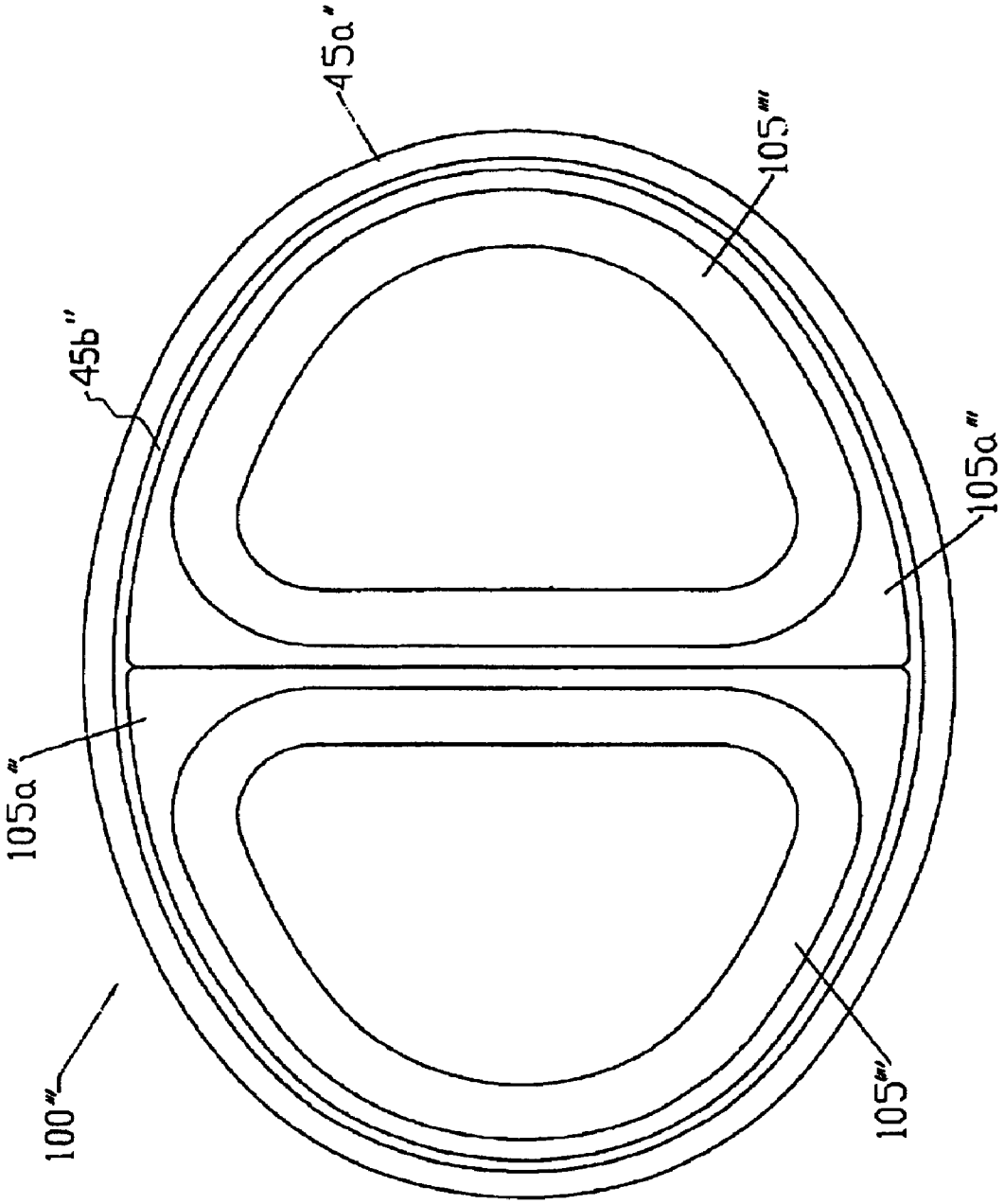


FIG.11A

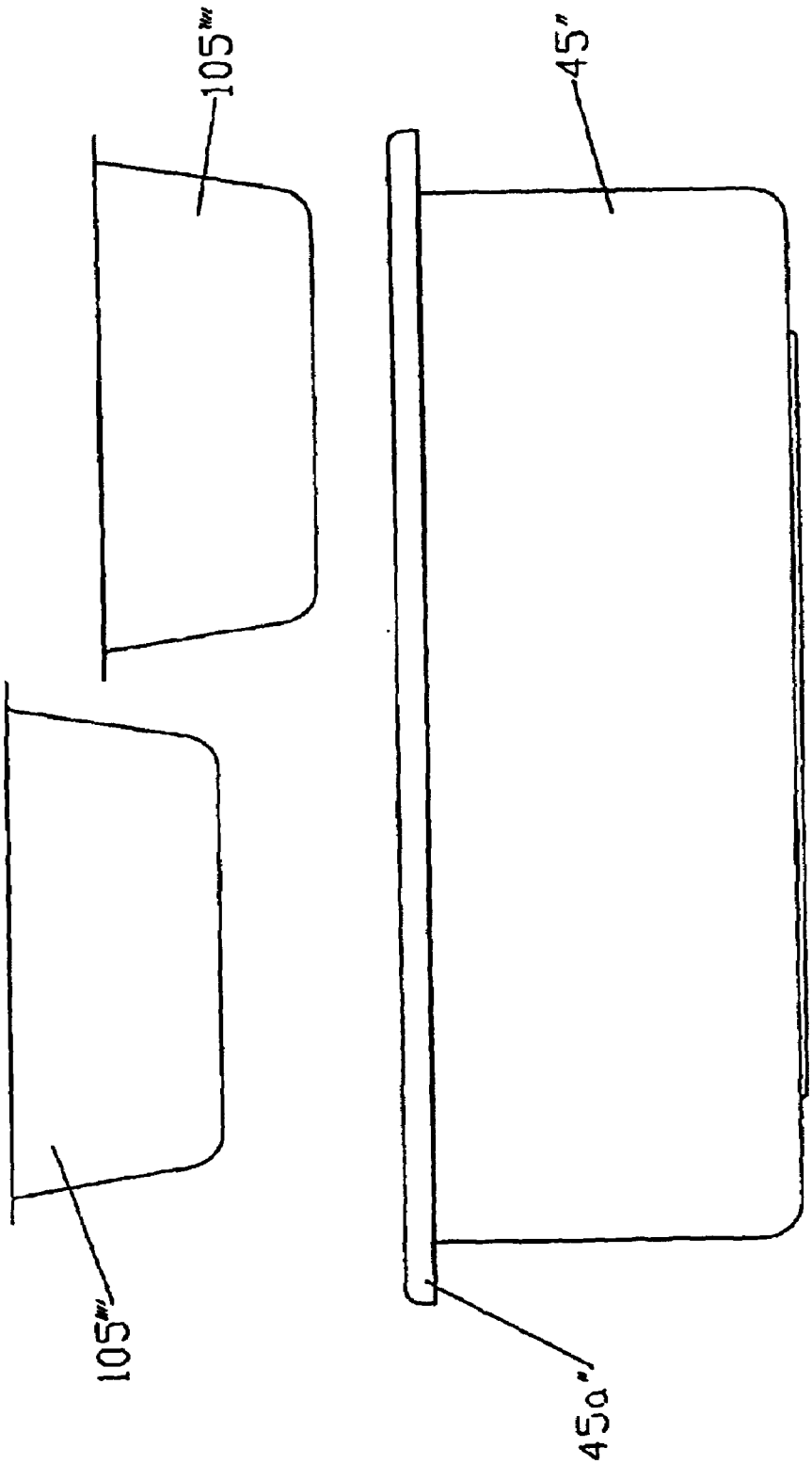


FIG.11B

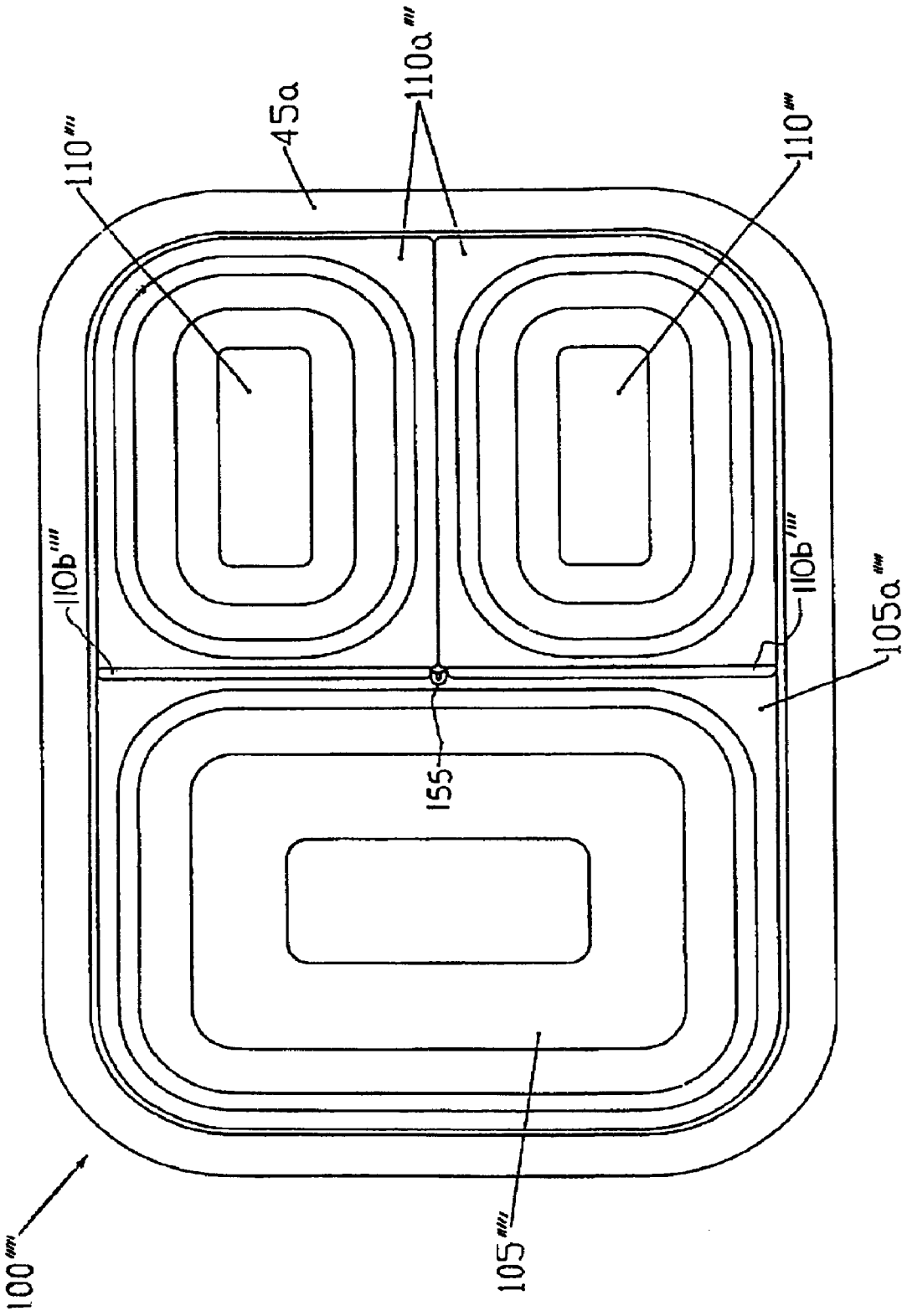


FIG.12A

