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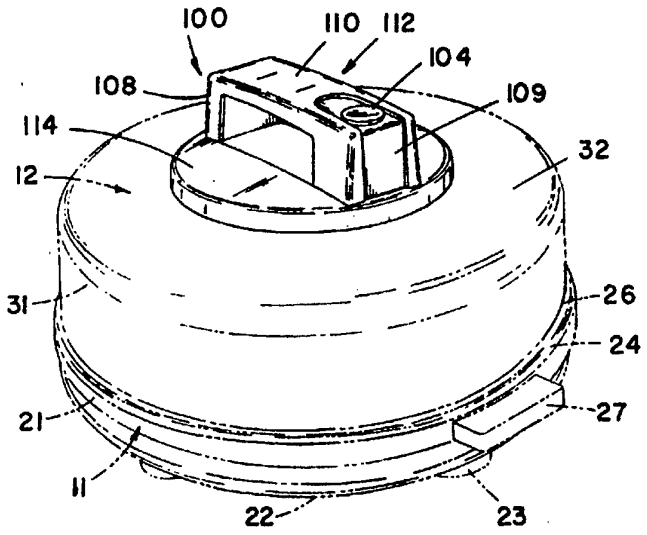

(57) Abstract

A handle (100) adapted for replacing a heater and blower system (13) removably located in a central opening (32') defined in a top enclosure (12) of a countertop oven (10) comprises a mounting system for removably attaching the handle in order to convert the countertop oven to a food server. A pan (250) having a flat, round bottom (252) with a central opening (258), an outer peripheral wall (254) and an inner peripheral wall (260) both extending upwardly can be used in this convection oven. An other cooking pan (230) has a base made of a mesh screen (232) surrounded by solid rim (234). A further pan system (270, 300) for an air oven comprises a plurality of spaced cup units (272) supported by their rims (278) on flat wire frame (214, 288) in a configuration permitting the flow of air therebetween. A rack (420) has legs (424) made of wire and having each two downwardly extending straight segments (428) connected by a connecting segment (430) whose shape allows the rack surface (422) to be placed at one of a plurality of predetermined distances above the surface in the oven. Several racks with different lengths of the straight segments (428, 428', 428'') may be used together to provide different ranges of height adjustability.

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COOKING SYSTEM AND ACCESSORIES

SUMMARY AND BACKGROUND OF THE INVENTION

The present invention relates to a system and methods for cooking of food products.

The present handle invention includes a handle adapted to replace a heater and blower system removably located in a central opening defined in a top enclosure of a countertop oven. The handle has a mounting system for removably attaching the handle to the top enclosure in order to replace the heater and blower system when the heater and blower system is removed. The handle enables a user to remove the top enclosure from the bottom enclosure by lifting up on the handle when the handle is installed in the top enclosure. In this manner, the countertop oven may be converted to a food server comprising the handle, the top enclosure, and the bottom enclosure.

One embodiment of the present cooking pan invention includes a pan having a generally flat, round bottom member, the bottom member defining a central opening. The pan further has an outer peripheral wall extending upwardly and being located at the outer diameter of the bottom member, the outer peripheral wall having a height of approximately one-half inch. In addition, the pan has an inner peripheral wall extending upwardly and being located at the periphery of the central opening, the inner peripheral wall having a height of approximately one-eight inch. The present invention also includes a countertop oven used with such a cooking pan.

Another embodiment of the cooking pan invention includes a countertop oven and cooking pan system for cooking food. The oven includes an enclosure having an upper enclosure member and a lower enclosure member, the upper member having defined therein an opening. Disposed within that opening is a power-driven heater and blower system mounted for heating and moving the air within the enclosure. The cooking pan is disposed

within the lower enclosure member. The cooking pan has a base member made of a mesh screen with a plurality of openings therein, and a solid rim extending around the periphery of the base member. In use, the heater and blower system move heated air in the enclosure so that food disposed on the cooking pan is cooked by the flow of heated air around the food and through the openings in the cooking pan.

The present cooking pan system invention is a system for cooking food in an air oven. The system includes a plurality of spaced cup units having side walls defining a generally cylindrical configuration which smoothly transition into a bottom member with a substantially rounded connection between the side walls and the bottom member. The system also includes a thin, relatively flat wire frame for holding the cup units in position. The wire frame has outer and inner annulus members, wherein the circumference of the outer and inner annulus members are determined by a diametrical dimension defined by the generally cylindrical configuration of each cup unit. The annulus members engage the cup side walls in order to secure the cup units in a system configuration permitting the flow of heated air between the cup units.

The present cooking rack invention includes a rack having a rack surface and a plurality of legs attached to the rack surface. Each of the legs is made of wire and has two straight segments extending downwardly from the rack surface and a connecting segment which connects together the straight segments. The connecting segment is shaped so as to allow the rack surface to be placed at one of a plurality of predetermined distances above the surface in the oven. The cooking rack invention also includes a plurality of such racks which may be used together in an oven. In such an instance, the length of the straight segments of one rack are different that those of another rack, so

that the racks provide different ranges of height adjustability.

A method invention of cooking foods in an air oven includes using a cooking pan having a hole in its center, wherein the air oven cooks food by circulating heated air throughout the air oven cook chamber. The circulating air is drawn back up into the center of the cooking chamber and reheated and directed back down to be circulated around food positioned on the cooking pan disposed in the air oven. The hole in the cooking pan creates a passage for the circulation of the heated air.

An alternative method of cooking foods in a convection oven includes placing within the enclosure of the oven a cooking pan having a base member and a solid rim extending around the periphery of the base member. The base member is made of a mesh screen defining a plurality of openings therein. Food to be cooked is placed on the cooking pan. Air is then circulated within the enclosure so that the oven cooks food by circulating heated air throughout the oven cooking chamber. The circulating air is drawn back up into the center of the enclosure and reheated and directed back down to be circulated around food positioned on the cooking pan disposed in the oven. The openings in the cooking pan create a passage for the circulation of the heated air.

Yet another alternative method invention of cooking food in an air oven having a cooking chamber includes positioning on a rack in the cooking chamber a food cooking system. The food cooking system placed on the rack has a frame and cup units positioned in the frame. In the method, the air oven cooks the food by circulating blower-driven heated air throughout the air oven cooking chamber. The circulating air is drawn back up into the center of the cooking chamber and reheated and directed back down to be circulated around the cup units. The frame cup units are spaced apart in order to

allow the heated air to flow throughout the cooking chamber and between the cups back up into the top of the cooking chamber.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a food serving device having a steam and heat controllable handle engaged;

Fig. 2 is a top view of the steam and heat controllable handle shown in Fig. 1;

Fig. 3 is a bottom view of the steam and heat controllable handle shown in Fig. 1;

Fig. 4 is a view taken along lines 4--4 in Fig. 2;

Fig. 5 is a perspective view of a 12-cup muffin cooking system;

Fig. 6 is a top view of the 12-cup muffin cooking system shown in Fig. 5;

Fig. 7 is a top view of the frame for the 12-cup muffin cooking system shown in Fig. 5;

Fig. 8 is a side elevational view of the frame shown in Fig. 7;

Fig. 9 is a top view of a muffin cup;

Fig. 10 is a view taken along lines 10--10 in Fig. 9.

Fig. 11 is a sectional view of a muffin cup engaged with a frame of a muffin cooking system, showing the frame and the muffin cup engagement with a cooking rack;

Fig. 12 is a prospective view of a 6-cup muffing cooking system;

Fig. 13 is a top view of the 6-cup muffin cooking system shown in Fig. 12;

Fig. 14 is a top view of the frame of the 6-cup muffin cooking system shown in Fig 12;

Fig. 15 is a side elevational view of the frame shown in Fig. 14;

Fig. 16 is a perspective view of a cooking device showing its use with a cooking pan having a hole in at its center;

Fig. 17 is a top view of the cooking pan shown in Fig. 16;

Fig. 18 is a view taken along lines 18-18 in Fig. 17;

Fig. 19 is a sectional view of the upper and lower portions of a cooking device showing an electric motor fan and cyclonic circulation of air;

Fig. 20 is a side view of a cooking device which has been partially cut away to show a cooking rack system;

Fig. 21 is an enlarged bottom view showing the manner in which preferred cooking racks rest upon one another;

Fig. 22 is a top view showing a preferred cooking rack;

Fig. 23 is a side view of the rack shown in Fig. 22;

Fig. 23A is a side view showing an alternative preferred cooking rack;

Fig. 23B is a side view showing an additional preferred cooking rack;

Fig. 24 is a top view of an alternative embodiment of cooking pan similar to that of Figs. 16-18;

Fig. 25 is a view taken along lines 25-25 in Fig. 24;

Fig. 26 is an enlarged sectional view of a portion of the cooking pan of Fig. 24, showing the surface contour thereof;

Fig. 27 is a perspective view of a cooking device showing its use with another embodiment of a cooking pan;

Fig. 28 is a top view of the cooking pan shown in Fig. 27;

Fig. 29 is a sectional view taken along lines 29-29 in Fig. 28; and

Fig. 30 is an enlarged top view of a portion of the cooking pan of Fig. 28.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The inventions described in the present application are particularly suitable for use with the countertop oven disclosed in U.S. Patent Nos. 4,817,509 and 5,165,328, which are assigned to the same assignee as is the present application. U.S. Patent Nos. 4,817,509 and 5,165,328 are incorporated by reference as if fully set forth herein.

A cooking device 10 as illustrated in Figs. 5, 12, 16, 19 and 20, includes a base member 11, a top 12 and a powered heater unit 13. The heater unit 13 is in locked engagement with top 12 as hereinafter described. The cooking device 10 further includes a lower frame bracket 14 and an upper frame bracket 15 which are hingedly engaged such as by removable pin 17. The brackets 14 and 15 may be integrally secured to the base 11 and top 12 respectively, or alternatively, they may be removably secured such as by snap mechanism 18.

The base 11 may be suitably formed of a polymeric material that may be transparent and includes a circumferential wall 21, an integral lower wall 22 and a plurality of feet 23. The feet 23 serve to elevate the lower wall 22 upwardly from a support surface such as a countertop. The lower unit 11 may include a thickened upper rim 24 defining a slot 26 into which the top 12 may by lodged. The base 11 may further include a handle 27. The circumferential wall 21 further includes an annular rim which serves to support the rack 29 on which the food pieces may be disposed. The rack 29 may be of a wire construction.

The top 12 of the cooking unit 10 likewise includes a circumferential wall 31 and an upper wall 32.

The wall 32 may be integral with wall 31; for example, produced by injection molding, or alternatively, vacuum molding. The upper wall 32 has an opening 32' defined therein for receipt of the powered heating unit 13.

The power heater unit 13 is illustrated in Figs. 5, 12, 16, and 19. The power unit 13 includes an outer housing 46, which contains a heater (not shown) and a blower blade 43. The outer housing 46 is preferably made of injection molded plastic. A motor is preferably located in the area above the hinge. A belt extends between the motor and a shaft on which blower blade 43 is mounted.

The heater may be an open coil, resistance wire type, and may be thermostatically regulated to maintain cooking temperatures ranging from 150 to 450+ degrees F.

The open heater coil is used in order to achieve the lowest possible surface watt density. With adequate air flow, such an element is capable of transferring maximum heat to the air stream via convection and conduction, while operating in the "black" heat range. In order for other types of heating elements, such as tubular types, to give off the same wattage given the same space and airflow, the heater would glow. Such a high surface watt density would result in overheating of the motor blower, the food being cooked, and plastic parts through an excessive radiation of heat. In addition, such an element would retain too much heat when the unit is shut off, causing additional over temperature problems.

The heater assembly also incorporates an over temperature device capable of shutting off power to the heater should the thermostat fail.

The blade 43 creates two air circulations. The first air circulation is throughout the heated chamber. The second air circulation passes a small portion of air over the heated coils in the heater. In other words, the small air current exits radially outwardly from the

blade 43, reverses direction 180 degrees to be drawn in over the coil, then radially inwardly to the center of the heater, then downwardly into the center zone of the blade 43.

Electrical current is fed into the device 10 by way of electric cord 67. The cord 67 may include a conventional plug for insertion into a wall socket. The electrical current passes through switch mechanism 68 mounted in the upper portion 15. The switch 68 includes a sensing mechanism to provide shutdown of the unit in the case of overheating in the heating chamber and/or motor housing 41. A sensing mechanism may also be included which shuts down the unit if the top portion 12 is pivoted upwardly with the throw portion of the switch 68 in the "on" position.

The air fryer disclosed may be placed in operation by pivoting the top portion 12 upwardly. Food pieces such as potatoes, bakery goods, pizzas and the like may be placed on the rack 29. The top portion 12 is then pivoted downwardly to the position illustrated in Figs. 5, 12, 16, and 19. The switch 68 is then activated turning the heating element and the motor on. With the blade 43 rotating, air is moved within the chamber formed by the lower unit portion 11 and the upper portion 12, as shown in Fig. 19. Air is circulated over the resistance coil thereby providing heat to the chamber. The temperature will typically be in the range of 150-400 degrees F. If desired, a central wall may be mounted in the heated chamber to provide a disturbance and thus greater turbulence within the heated chamber.

Unlike conventional devices, the blower of the disclosed fryer is placed in the top center of the cooking chamber. The blower wheel is mounted in such a way as to project into the cooking chamber, its upper surface being at the same level or lower than the upper wall of the chamber. In this position, the air thrown

off the wheel travels parallel horizontally to the upper wall of the chamber until it is directed downward by the radius joining the upper wall and the vertical round side wall. The air then travels downward until it is again deflected at the base of the outside wall by the radius joining the side wall with the lower wall of the enclosure. The air is then simultaneously pushed and drawn by the blower across the top of and beneath the cooking rack. As the air approaches the center of the enclosure, it is drawn up into the open underside of the blower wheel, where it is then recirculated through the same pattern described above.

The velocity of the air is not constant within the chamber, since the heated air converges as it moves to the center of the unit and is drawn into the blower. In the air fryer, the air cools as it contacts the food, but simultaneously accelerates as it converges on the center of the chamber. This change in velocity compensates for the dropping temperature by more effectively exchanging the heat remaining in the air. The result is very uniform cooking from the outer edge to the center of the cooking rack. The velocity of the air in the oven is preferably very high, in the range of 1000-4000 linear feet per minute in the vicinity of the food, with a range of 1200-2500 being particularly preferred.

When cooking items that cover most of the cooking rack, such as pizza, or that require a pan, such as cookies, airflow to the underside of the rack is hindered from being drawn back into the blower wheel. The trapped air swirls rapidly, but cools off significantly, due to inadequate air exchange with the heated air mass above the rack. To compensate for the above, one or more "mixing vanes" may be located diagonally under the cooking rack. This causes the air to form two or more counter-rotating air masses that dramatically improve the air exchange under the rack.

Another method of solving the above mentioned problem associated with items that cover most of the rack is to use a cooking pan 250 having a hole in the center of the pan, as shown in figure 16-18. Figs. 16-18 show a cooking pan 250 having a large flat-bottom surface 252 and a peripheral side wall 254. Peripheral side wall 254 is created by gradually inclining the bottom of the flat surface 252 until the side wall 254 is formed. The flat bottom 252 and peripheral side wall 254 are a continuous surface and the peripheral side walls slope upwardly and outwardly from the center 256 of the flat-bottom surface 252. The flat-bottom surface 252 of the cooking pan 250 has a circular opening 258 at its center 256. The circular opening 258 has an inner peripheral wall 260 sloping upwardly and inwardly.

The outer peripheral side wall 254 serves the function of a normal cooking pan. The circular opening 258 in the center 256 of the cooking pan 250 serves a purpose of allowing the cyclonic air to flow through the center of the cooking pan 250, thereby reducing the amount of air trapped beneath the cooking pan 250. This allows air to circulate more freely through the cooking chamber. The hole 258 in the center 256 of the cooking pan 250 in a preferred embodiment is approximately two (2) inches in diameter. However, other diameters may be more appropriate given the level of cyclonic air flow desired. The outside peripheral side walls 254 preferably slope upwardly and outwardly for approximately 1/2 of an inch. The inner peripheral walls 260 preferably slope upwardly and inwardly for approximately 1/8 of an inch. In addition, the cooking pan is preferably made of a conductive material having a layer of non-stick surface attached thereon.

The hole 258 in the center of the cooking pan allows for increased flow of cyclonic air, by allowing air to be drawn back up into the blower wheel 43.

The cooking pan is preferably placed directly

on top of the rack of the cooking oven as shown in Figure 16. This allows the cooking pan to keep some distance between its bottom surface and the bottom of the cooking chamber base. This distance allows for a more complete circulation of air flow.

Figures 24-26 show an alternative embodiment of a cooking pan 370. Like the cooking pan disclosed in Figs. 16-18, cooking pan 370 has a flat-bottom surface 372 and a peripheral side wall 374. The flat-bottom surface 372 of the cooking pan 370 has a circular opening 378 at its center 376. The circular opening 378 has an inner peripheral wall 380 sloping upwardly and inwardly.