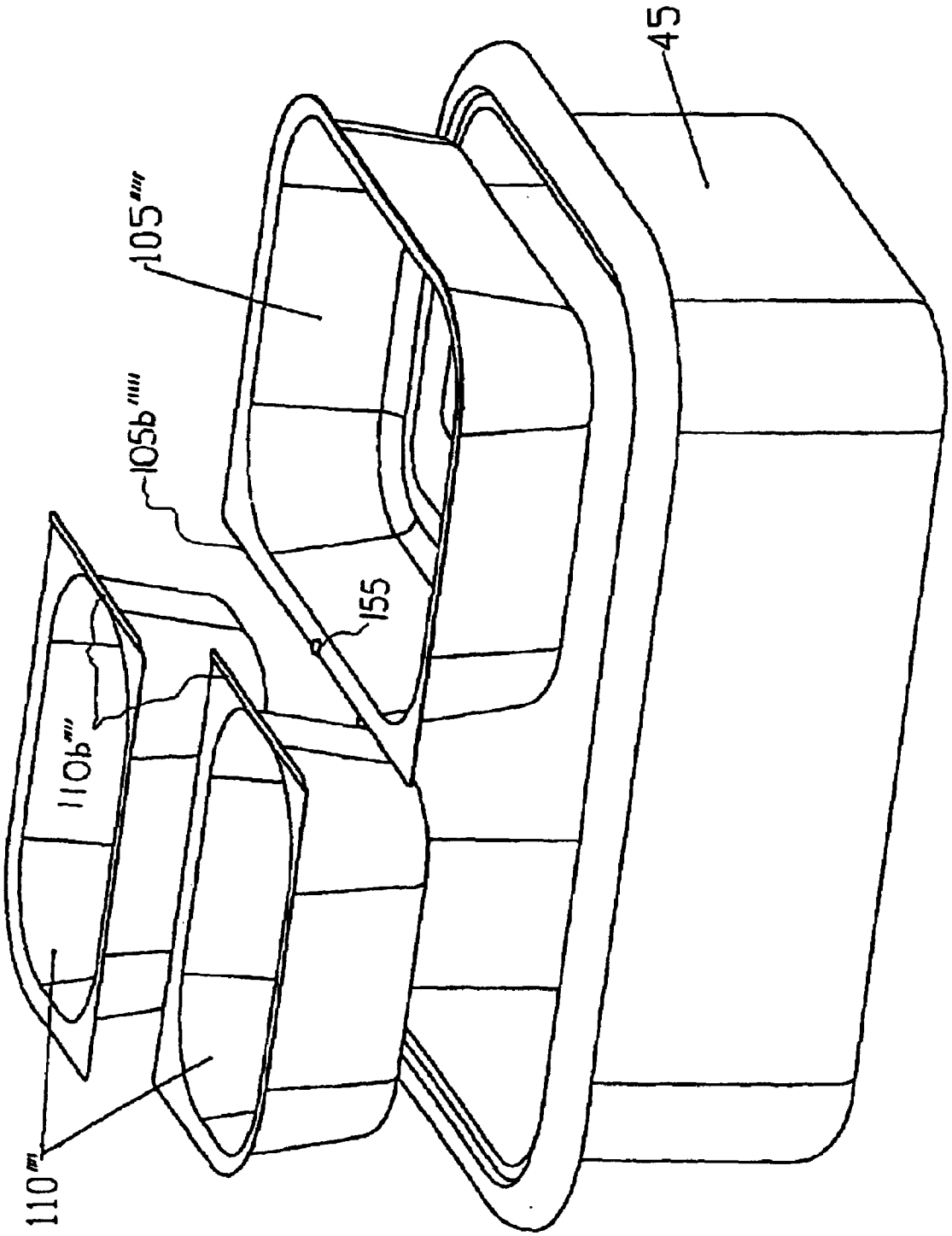


FIG. 12B

FOOD SERVING SET FOR ROASTING OVEN

CROSS-REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part of U.S. patent application Ser. No. 10/124,686 entitled Food Serving Set for Roasting Oven filed Apr. 19, 2002 and now U.S. Pat. No. 6,653,602 and claims the benefits provided under 35 USC §120.