The primary difference between the embodiment of Figs. 24-26 and that of Figs. 16-18 is that the flat-bottom surface 372 has a surface contour formed by a plurality of small deformations 382 in the flat-bottom surface. The primary purpose of the surface contour is to prevent movement of the food, which may be caused by the rapidly-moving air.

As shown in greater detail in Fig. 26, deformations 382 may be in the form of small hills 384 and valleys 386 formed in the flat-bottom surface 372. The hills and valleys are preferably of uniform height and uniformly distributed over surface 372. The vertical distance d between hills and valleys is preferably in the range of .003 inches to .025 inches, with .005 to .010 being acceptable. The thickness of the metal forming the bottom surface may be approximately 0.032 inches; however, in such an embodiment, the surface contour typically increases the effective "thickness" (i.e., the distance D between the top surface of the peaks and the bottom surface of the valleys) of the flat-bottom surface is increased due to the deformations.

Another embodiment of an oven and cooking pan system 130 is shown in Fig. 27. The oven includes a cooking

chamber 142 removably supported by a frame 144. Frame 144 is preferably made of a thermoplastic material, such as by molding.

The cooking chamber is made up of a lower enclosure member 146 and an upper enclosure member 148. The upper and lower enclosure members are preferably made out of heat resistant glass, such as PYREX. A cooking rack 149 is preferably placed within the cooking chamber to support the food to be cooked. A ridge is formed along the upper edge of the side wall to support the upper enclosure member. The upper enclosure member has a centrally-located opening for receiving a heater and fan as will be hereinafter described.

Frame 144 is preferably made up of a base member 158 and two upright members 160. The base member may be generally circular in shape, and is designed to rest on the supporting surface, such as a countertop. The upright members are preferably located on diametrically opposed sides of the base member, and are made up of two riser portions 161 connected together by a connecting portion 163. The riser portions 161 extend outwardly at the upper end thereof to form supporting surfaces 164.

The lower enclosure member 166 is configured to rest on the lower curved region 166 of the riser portions. Because of this arrangement, a small air space is formed between the bottom wall of the lower enclosure member and the base member 158. This air space helps to prevent the transfer of heat from the cooking chamber to the base member, so as to avoid excessive heating of the countertop. Alternatively, the air space may also be formed by placing a number of spacer members (not shown) between the bottom wall of the lower enclosure member and the base member.

The design of the frame provides passive cooling so as to keep the countertop cool. Specifically, air trapped in the region between the

connecting portion 163 of the upright members and the cooking chamber is heated by the cooking chamber. This hot air rises along the upright member. The rising air creates a suction effect, drawing cooler air into the region under base member. This flow of air helps cool the base member and hence helps to keep the countertop cool.

A number of cushioning members (not shown) may be attached to the connecting portion 163 of the upright members. These cushioning members help provide support to the cooking chamber when it is held by the frame.

A housing 174 is attached to the upper enclosure member 148. Like the frame, the housing is preferably made out of a thermoplastic material. The housing is made up of a central portion 176 and two arms 178 which project outwardly from the central portion. A handle 180 is attached to the central portion of the housing.

The arms 178 project past the outer edge of the upper enclosure member 148. The arms may be configured so that the outer peripheral portion of the arms rest on the supporting surfaces 164 of the upright members. In this way, the housing 174 is supported and stabilized by the frame 144. In addition, the outer edges of the arms 178 may extend below the lower surface of the upper enclosure member 148. This is a useful feature because, when the housing and upper enclosure member are lifted off the frame and placed on the countertop, the hot upper enclosure member does not come into direct contact with the countertop. Hence, the chances of burning the countertop are reduced.

A motor (not shown) is mounted within the central portion 176. The motor is connected by a shaft to a hot-air fan located within the cooking chamber. A heater is also located within the cooking chamber. The heater/fan assembly may be substantially the same as that shown in Fig. 19. Instead of employing a fan like

that shown in Fig. 19, oven 130 may also employ an axial-type fan with a shroud around it, which provides for a different air flow pattern within the cooking chamber.

Arms 178 preferably define two air channels extending along the length of the arms. The air channels may communicate with a cooling fan (not shown) located within the central portion 176. The cooling fan may be attached to the same shaft as the hot air fan. This arrangement provides for a venting system for cooling the motor as well as the upper enclosure member 148. Particularly, rotation of the cooling fan causes cool air to be drawn in through the outer portion of arms 178. From there, the cool air passes through one of the channels in the arms and into the central portion 176 so as to cool the motor. The cool air is then expelled into the second channel in the arms 178. From there, the cool air is forced out through the small space 211 between the side walls of the arm and the upper enclosure member. These jets of cool air across the surface of the upper enclosure member provide an effective method of cooling the upper enclosure member, so as to reduce the chance of accidental burning of the user. The flow of cool air also helps cool the housing itself which, being preferably made of plastic, cannot take the high temperatures produced in the heating chamber.

The heater in oven 130 is preferably an open coil resistance wire heater, like that shown in Fig. 19. The heater may be thermostatically regulated to maintain cooking temperatures ranging from 150 to 500+ degrees F. Electrical current is fed into the device 130 by way of electric cord (not shown). A timer/switch mechanism (not shown) is provided for turning the heater and motor on and for controlling the cooking time. A thermostat is provided which adjusts the current supplied to the heater so as to control the temperature within the

cooking chamber. A sensing mechanism may be provided to provide shutdown of the unit in the case of overheating in the cooking chamber 142 and/or housing 174. A sensing mechanism may also be included which shuts down the unit when the housing is removed from the frame with the switch in the "on" position.

Figure 27 illustrates a cooking pan 230 located within cooking chamber 130. Cooking pan 230, which preferably rests removably on rack 149, is shown in greater detail in Figs. 28-30.

Cooking pan 230 may be made up of a base member 232 and a solid rim 234 extending around the periphery of the base member. Both pieces are preferably made of metal. Base member 232 is preferably a mesh screen having a plurality of openings 236 therein (Fig. 30). The mesh screen may be formed by cutting a plurality of slits in a solid metal sheet. A thickness of 0.02 inches for the metal sheet is acceptable. The sheet may then be stretched perpendicular to the direction of the slits, causing the sheet to deform into the mesh pattern shown in Fig. 11. The rim 234 may be attached to the base member 232 by folding a flat piece of metal around the base member and crimping (Fig. 29).

Openings 236 are preferably uniformly distributed over base member. The openings may be in the range of .002 to .007 square inches in size, with .003 square inches being typical. Approximately 125 of the openings are typically located within each square inch of the base member 232, although other densities may be employed.

Cooking pan 230 also preferably includes clips 237 for assisting in placing and removing the cooking pan from the oven. Two such clips may be used, located at diametrically opposed position along the rim of the cooking pan. The clips are preferably C-shaped in cross-section, and may be attached to the pan by inserting one of the legs of the clips between the base

member 232 and rim 234 and crimping. One purpose of the clips is to make it easier to remove the cooking pan from the oven. The shape of the clips allows the clips to be engaged by a set of tongs (not shown), for removal of the pan even when the pan is hot.

The convection oven described above is used by first lifting up on the housing so as to remove the upper enclosure member from the lower enclosure member. Food pieces may be placed on the rack 149, or if desired, a cooking pan such as pan 230 may be placed on the rack, with the food pieces being placed on the cooking pan. The housing is then once again placed on the frame, so that the upper enclosure member again rests on the lower enclosure member. The switch is then activated, turning the heating element and the motor on. With the fan rotating, air is moved within the cooking chamber. Air is circulated over the resistance coil, thereby providing heat to the chamber. The temperature will typically be in the range of 150-500 degrees F.

The mesh screen of cooking pan 230 has the advantage of providing substantial support to food placed on it, while still allowing air to flow freely through the cooking pan. In this way, air does not become trapped under the cooking pan, which would cause reduced air flow and velocity. The use of the screen is especially advantageous when cooking items such as cookies. A solid pan would not provide for suitable air flow within the cooking chamber and hence would not properly cook the cookies. On the other hand, a cooking pan with large openings might suffer from the problem of the raw cookie dough running through the openings in the cooking pan. The number and size of the openings in cooking pan 230 ensures both adequate support of the food being cooked and adequate air flow through the cooking pan.

While cooking pan 230 is shown used in connection with oven 130, the cooking pan may also be

used with other types of convection-type ovens, such as that shown in Fig. 19.

In addition to the cooking pans 230, 250 and 370, another way to solve the problems associated with cooking items which cover most of the rack, such as muffin pans, is to use the muffin baking system of the present invention. A preferred embodiment of the muffin baking system 270 is shown in Figs. 9-15.

The muffin baking system 270 involves a plurality of spaced cup units 272 positioned in a frame. Preferred cup units 272 have a flat bottom surface 274, peripheral walls 276 and peripheral rims 278. The peripheral walls 276 preferably are created by sloping the bottom surface 274 upwardly and outwardly. The bottom surface 274 and the peripheral wall 276 typically are one continuous surface. The peripheral rim 278 may be created by tightly rolling the edge of the peripheral wall 276.

There are a number of methods for attaching the cup units 272 to a frame for holding the cup units in position. The embodiment 270 shown in Figure 13 involves the use of six cup units 272 and a frame system 288. In addition, there are a number of frame configurations, holding more or less than six cup units. An embodiment having a frame holding twelve cup units is shown in Figs. 5-8.

Figure 13 shows a frame having six cup units 272. The cup units 272 may be attached to the frame, such as by clamping or by other means including welding. Clamping may be done by a number of different methods; the method proposed in the embodiment shown is by rolling a tab connected to the rim of the cup unit 272. The tab is rolled over the frame segments in at least two positions. In other embodiments, positions of tab rolling and frame connection may vary depending on the number of cups used and the number of annulus shafts used in the frame.

Figure 14 shows that the frame system 288 is preferably made up of an outer annulus shaft 280, an inner annulus shaft 282, and a plurality of frame connectors 286. The frame connectors typically extend radially between the inner and outer annulus shafts. Another embodiment allows the frame connectors 286 to continue until they meet at the center. The frame connectors may be welded together to created a spoked system. The cup units 272 may be connected to the outer annulus shaft 280 and the frame connectors 286.

Figures 5-8 illustrate an embodiment of the muffin baking system 300 having a twelve cup unit. The cup units 302 may be attached in at least two positions by welding the cup unit 302 peripheral rim to the frame system 214. In this embodiment there are 3 annulus shafts, outer 304, middle 306, and inner 308. The remainder of the frame system is shown comprised of four shafts 310, which may be welded to the annular members.

In either of the above-mentioned embodiments of the muffin baking system, the cup units typically are positioned on the rack 29 inside of the air oven 10. The muffin baking system structure allows for cyclonic air to more freely circulate throughout the cooking chamber. Air can be drawn up through the muffin baking system as required to keep the air heated and circulating in its cyclonic pattern. This frame structure eliminates the problems associated with muffin pans lacking holes within its structure.

As with any device that cooks a variety of foods, cleanability is a major concern. In most convection ovens, food particles, oil and grease are distributed over most interior surfaces of the oven. When these particles contact the heater in a convection oven, they burn, causing smoke, odor and cleaning problems. With the disclosed air fryer, such problems are largely eliminated due to the easy cleanability of the cooking enclosure and the design of the heater and

its positioning.

The open coil heater in the disclosed air fryer is positioned directly above the blower wheel 43. The blower is fully open at the bottom, but also partially open on its top. As a result, the blower draws most of its make-up air into its bottom side, but also draws air into its top. This causes a portion of the air thrown out from the circumference of the blower to reverse direction and be drawn back through the heater perimeter, down through the open lower plate of the heater assembly and into the semi-open top of the blower wheel. This highly heated air is then mixed with the air being drawn in from the bottom of the blower. This mixture is then thrown out horizontally into the cooking chamber. This configuration provides the following advantage: most particles are unable to make the abrupt 180 degree change in direction that the air drawn through the heater does. Therefore, the air traveling through the heater assembly is virtually free of contamination, while most particles are thrown off to the sides and bottom of the cooking chamber, where they can easily be cleaned away. As a result of the above, the heater does not accumulate food, oil or grease, thereby eliminating the need to clean the heater, extending heater element life and preventing smoke or fire hazard.

Positioning the heater immediately above the blower saves substantial space, and allows for the compact design of an easily-removed blower assembly. When the assembly is removed, the entire cooking enclosure can then be washed in a conventional household dishwasher. The compactness allowed by the described heater position leaves more visibility through the top wall of the transparent cooking enclosure, providing the user with a maximum view of the cooking operation. Due to the blower wheel being located directly below the heater assembly, the blower wheel provides additional

mechanical protection to the heater while further reducing the risk of electrical shock to the user.

The disclosed air fryer is designed to be easily disassembled, allowing the entire two piece cooking enclosure to be emersed in water for soaking or washing household dishwasher. The enclosure typically is molded of low-stick plastic capable of withstanding at least the maximum internal operating temperature of 400 degrees F. The blower assembly contains all electrical components and easily mounts in the top half of the cooking enclosure. The blower assembly is preferably connected to the cooking enclosure by way of a bayonet mount, but may also be connected by snapping in place by way of metal clips or screwing into place, much like the lid on a jar. The blower assembly is dimensioned to fit easily inside the cooking enclosure for storage, thereby saving on scarce kitchen storage space and reducing shipping and packaging expense.

Due to the extensive use of plastics and the need to keep assembly temperatures comfortable to the touch, internal cooling of the assembly is critical. The motor must also be kept within safe operating temperature limits.

To achieve the above objectives, the power unit 13 has been designed to draw cool, room temperature air in from directly above the hinge area. Drawing air from this point avoids taking in hot air rising off of the cooking enclosure. A cooling blade (not shown) located on the same shaft as the blower blade 43 serves to draw in this cool air. The cool air is pulled through the rectangular segment connecting the motor enclosure to the hinge. This "duct" may also house electronic components that are heat sensitive or require cooling, such as triacs. From here, the air is drawn over the motor, and is then exhausted downwardly through a gap 74 separating the cooking enclosure and the bottom edge of the blower assembly. Here the air serves a valuable

function of cooling the cooking enclosure plastic at its most vulnerable point, close to the heater assembly.

Any deformation of the blower mount area due to over temperature trouble would render the cooking enclosure useless. Gussets may be molded into the blower mount area to act as stiffeners and cooling fins for the plastic.

When the blower is removed from the cooking enclosure, the user may then install optional attachments to convert the air fryer into a steamer, a corn popper or other application that would fit the configuration and features of the cooking enclosure.

An important feature fitting the configuration that may be installed when the blower is removed is a steam and heat controlling handle. Figure 1 illustrates an embodiment of the use of a steam and heat control handle 100, shown in conjunction with the frying oven.

The steam control handle interacts in the opening in the upper member 12 of the cooking chamber. The steam control handle 100 includes a handle portion 112 and a base portion 114. The base portion 114 is designed to mount on the upper wall 32 of the cooking chamber. The base portion preferably attaches to the upper wall in the same manner as does the blower assembly, such as by a bayonet mounting system. The handle portion 112 has a first riser portion 108 and a second movable riser portion 109. The handle portion 112 further includes a transverse portion 110 that forms a grippable handle. The sliding portion 109 may be opened so that steam entrapped in the cooking chamber may be released through an aperture 105.

The sliding portion 109 is movable from a first position, where the sliding portion covers the aperture 105, to a second position as shown in Figure 4, wherein a space 106 is formed between the base portion 114 and the sliding portion 109. When the handle is so opened, steam is allowed to escape from the cooking chamber out

through space 106 into the atmosphere. The opening is preferably approximately 1-1.2 square inches. When the sliding portion is moved so that the aperture 105 is covered, steam rises in the sliding portion 109 of the handle. A separation member 118 engages an upper portion 104 of the sliding handle 109 to prevent steam from entering the hollow chamber of the transverse portion 110 of the handle 100. In this manner, even with the sliding portion 109 in a closed position, steam will not enter the transverse portion 110 of the handle 100 so that the handle still may be held comfortably.

A ribbed portion 116 of the transverse portion 110 engages a raised end portion 117 of the sliding portion 109 to retain the handle in the closed or open position. Figure 4 illustrates that there are three levels at which the handle may be retained. In addition, other embodiments may maintain more or less than three raised portions for retention of the handle.

The handle is preferably used to convert the oven from a cooking device to a food server. In particular, food may be placed within the oven of Fig. 19, and cooked as described above. When the food is done, the user simply removes the heater unit 13 from the top 12, such as by releasing the preferred bayonett mount. Lower frame bracket 14 and upper frame bracket 15 are preferably removed from the cooking enclosure as well. Handle 118 is then attached to top 12, for example by using the preferred bayonet mount. The oven is thereby converted to a serving container, which can be carried out to the dining table and used to serve the food.

Figure 20 shows a preferred embodiment of an oven employing preferred cooking racks. In Fig. 20, the oven 10 is shown as including two extension rings 411 and two extension segments 413. The extension rings 411 are placed between the base member 11 and top 12 so as to enlarge the size of the cooking chamber. The

extension rings are preferably formed as two pieces connected together by clips 415. The extension segments 413 are placed between the lower frame bracket 14 and upper frame bracket 15 so as the accommodate the increased size of the cooking chamber.