FIELD OF INVENTION

The present invention relates to cooking appliances and, more particularly, to a food serving set for use with a roasting oven or other similar deep well cooker including both a collapsible supporting rack for food containers, which can be folded or disassembled for storage and packaging within the roasting oven and, in the alternative, a non-collapsible supporting rack for such food containers.

BACKGROUND OF THE INVENTION

Electric cooking pots for preparing and serving hot foods are well known in the prior art. Such cooking pots typically include a deep well member and a heating element arranged in functional relation thereto for supplying heat. Such cooking pots may be provided with compartmented trays, which are disposed within the interior space of the cooker for reheating and maintaining food in a ready-to-eat condition.

However, such compartmented trays are not convenient for the storage of leftover food items due to size constraints within a typical refrigerator. Further, such serving trays typically are not easily handled when hot, are not stackable (i,e. one within another) to save space, and are not conveniently packaged at the time of manufacture due to the lack of available space within the interior cavity of the roasting oven. As a result the food trays must be packaged and shipped separately, which increases overall manufacturing costs.

Thus, the present invention has been developed to resolve this problem and other shortcomings of the prior art.

DESCRIPTION OF RELATED PRIOR ART

U.S. Design Pat. Nos. 230,243; 283,666; 284,727; 305,855; 358,292; and 431,149 disclose cooking appliances and/or compartmented trays of generally similar subject matter in this field of art. However, only the ornamental appearance is illustrated for these devices and no technical disclosure or functional details are discernable.

While these devices fulfill their respective, particular objectives and requirements, the aforementioned patents do not disclose the present invention. The present inventive device comprises a food serving set including a plurality of individual food containers, which are suitable for storage, heating and serving of food items. The food containers are designed to reside in a supporting rack within the interior space of a roasting oven or other deep well cooker during use. The supporting rack and/or the individual food containers feature lift out handles for the convenience and safety of the user. The food containers are suitable for refrigerator storage of leftover food items being provided with sealable lids for all embodiments. In one embodiment the supporting rack is collapsible and may be folded and/or disassembled for storage within the interior space of the deep well cooker after use or during packaging. Alternatively, the supporting rack is provided in a non-collapsible embodiment. The individual food containers are designed to nest together in stackable relation for convenient packaging and storage within the roasting oven.

In these respects the present invention substantially departs from the conventional concepts and designs of the prior art, and in so doing provides a food serving set primarily developed for the purpose of food service and storage.

SUMMARY OF THE INVENTION

Accordingly, the present invention provides a food serving set for use with a roasting oven or other similar deep well cooker comprised of a plurality of individual containers with sealable lids for reheating and maintaining food items in a ready-to-eat condition. The present serving set features a collapsible supporting rack, which positions such individual containers within the deep well cooker while in use. In one embodiment the supporting rack is foldable for convenient storage of the serving set within the cavity of the roasting oven. In another embodiment the supporting rack may be easily disassembled for storage using a latching mechanism for the users convenience. In yet another embodiment the collapsible supporting rack is replaced by peripheral supporting flanges, which are integrally formed on the individual food containers to support them within the deep well cooker. In still yet another embodiment the supporting rack is provided in a non-collapsible configuration to reduce manufacturing costs. The food containers are designed to nest together in stacked relation for efficient packaging and storage within the roasting oven.

Other features and technical advantages of the present invention will become apparent from a study of the following description and the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features of the present invention are set forth in the appended claims. The invention itself, however, as well as other features and advantages thereof will be best understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying figures wherein:

FIG. **1** is a front elevational view of a roasting oven wherein the serving set of the present invention is utilized;

FIG. **2A** is a longitudinal cross-section of the roasting oven showing details of the construction thereof;

FIG. **2B** is a transverse cross-section of the roasting oven showing further details thereof;

FIG. **3A** is a top plan view of the food serving set of the present invention within a collapsible supporting rack;

FIG. **3B** is an exploded perspective view of the food serving set of FIG. **3A** showing the components thereof;

FIG. **3C** is an exploded elevational view of another embodiment of the serving set shown in relation to the removable liner of the roasting oven;

FIG. **3D** is a perspective view of the supporting rack the food serving set of FIG. **3C** shown in a disassembled condition;

FIG. **4A** is a top plan view of another embodiment of the food serving set of the present invention within a non-collapsible supporting rack;

FIG. **4B** is an exploded perspective view of the food serving set of FIG. **4A** showing the components thereof;

FIG. **4C** is an exploded elevational view showing the food serving set of FIGS. **4A** and **4B** in relation to the removable liner of the roasting oven;