Within the oven 10 of Fig. 20, two racks 420 and 420' can be seen. The rack 420 is shown in greater detail in Figs. 22-23. As seen therein, the rack 420 includes a rack surface 422 and three legs 424. The rack surface is preferably made of approximately 13 gauge wire. The rack surface may be made up of a plurality of concentric wire rings 423 connected together by generally V-shaped wire connectors 425, such as by welding. This arrangement provides for a rigid surface upon which food can be placed.

The legs are also made of wire, preferably a single piece of wire of approximately the same thickness as the rack surface. Each of the legs is made up two attachment segments 426, two straight segments 428 and a connecting segment 430. The attachment segments 426 are fixedly attached to the rack surface, preferably by welding. The straight segments 428 extend downwardly, preferably perpendicularly, from the rack surface.

The connecting segments 430 connect the two straight segments 428 together and preferably include a plurality of U-shaped portions 432. The U-shaped portions 432 are located at varying distances away from the rack surface so as to provide adjustability to the racks. As shown in Figs. 20 and 21, the U-shaped portions may rest on the wire of cooking rack 29. The height to the rack 420 above cooking rack 29 can be adjusted by varying which set of U-shaped portions are placed on the cooking rack 29.

The rack 420' shown in Fig. 23A is identical to that shown in Fig. 23, except that the straight segments 428' are longer than those of Fig. 23. Likewise, the rack 420'shown in Fig. 23B is identical to the other

disclosed racks, except that the straight segments 428' are even longer. For the rack 420, the range of adjustability may preferably be from about 3/4" to 2". The rack 420' is preferably adjustable from about 3 3/4" to 5". The rack 420" is preferably adjustable from about 6 1/4" to 7 1/2". Together, these three racks provide for a great range of adjustability in the placement of food within the oven.

As shown in Fig. 20, the racks can be stacked so that more than one rack can be used at a time. In Fig. 20, the lower rack 420' is placed on the base rack 29, while the upper rack 420 is placed on the rack 420'. Alternatively, according to the present rack invention, it is also possible, for example, to place both racks 420 and 420' directly on the base rack 29.

In addition to providing a surface on which food can be placed, the racks 420, 420' and 420'' also can serve as hold down racks to hold down food placed underneath the racks. The oven shown in Fig. 20 may develop very high speed air movement within the oven. This high air speed can result on the food being blown off the rack. By placing a rack 420 over the food which has been placed on a lower rack, the problem of blowing food off the rack is greatly reduced.

The foregoing constitutes a description of various preferred embodiments. Numerous changes to the preferred embodiments are possible without departing from the spirit and scope of the invention. Hence, the scope of any invention should be determined based on the following claims.

WHAT IS CLAIMED IS:

1. A handle adapted for replacing a heater and blower system removably located in a central opening defined by a top enclosure of a countertop oven, the oven comprising the top enclosure and a bottom enclosure, the handle comprising:

a. mounting means for removably attaching the handle to the top enclosure in order to replace the heater and blower system when the heater and blower system is removed; and

b. handle means for enabling a user to remove the top enclosure from the bottom enclosure by lifting up on the handle when the handle is installed in the top enclosure;

c. whereby the countertop oven may be converted to a food server comprising the handle, the top enclosure, and the bottom enclosure.

2. The handle of claim 1 wherein:

a. the handle comprises means for plugging the upper member central opening for the entrapment of steam and heat;

b. the handle defines an opening; and

c. the handle comprises vent means for controlling escape of steam and heat through the opening defined in the handle.

3. The handle of claim 2 wherein the vent means for controlling the escape of steam and heat includes a slidable cover wherein the slidable cover adjustably engages with the opening for adjustment of steam and heat escape levels.

4. The system of claim 3 wherein:

a. the slidable cover controls the escape of steam and heat by varying the coverage of the slidable cover over the hole; and

b. the slidable cover has a plurality of predetermined positions.

5. The handle of claim 1 wherein:

a. the handle is longer that it is wide, thereby having at least one end surface; and

b. the opening defined by the handle is located in the at least one end surface;

c. whereby steam and heat escaping from the handle opening is directed away from the hand of a user grasping the handle.

6. The handle of claim 5 wherein the mounting means comprises a quick-release bayonet coupling for mounting the handle with the upper enclosure member central opening.

7. The countertop oven of claim 1 wherein the opening defined by the handle has an area greater than approximately one square inch.

8. A food cooking and serving system, comprising:

a. a countertop oven comprising a top enclosure and a bottom enclosure, the top enclosure defining a central opening;

b. a heater and blower system removably located in the central opening defined by the top enclosure; and

c. a handle adapted for replacing the heater and blower system when the heater and blower system is removed, the handle comprising:

i. mounting means for removably attaching the handle to the top enclosure in order to replace the heater and blower system when the heater and blower system is removed; and

ii. handle means for enabling a user to remove the top enclosure from the bottom enclosure by

lifting up on the handle when the handle is installed in the top enclosure;

d. whereby the countertop oven may be converted to a food server comprising the handle, the top enclosure, and the bottom enclosure.

9. The handle of claim 8 wherein:

a. the handle comprises means for plugging the upper member central opening for the entrapment of steam and heat;

b. the handle defines an opening; and

c. the handle comprises vent means for controlling escape of steam and heat through the opening defined in the handle.

10. The system of claim 9 wherein said vent means for controlling the escape of steam and heat includes a slidable cover wherein the slidable cover adjustably engages with the opening for adjustment of steam and heat escape levels.

11. The system of claim 10 wherein:

a. the slidable cover controls the escape of steam and heat by varying the coverage of the slidable cover over the hole; and

b. the slidable cover has at a plurality of predetermine positions.

12. The handle of claim 8 wherein:

a. the handle is longer that it is wide, thereby having at least one end surface; and

b. the opening defined by the handle is located in the at least one end surface;

c. whereby steam and heat escaping from the handle opening is directed away from the hand of a user grasping the handle.

13. The system of claim 12 wherein the mounting means comprises a quick-release bayonet coupling for mounting the handle with the upper enclosure member central opening.

14. The system of claim 8 wherein the opening defined by the handle has an area of approximately 1.2 square inches.

15. A food cooking and serving system, comprising:

a. countertop oven upper member and lower members, the members defining an enclosure having a circular horizontal cross section and an ovular vertical cross section, the lower member having disposed therein a rack for supporting food pieces to be cooked, the upper member defining therein a central upper opening;

b. heater and blower means, adapted to be removable disposed in the upper member central opening, for circulation of heated air, the heater and blower means comprising a quick-release bayonet screw mechanism for quickly mounting or removing the heater and blower means in the upper enclosure member central opening; and

c. a removable handle adapted to be disposed in the upper member central opening, the handle comprising:

i. means for plugging the upper member central opening for the entrapment of steam and heat; and

ii. vent means for controlling the escape of the steam and heat through an opening defined by the handle, the vent means including a slidable cover which adjustably engages with the opening for adjustment of steam and heat escape levels, the slidable cover comprising means for controlling the escape of steam and heat by varying the coverage of the slidable cover over the opening, the slidable cover having a plurality of predetermined positions;

iii. mounting means for removably attaching the handle to the top enclosure in order to replace the heater and blower system when the heater and blower system is removed, the mounting means comprising a quick-release bayonet screw mechanism for quickly mounting or removing the handle in the upper enclosure member central opening; and

iv. handle means for enabling a user to remove the top enclosure from the bottom enclosure by lifting up on the handle when the handle is installed in the top enclosure;

d. whereby the countertop oven may be converted to a food server comprising the handle, the top enclosure, and the bottom enclosure.

16. A cooking pan comprising:

a. a generally flat, round bottom member, the bottom member defining a central opening;

b. an outer peripheral wall extending upwardly and being located at the outer diameter of the bottom member, the outer peripheral wall having a height of approximately one-half inch.

c. an inner peripheral wall extending upwardly and being located at the periphery of the central opening, the inner peripheral wall having a height of approximately one-eighth inch.

17. The cooking pan of claim 16 wherein:

a. the outer peripheral wall transitions from the bottom member of the pan in a smooth radius; and

b. the inner peripheral wall transitions upwardly and inwardly from the bottom member toward the central opening.

18. A cooking pan as set forth in claim 16 wherein:

a. the diameter of the pan is approximately 12 inches; and

b. the central opening is round and is at least approximately two inches in diameter.

19. A cooking pan as set forth in claim 16 wherein a top side of the bottom member comprises a thermally conductive materials having a layer of a non-stick surface thereon.

20. A cooking pan as set forth in claim 16 wherein the bottom member has a contoured surface formed by a plurality of small deformations in the bottom member.

21. A cooking pan as set forth in claim 20, wherein the contoured surface of the bottom member has a plurality of peaks and valleys, and wherein the vertical distance between the peaks and the valleys is between approximately .003 and .025 inch.

22. A cooking pan as set forth in claim 21, wherein the vertical distance is between approximately .005 and .010 inch.

23. A countertop oven and cooking pan system for cooking food, the system comprising an enclosure having a circular horizontal cross section and an ovular vertical cross section, the enclosure being defined by an upper member and a lower member, the lower member having a selectively removable cooking pan disposed therein, the cooking pan having at least one hole defined therein, the upper member of the oven having defined therein a central opening, a power-driven heater and blower system mounted in the central opening, the heater and blower system being adapted to move heated air in the enclosure so that food disposed on the cooking pan is cooked by the flow of heated air around the food and through the at least one hole in the cooking pan.

24. The system of claim 23 wherein the hole of the cooking pan disposed in the enclosure is located approximately in the center of the pan in order to allow air circulation to move freely through out the enclosure.

25. The system of claim 23 wherein the cooking pan comprises:

a. a generally flat, round bottom member, the bottom member defining a central opening;

b. an outer peripheral wall extending upwardly and being located at the outer diameter of the pan, the outer peripheral wall having a height of approximately one-half inch; and

c. an inner peripheral wall located at the periphery of the central opening, the inner peripheral wall having a height of approximately one-eight inch.

26. The system of claim 25 wherein:

a. the outer peripheral wall of the cooking pan transitions from the bottom member of the pan in a smooth radius; and

b. the inner peripheral wall of the cooking pan transitions upwardly and inwardly from the bottom member toward the central opening.

27. A cooking pan as set forth in claim 23 wherein:

a. the diameter of the pan is approximately 12 inches; and

b. the central opening is round and is at least approximately two inches in diameter.

28. The system of claim 23 wherein a top surface of the cooking pan bottom member comprises a thermally-conductive material having a layer of a non-stick surface thereon.

29. The system of claim 23 wherein the bottom member has a contoured surface formed by a plurality of small deformations in the bottom member.

30. The system of claim 29, wherein the contoured surface of the bottom member has a plurality of peaks and valleys, and wherein the vertical distance between the peaks and the valleys is between approximately .003 and .025 inch.

31. The system of claim 30, wherein the vertical distance is between approximately .005 and .010 inch.

32. A method of cooking foods in an air oven using a cooking pan having a hole in its center, wherein the air oven cooks food by circulating heated air throughout the air oven cooking chamber, wherein the circulating air is drawn back up into the center of the cooking chamber and reheated and directed back down to be circulated around food positioned on the cooking pan disposed in the air oven, and wherein the hole in the cooking pan creates a passage for the circulation of the heated air.

33. A countertop oven and cooking pan system for cooking food, the system comprising:

an enclosure having an upper enclosure member and a lower enclosure member, the upper member having defined therein an opening;

a power-driven heater and blower system mounted in the opening in the upper member for heating and moving air within the enclosure;

a selectively removable cooking pan disposed within the lower enclosure member, the cooking pan having a base member made of a mesh screen defining a plurality of openings therein, and a solid rim extending around the periphery of the base member;

wherein the heater and blower system are adapted to move heated air in the enclosure so that food disposed on the cooking pan is cooked by the flow of heated air around the food and through the openings in the cooking pan.

34. The system of claim 33, wherein the openings in the base member are uniformly distributed on the base member and have a density of approximately 125 per square inch.

35. The system of claim 34, wherein the openings in the base member are approximately .003 square inches in size.

36. The system of claim 33, wherein the cooking pan further comprises at least one clip for assisting in removing the pan from the oven.

37. The system of claim 36, comprising two of said clips, said clips being attached to the rim at diametrically opposed positions.

38. The system of claim 37, wherein said clips are substantially C-shaped in cross-section, and wherein the clips have a leg portion which is interposed between the base member and the rim.

39. A cooking pan for selectively removable use in an oven having a power-driven heater and blower system for heating air within an oven enclosure, the cooking pan comprising a base member made of a mesh screen defining a plurality of openings therein, a solid rim extending around the periphery of the base member, and at least one clip for assisting in removing the pan from the oven;

wherein the pan may be placed in the oven so that

food disposed on the cooking pan is cooked by the flow of heated air around the food and through the openings in the cooking pan.

40. The system of claim 39, wherein the openings in the base member are uniformly distributed on the base member and have a density of approximately 125 per square inch.

41. The system of claim 40, wherein the openings in the base member are approximately .003 square inches in size.

42. The system of claim 39, comprising two of said clips, said clips being attached to the rim at diametrically opposed positions.

43. The system of claim 40, wherein said clips are substantially C-shaped in cross-section, and wherein the clips have a leg portion which is interposed between the base member and the rim.

44. A method of cooking foods in a convection oven, the oven comprising an enclosure having an upper enclosure member and a lower enclosure member, and a power-driven heater and blower system for moving air within the enclosure, the method comprising:

placing within the enclosure a cooking pan having a base member made of a mesh screen defining a plurality of openings therein, and a solid rim extending around the periphery of the base member;

placing food to be cooked on the cooking pan; and

circulating the air within the enclosure so as to cook the food on the cooking pan, wherein the circulating air is drawn back up into the center of the enclosure and reheated and directed back down to be circulated around food positioned on the cooking pan

disposed in the oven, and wherein the openings in the cooking pan create a passage for the circulation of the heated air.

45. A cooking pan system of cooking food in an air oven, the system comprising:

a. a plurality of spaced cup units having side walls defining a generally cylindrical configuration which smoothly transition into a bottom member with a substantially rounded connection between the side walls and the bottom member; and

b. a thin, relatively flat wire frame for holding the cup units in position, the wire frame comprising outer and inner annulus members, wherein the circumference of the outer and inner annulus members are determined by a diametrical dimension defined by the generally cylindrical configuration of each cup unit, and wherein the annulus members engage the cup side walls in order to secure the cup units in a system configuration permitting the flow of heated air between the cup units.

46. The system of claim 45 wherein each cup unit has peripheral rim engagement means around at least a portion of the upper edge of the cup for engaging the annulus members.

47. The system of claim 45 wherein:

a. the wire frame comprises a middle annulus member located between the outer and inner annulus members, wherein the circumference of the outer, middle and inner annulus members are determined by a diametrical dimension defined by the generally cylindrical configuration of each cup unit, wherein the three annulus members engage the cup side walls in order to secure the cup units in a system configuration permitting the flow of heated air between the cup units.

48. The system of claim 47 wherein each cup unit has peripheral rim engagement means around at least a portion of the upper edge of the cup for engaging the annulus members.

49. A method of cooking food in an air oven having a cooking chamber, the method comprising positioning on a rack in the cooking chamber a food cooking system comprising a frame and cup units positioned in the frame, wherein the air oven cooks the food by circulating blower-driven heated air throughout the air oven cooking chamber wherein the circulating air is drawn back up into the center of the cooking chamber and reheated and directed back down to be circulated around the cup units, the frame having cup units spaced apart in order to allow the heated air to flow throughout the cooking chamber and between the cups back up into the top of the cooking chamber.

50. The cooking method of claim 49 wherein said cooking comprises a plurality of said cup units, each of said units having side walls defining a generally cylindrical configuration which smoothly transition into a bottom member with a substantially rounded connection between the side walls and the bottom member, and wherein said frame comprises a thin, relatively flat wire frame for holding the cup units in position, the wire frame comprising outer and inner annulus members, wherein the circumference of the outer and inner annulus members are determined by a diametrical dimension defined by the generally cylindrical configuration of each cup unit, and wherein the annulus members engage the cup side walls in order to secure the cup units in a system configuration permitting the flow of heated air between the cup units.

51. The cooking method of claim 50 wherein each cup

unit has peripheral rim engagement means around at least a portion of the upper edge of the cup for engaging the annulus members.

52. The cooking method of claim 50 wherein:

a. the wire frame comprises a middle annulus member located between the outer and inner annulus members, wherein the circumference of the outer, middle and inner annulus members are determined by a diametrical dimension defined by the generally cylindrical configuration each cup unit, wherein the three annulus engage the cup side walls in order to secure the cup units in a system configuration permitting the flow of heated air between the cup units.

53. The cooking method of claim 52 wherein each cup unit has peripheral rim engagement means around at least a portion of the upper edge of the cup for engaging the annulus members.