FIG. **5** is a perspective view of an alternative embodiment of the supporting rack of the serving set shown in a folded condition;

FIG. **6**A is a top plan view of an alternative embodiment of the supporting rack in an oval configuration;

FIG. **6**B is a top plan view of the supporting rack of FIG. **6**A shown in a disassembled condition;

FIG. **6**C is a top plan view of another embodiment of the oval supporting rack in a non-collapsible configuration;

FIG. **7** is a top plan view of an alternative embodiment of a collapsible supporting rack in a generally rectangular configuration;

FIG. **8**A is a perspective view of the top surface of the D-shaped end section of the supporting rack seen in FIG. **7** showing details thereof;

FIG. **8**B is a perspective view of the bottom surface of a D-shaped end section of the supporting rack seen in FIG. **7** showing details thereof;

FIG. **9**A is a perspective view of the top surface of the center section of the supporting rack seen in FIG. **7** showing details thereof;

FIG. **9**B is a perspective view of the bottom surface of the center section of the supporting rack seen in FIG. **7** showing details thereof;

FIG. **9**C is a top plan view of another embodiment of the rectangular supporting rack in a non-collapsible configuration;

FIG. **9**D is a perspective view of another embodiment of the food serving set wherein the supporting rack and the individual food containers are provided with pivoting handles;

FIG. **10**A is a perspective view of an alternative embodiment of the present serving set in a rectangular configuration wherein a supporting rack is not required;

FIG. **10**B is a top plan view of the serving set shown in FIG. **10**A;

FIG. **10**C is an exploded elevational view of another embodiment of the food serving set wherein the center food container includes overlapping lateral edges;

FIG. **10**D is an elevational view of the food containers of FIG. **10**C shown in stacked relation for storage;

FIG. **10**E is a perspective view of another embodiment of the food serving set wherein the individual food containers are provided with pivoting handles;

FIG. **11**A is a top plan view of an alternative embodiment of the present serving set in an oval configuration; and

FIG. **11**B is an exploded elevational view of the serving set shown in FIG. **11**A;

FIG. **12**A is a top plan view of an alternative embodiment of the serving set wherein a supporting rack is not required; and

FIG. **12**B is an exploded perspective view of the serving set shown in FIG. **12**A.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Prior to describing the food serving set of the present invention in detail it may be beneficial to review the structure and function of a roasting oven or other deep well cooker wherein the present serving set is utilized. With further reference to the drawings, there is shown therein a preferred embodiment of a roasting oven in accordance with the present invention, indicated generally at **10**, and illustrated in FIG. **1**. The present roasting oven **10** is comprised of an outer housing **22** equipped with external handles **24** and feet **26**. In the preferred embodiment the housing **22** is constructed of sheet steel or other suitable material and is provided in different exterior finishes. The roasting oven **10** is also provided with a lid **28** equipped with a handle **30**. A hinge structure, indicated generally at **75**, attaches the lid **28** in opening/closing relation to the housing **22**.

The present roasting oven **10** also includes an internal heating well **36** disposed within the housing **22** as more clearly shown in FIGS. **2**A and **2**B. The heating well **36** is constructed of enamel-coated steel, cast aluminum, cast iron or other material having suitable physical characteristics. Such a roasting oven **10** may include a wrap-around heating element, indicated generally at **40**, and/or a top heating element, indicated generally at **150**.

In the preferred embodiment the present roasting oven **10** also includes a removable cooking liner **45** including a peripheral flange member **45***a* which is seated on the upper edge of the housing **22** as shown. The liner **45** is also constructed of stainless steel, enamel-coated steel, cast aluminum or other suitable material. The cooking liner **45** is easily removed from the heating well **36** for washing for the convenience of the user.

A layer of heat-resistant insulating material (not shown) is disposed in the air space as at **20** between the housing **22** and the cooking well **36** as shown in FIGS. **2**A and **2**B. Numerous types of heat insulating materials having physical and chemical properties suitable for this application are commercially available. Since such heat insulating materials are well known to those skilled in the art, further detailed discussion of the same is not deemed necessary.

The present roasting oven **10** may be constructed in an oval, rectangular, round or other configurations with minor modifications to the heating elements **40**, **150**.

Referring again to FIG. **1**, a control panel indicated generally at **32**, is typically provided on the lower front surface of the housing **22** to carry out the functions of the roasting oven **10**. The control panel **32** includes a plurality of temperature control switches **33** which are electrically interconnected with the wrap-around and/or top heating elements **40**, **150** and serve to regulate the operation thereof. The control panel **32** also includes a digital display **35**, cooking mode switches **31**, and a power switch **39**.

In the preferred embodiment the control panel **32** is comprised of a heat-resistant housing **34** including a flexible, push button film **38** which overlays an electronic control circuit board **37** (FIG. **2**B) that provides the user with fingertip control of the cooking functions. A ventilated compartment **80** is provided wherein the power supply circuit board is protected from the heat source.

The present roasting oven **10** is designed for use with standard household and commercial electrical systems. In the preferred embodiment the wrap-around heating element **40** is designed to operate in the range of 1000–1500 watts and the top heating element **150** to operate in the range of 25 to 75 watts. This wattage rating varies for a given application and capacity of the roasting oven.

With reference to FIGS. **3**A and **3**B there is shown therein a food serving set in accordance with the present invention, indicated generally at **100**, that is designed for use with such a roasting oven **10**. In this embodiment the present food serving set **100** is comprised of two small food containers **105** and one large food container **110** each being provided with sealable lid members **105***a* and **110***a* respectively and a supporting rack **115** wherein the containers **105**, **110** reside

during use. It can be seen that the containers **105, 110** are constructed in a generally octagonal shape to conform with mating openings **106** and **111** respectively formed in the supporting rack **115**. To this end each container **105, 110** includes a peripheral flange **105***b*, **110***b* formed thereon which overlaps and engages a raised edge formed about the periphery of the openings **106, 111** in the supporting rack **115** as shown.

Containers **105, 110** and lid members **105***a*, **110***a* respectively may be constructed from heat resistant plastics, engineering resins, sheet metal or other materials having physical and chemical properties suitable for this application.

It will be appreciated that various other geometric shapes and configurations of the containers **105, 110** and mating openings **106, 111** formed in the supporting rack **115** can be utilized. Thus, the embodiments disclosed in the drawings are intended to be merely illustrative and not restrictive in any sense.

In the embodiment shown in FIGS. **3**A and **3**B the half sections **115***a* and **115***b* form a simple butt joint at the juncture of their inner edges as at **109**. The half sections **115***a* and **115***b* of the supporting rack **115** are configured to reside in the top opening of the roasting oven **10** or other deep well cooker and to engage the flange member **45***a* of the cooking liner **45**. In operation the liner **45** is filled with water to a sufficient level as at **50** to contact the food containers **105, 110** when disposed in the supporting rack **115** in order to heat the food items contained therein.

In another embodiment shown in FIGS. **3**C and **3**D the supporting rack **115'** provides structures comprising collapsing means including, but not limited to, the following structures. Advantageously, the supporting rack **115'** is constructed to be easily disassembled into half sections **115***a'*, **115***b'* as shown in FIG. **3**D for packaging and storage. In the embodiment seen in FIG. **3**D this is accomplished by the use of a pair of latch assemblies, indicated generally at **120**. Each latch assembly **120** is comprised of a tongue bracket **122** which is installed in sliding engagement with a mating hasp **124** such that the half sections **115***a'*, **115***b'* are detachably secured in position.

In the embodiment seen in FIG. **3**D, the supporting rack **115'** is a stamped metal construction and tongue brackets **122** and hasps **124** are secured to the half sections **115***a'*, **115***b'* by weldment or other suitable fasteners such as rivets.

It will be appreciated by those skilled in the art that various other types of attaching hardware and quick connect/disconnect fasteners may be utilized for detachably securing the half sections **115***a'*, **115***b'* of the supporting rack **115'** and such attaching hardware is understood to be within the scope of the present invention

With reference to FIGS. **4**A–**4**C there is shown another embodiment of the food serving set, indicated generally at **100'**, that is designed for use with the roasting oven **10**. In this embodiment a non-collapsible supporting rack **215** is configured to reside in the top opening of the roasting oven **10** engaging the flange member **45***a* of the cooking liner **45** as shown in FIG. **4**C. In practical use the liner **45** is filled with water to a sufficient level as at **50** to contact the food containers **105, 110** when disposed in the supporting rack **215** in order to heat the food items contained therein.

In another embodiment the half sections **115***a"*, **115***b"* of a supporting rack **15"** are permanently joined by hinge assemblies, indicated generally at **130**, as shown in FIG. **5**. Thus, the supporting rack **115"** is foldable 180 degrees onto itself to the position shown for convenient storage within the interior space of the roasting oven **10**. Thereafter, the supporting rack **115"** is unfolded to a flattened condition for use with the present roasting oven **10** as described hereinabove.

Of course, the present serving set including the supporting rack can also be adapted for use with roasting ovens or other deep well cookers having different geometric configurations. Referring to FIGS. **6**A and **6**B there is shown therein a modified supporting rack, indicated generally at **115'"**, which is oval in configuration having modified openings **106"** and **111"** formed therein. The food containers (not shown) for this embodiment are configured for mating engagement with their corresponding openings **106", 111"**. In this embodiment semi-oval half sections **115***a'"*, **115***b'"* are detachably secured by a transverse bracket member **125** whereon a pair of modified tongue brackets **122"** are mounted for sliding engagement with mating hasps **124"** as shown in FIG. **6**B.

In an alternative construction shown in FIG. **6**C, a non-collapsible supporting rack **215"** is provided, which is also oval in configuration having the same modified openings **106"** and **111"** formed therein. The food containers (not shown) for this embodiment are also configured for mating engagement with their corresponding openings **106", 111"**. The oval supporting rack **215"** includes pivoting lift-out handle assemblies **225** for conveniently lifting the present serving set from the roasting oven during use.

In FIG. **7** there is shown yet another embodiment of a collapsible supporting rack, indicated generally at **115""**, which is generally rectangular in configuration. The supporting rack **115""** is divided into three separate sections, namely, two D-shaped end sections **115***a'"* and a center section **115***b""* each having a generally rectangular opening **132'"** with corner radii for receiving a mating food container (not shown).