54. An oven cooking system comprising an upper enclosure member and a lower enclosure member, wherein the upper and the lower enclosure members cooperatively define a cooking chamber; means for circulating and heating air inside the cooking chamber; and a selectively removable food cup system assembly comprising a plurality of food cups and a food cup support system.

55. An oven cooking system of claim 54 wherein the removable food cup system comprises:

a. a plurality of spaced cup units having side walls defining a generally cylindrical configuration which smoothly transition into a bottom member with a substantially rounded connection between the side walls and the bottom member; and

b. a thin, relatively flat wire frame for

holding the cup units in position, the wire frame comprising outer and inner annulus members, wherein the circumference of the outer and inner annulus members are determined by a diametrical dimension defined by the generally cylindrical configuration each cup unit, and wherein the annulus members engage the cup side walls in order to secure the cup units in a system configuration permitting the flow of heated air between the cup units.

56. The oven cooking system of claim 55 wherein each cup unit has peripheral rim engagement means around at least a portion of the upper edge of the cup for engaging the annulus members.

57. The oven cooking system of claim 55 wherein:

a. the wire frame comprises a middle annulus member located between the outer and inner annulus members, wherein the circumference of the outer, middle and inner annulus members are determined by a diametrical dimension defined by the generally cylindrical configuration each cup unit, wherein the three annulus engage the cup side walls in order to secure the cup units in a system configuration permitting the flow of heated air between the cup units.

58. The oven cooking system of claim 57 wherein each cup unit has peripheral rim engagement means around at least a portion of the upper edge of the cup for engaging the annulus members.

59. A rack to be placed on a cooking surface in an oven, comprising:

a rack surface; and

a plurality of legs attached to the rack surface, each of the legs being made of wire and having two straight segments extending downwardly from the rack surface and a connecting segment which connects together

the straight segments, the connecting segment being shaped so as to allow the rack surface to be placed at one of a plurality of predetermined distances above the cooking surface.

60. The rack as claimed in claim 59, wherein the rack surface defines a plane, and wherein the straight segments extend substantially perpendicular from the plane of the rack surface.

61. The rack as claimed in claim 60, wherein each of the legs further comprises two mounting segments extending substantially parallel to the plane of the rack surface, the mounting segments being fixed to the rack surface.

62. The rack as claimed in claim 61, wherein each of the mounting segments is formed integrally with one of the straight segments.

63. The rack as claimed in claim 59, wherein the rack surface comprises at least one wire and is suitable to support food thereon.

64. The rack as claimed in claim 59, wherein the rack surface is positioned above the cooking surface in the oven so as to hold down food placed on the cooking surface in the oven.

65. The rack as claimed in claim 59, wherein the connecting segments each comprise a plurality of U-shaped portions located at different distances from the rack surface, and wherein the U-shaped portions may be selectively engaged with the cooking surface so as to allow the rack surface to be placed at one of the plurality of predetermined distances above the cooking surface.

66. A countertop oven, comprising:

an upper enclosure member and a lower enclosure member which together form a cooking chamber;

a cooking surface formed within the cooking chamber on which food to be cooked may be placed;

a plurality of racks disposed within the cooking chamber, each of the racks comprising:

a rack surface; and

a plurality of legs attached to the rack surface, each of the legs being made of wire and having two straight segments extending downwardly from the rack surface and a connecting segment which connects together the straight segments, the connecting segment being shaped so as to allow the rack surface to be placed at one of a plurality of predetermined distances above the surface.

67. The oven as claimed in claim 66, wherein the straight segments have a length and wherein the length of the straight segments of one of the racks is different than the length of the straight segments of another of the racks.

68. The oven as claimed in claim 67, wherein the connecting segments of the at least one of the racks and of the another of the racks rest on the cooking surface.

69. The oven as claimed in claim 66, wherein the connecting segments of one of the racks rests on the cooking surface, and wherein the connecting segments of another of the racks rests on the rack surface of the one of the racks.

70. The oven as claimed in claim 66, wherein the rack surfaces of the racks are made of wire and are suitable to support food thereon.

71. The oven as claimed in claim 66, wherein the rack surface of one of the racks is positioned above the cooking surface so as to hold down food placed on the cooking surface.

72. The oven as claimed in claim 71, wherein the rack surface of another of the racks is positioned above the rack surface of the one of the racks so as to hold down food placed on the cooking surface.

73. The oven as claimed in claim 66, wherein the connecting segments of the racks each comprise a plurality of U-shaped portions located at different distances from the rack surface.

FIG. 1

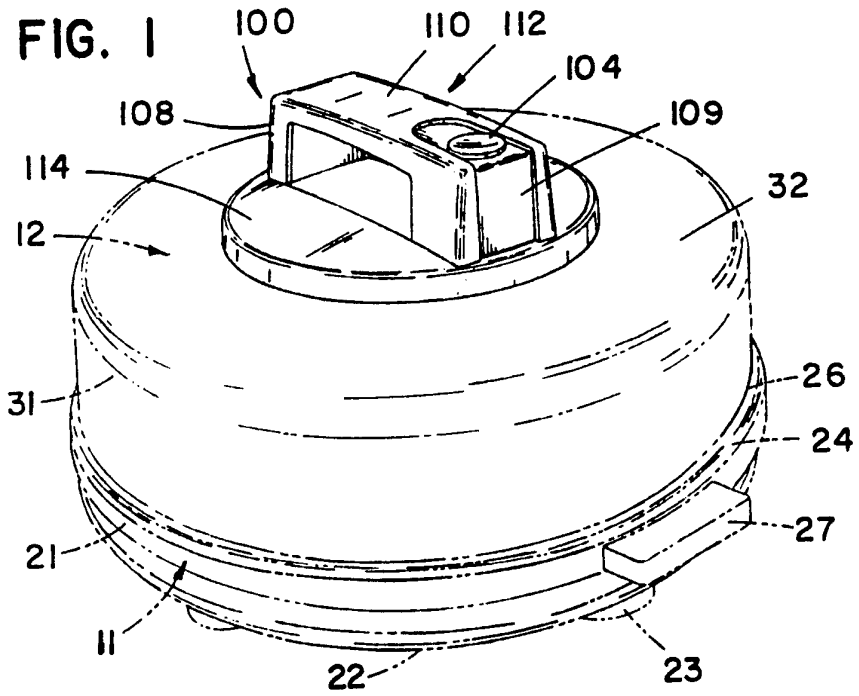
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FIG. 2

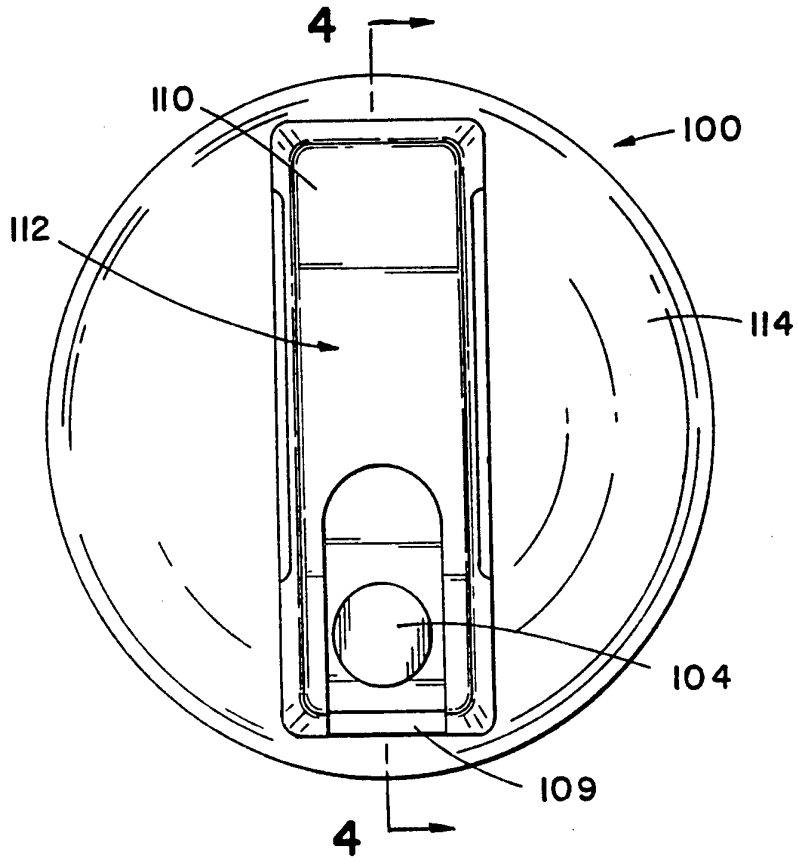
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FIG. 3