As more clearly shown in FIGS. **8**A and **8**B, each of the D-shaped end sections **115***a'"* is a unitary construction conforming to the inner edge of the flange **45***a* of the cooking liner **45** (FIG. **3**C). It can be seen that each end section **115***a'"* includes a pair of receptacles, indicated generally at **135**, which are recessed into the upper surface of each end section **115***a'"*. In the embodiment shown receptacles **135** are cut and stamped into the sheet metal end sections **115***a'"* in a metal fabrication process such that rectangular sections **135***a* are displaced approximately ⅛ to ¼ inch from the upper surface, but remain integrally attached thereto. The slotted openings **135***b* are so formed for receiving mating tabs **136** formed on the center section **115***b""* shown in FIGS. **9**A and **9**B.

Referring to FIG. **9**C there is shown another embodiment of a non-collapsible supporting rack **215'"**, which is also generally rectangular in configuration. This embodiment of the supporting rack **215'"** includes three generally rectangular openings **132'"** with corner radii for receiving mating food containers **104** having a corresponding contour as shown in FIG. **9**D. In this embodiment the supporting rack **215'"** includes pivoting lift-out handles **225** at opposite ends thereof for conveniently lifting the present serving set from the roasting oven during use. In addition, each of the individual food containers **104** is provided with pivoting lift-out handles **225'** for lifting the food containers from the supporting rack **215'"** when in use.

In yet another alternative embodiment of the present serving set **100"** as shown in FIG. **10**A, a supporting rack as described hereinabove is unnecessary due to the modified configuration of the food containers. In this embodiment three generally rectangular food containers **105'**, **105"** including peripheral flanges **105***b'*, **105***c"* respectively are

configured to fit the inner edge **45***b* of the flange **45***a* of the cooking liner **45** as more clearly shown in FIG. **10**B. It can be seen that the peripheral flanges **105***b*' of the outer pair of containers **105**' are generally D-shaped in configuration being interchangeable and fitted to the opposite ends of the cooking liner **45**.

Still referring to FIG. **10**B, the center food container **105**' includes a rectangular, peripheral flange **105***c*", which is configured to fit the central portion of the inner edge **45***b* of the cooking liner **45** as shown. It will be understood that in FIGS. **10**A–**10**B the lateral edges **105***d*" of the flange **105***c*" of the center container **105**" are configured to form a butt joint with the adjoining lateral edges of the outer pair of food containers **105**'.

In an alternative construction shown in FIG. **10**C, the lateral edges **105***d*'" of the flange **105***c*"of the center container **105**'" are bent at a predetermined offset angle and are positioned in overlapping relation with the corresponding lateral edges of the outer pair of food containers **105**'. In a preferred construction the lateral edges **105***d*'" are bent at a 90° offset angle. In this manner the center food container **105**'" shown in FIG. **10**C engages and overlaps the outer containers **105**' maintaining the containers in position.

The food containers **105**', **105**", **105**'" are fabricated with inwardly tapered sidewalls to permit the food containers to nest together in stacked relation as shown in FIG. **10**D for convenient packaging and storage of the food containers.

In another embodiment of the food serving set illustrated in FIG. **10**E, the individual food containers **105**', **105**", **105**'" may be provided with pivoting lift-out handles **225**' for lifting the food containers from the cooking liner **45** during use.

Similarly, a supporting rack is unnecessary in the embodiment of the food serving set **100**'" illustrated in FIGS. **11**A and **11**B. In this oval configuration of the cooking liner **45**", the two food containers **105**"" including peripheral flanges **105***a*'" are configured to fit the inner edge **45***b*" of the flange **45***a*" of the cooking liner **45**". It can be seen that the peripheral flanges **105***a*'" of the pair of containers **105**"" are semi-oval in configuration being fitted to the opposite ends of the cooking liner **45**".

Referring now to FIG. **12**A there is shown yet another embodiment of the serving set, indicated generally at **100**"", wherein a supporting rack is not required. In this configuration of the serving set, a single large food container **105**"" including peripheral flange **105***a*"" and two smaller food containers **110**"" including peripheral flanges **10***a*"" are configured to fit the inner peripheral edge of the cooking liner **45**. It can be seen that the inner lateral edges **110***b*"" of the peripheral flanges **110***a*"" of food containers **110**"" are bent at a 90° offset angle and are positioned in overlapping relation with the corresponding lateral edge of the larger food container **105**"". In this manner the smaller food containers **110**"" engage and overlap the larger container **105**""maintaining it in position. A protuberance **155** is formed adjacent the midpoint of the inner lateral edge of flange **105***a*"", which functions to maintain the smaller food containers **110**"" in position.

Thus, it can be seen that the present invention provides a versatile food serving set for use in combination with a roasting oven or other deep well cooker, which can be utilized for maintaining food items in a ready-to-eat condition. The food serving set features individual food containers having sealable lid members, which can be transferred directly from the refrigerator to the cooker. The food serving set includes a supporting rack, which positions the food containers within the cooker during use, and which is collapsible for efficient storage and/or packaging within the interior space of the cooker. In various alternative embodiments the supporting rack is non-collapsible or is not required as the food containers are provided with integral flanges, which conform to the inner peripheral edge of the cooking liner and support the food containers in position.

Although not specifically illustrated in the drawings, it should be understood that additional equipment and structural components will be provided as necessary, and that all of the components described above are arranged and supported in an appropriate fashion to form a complete and operative food serving set incorporating features of the present invention.

Moreover, although illustrative embodiments of the invention have been described, a latitude of modification, change, and substitution is intended in the foregoing disclosure, and in certain instances, some features of the invention will be employed without a corresponding use of other features. Accordingly, it is appropriate that the appended claims be construed broadly and in a manner consistent with the scope of the invention.

What is claimed is:

1. A food serving set for use in combination with a roasting oven defining an interior space having a top opening, said food serving set comprising:

a plurality of individual food containers having sealable lid members, said containers including inwardly tapering sidewalls permitting said containers to be stacked one within another; and

a supporting rack including a plurality of openings conforming to the contour of said food containers, said supporting rack being configured for detachable engagement within said top opening of said roasting oven such that said food containers are disposed within said interior space for heating of said food items.

2. The food serving set of claim **1** wherein said supporting rack is generally rectangular in configuration having a plurality of generally rectangular openings formed therein for receiving said food containers.

3. The food serving set of claim **2** wherein said supporting rack includes collapsing means providing for disassembly of said rack into two D-shaped end sections and a generally rectangular center section, said end sections and said center section conforming to said top opening of said roasting oven upon assembly.

4. The food serving set of claim **3** wherein said collapsing means includes at least one slotted receptacle formed within each of said D-shaped end sections for receiving mating tabs formed on said center sections in sliding engagement.

5. The food serving set of claim **1** wherein said supporting rack is non-collapsible.

6. The food serving set of claim **5** wherein said supporting rack includes a pair of pivoting handles mounted on said supporting rack for lifting said serving set from said roasting oven.

7. The food serving set of claim **6** wherein said food containers each include a pair of pivoting handles for lifting said food containers from said supporting rack.

8. The food serving set of claim **1** wherein said supporting rack is oval in configuration having a plurality of semi-oval openings formed therein for receiving said food containers.

9. The food serving set of claim **8** wherein said supporting rack includes collapsing means providing for disassembly of said rack into two semi-oval end sections conforming to said top opening of said roasting oven upon assembly.

10. The food serving set of claim **9** wherein said collapsing means includes at least one slotted receptacle formed in

a first semi-oval end section for receiving mating tabs formed in the mating semi-oval end section for sliding engagement therein.

11. The food serving set of claim **8** wherein said supporting rack is non-collapsible.

12. The food serving set of claim **11** wherein said supporting rack includes a pair of pivoting handles mounted on said supporting rack for lifting said serving set from said roasting oven.

13. An improved deep well cooker having an outer housing, a cooking well having a top opening installed within said housing, a cooking liner disposed within said cooking well, a heat source disposed in heating relation to said cooking well and a temperature control switch electrically interconnected to said heat source wherein the improvement comprises:

a food serving set including a plurality of individual food containers having integral peripheral flanges formed thereon for engaging an inner peripheral edge of said cooking liner to position said food containers within said cooker for heating of food items within said containers.

14. The improved deep well cooker of claim **13** wherein said cooking liner is generally rectangular in configuration.

15. The improved deep well cooker of claim **14** wherein three generally rectangular food containers including an outer pair of food containers and a center food container are arranged in side-by-side relation within said cooking liner.

16. The improved deep well cooker of claim **15** wherein said outer pair of containers each includes a D-shaped peripheral flange and said center food container includes a rectangular peripheral flange conforming to the inner peripheral edge of said cooking liner when positioned therein.

17. The improved deep well cooker of claim **16** wherein the lateral edges of said rectangular peripheral flange are bent at a ninety degree offset to overlap the adjacent peripheral flanges of said outer pair of food containers to maintain said outer pair of flanges in position.

18. The improved deep well cooker of claim **15** wherein each of said food containers includes a pair of pivoting handles for lifting said food containers from said roasting oven.

19. The improved deep well cooker of claim **13** wherein said food containers include detachable lid members.

20. The improved deep well cooker of claim **13** wherein said cooking liner is oval in configuration.

21. The improved deep well cooker of claim **20** wherein two semi-oval food containers are arranged in side-by-side relation within said cooking liner.

22. The improved deep well cooker of claim **21** wherein each of said food containers includes an integral semi-oval peripheral flange conforming to the inner peripheral edge of said cooking liner.

23. The improved deep well cooker of claim **13** wherein three generally rectangular food containers including a single large container having an integral peripheral flange and a pair of smaller containers having integral peripheral flanges are arranged within said cooking liner.

24. The improved deep well cooker of claim **22** wherein said single large container includes a D-shaped flange conforming to one-half of the inner peripheral edge of said cooking liner and said pair of smaller containers in combination define a D-shaped flange conforming to one-half of said inner peripheral edge of said cooking liner.

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