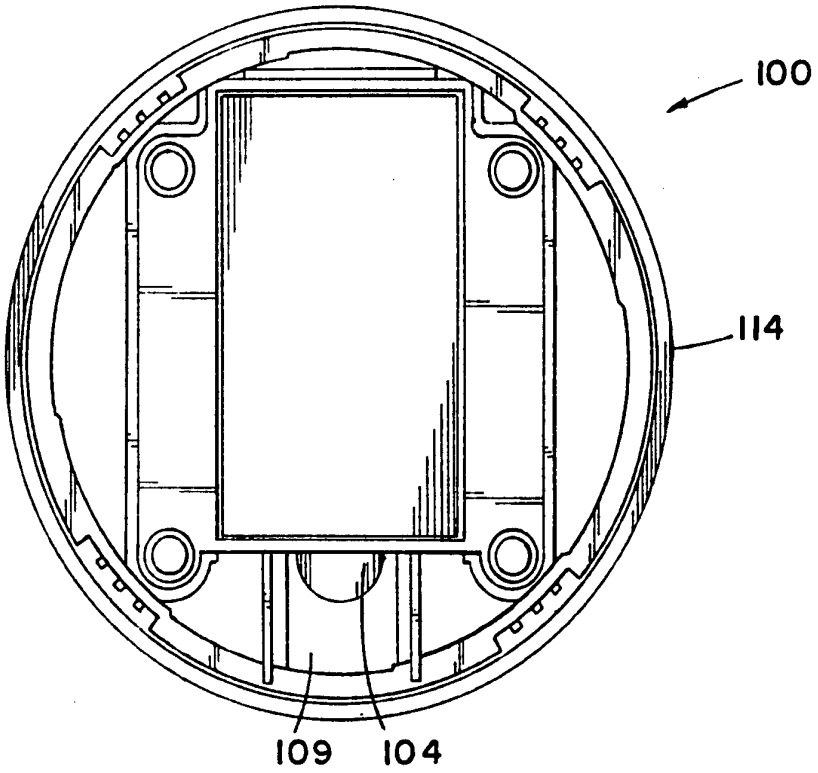

FIG. 4

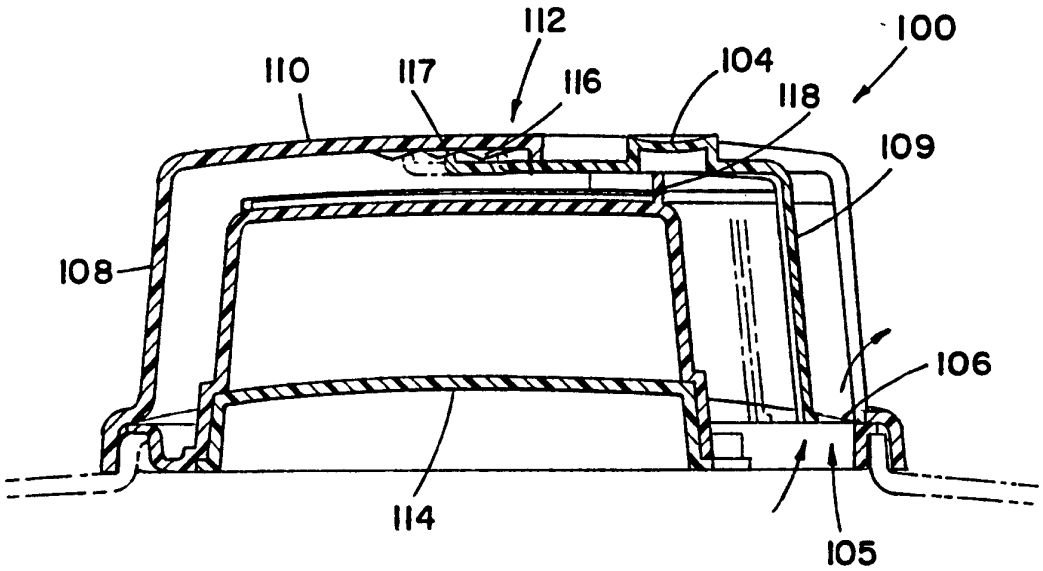

FIG. 5

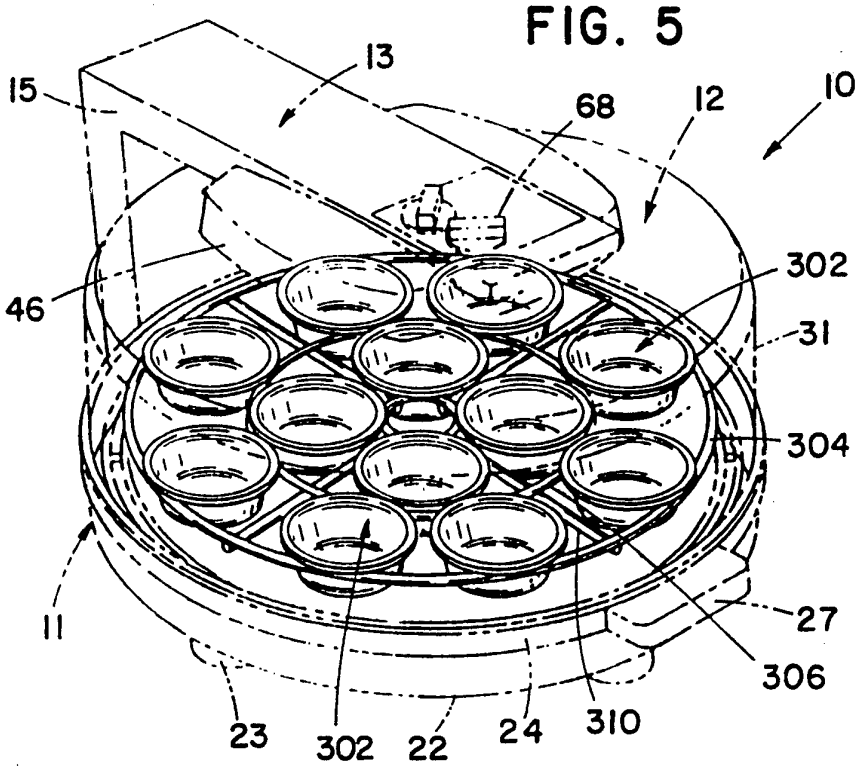
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FIG. 6

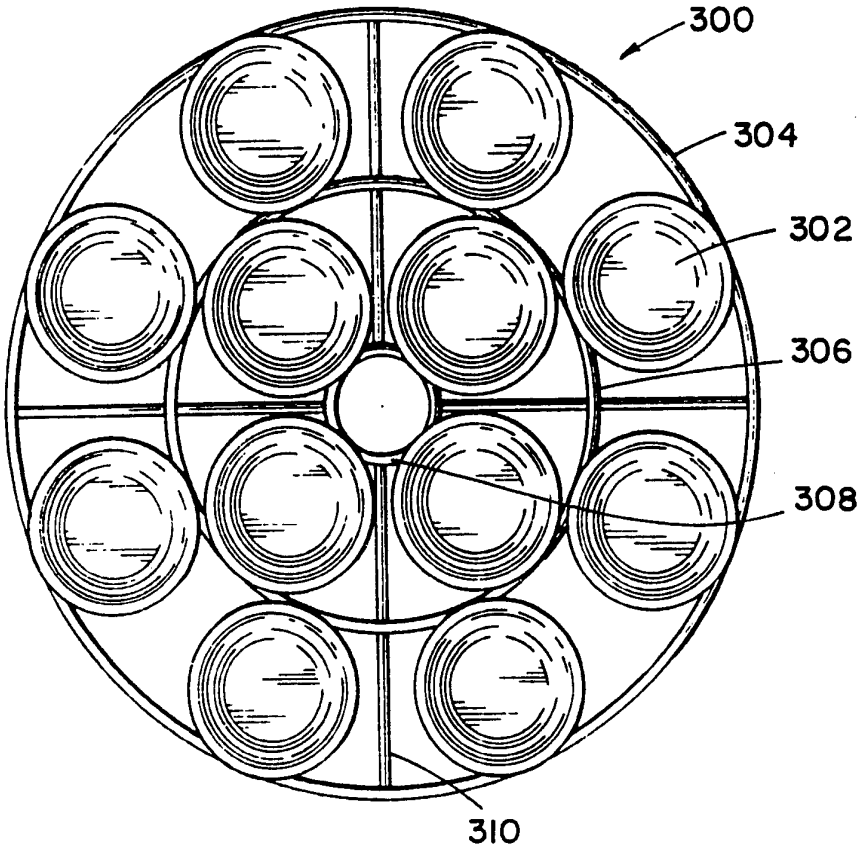
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FIG. 7

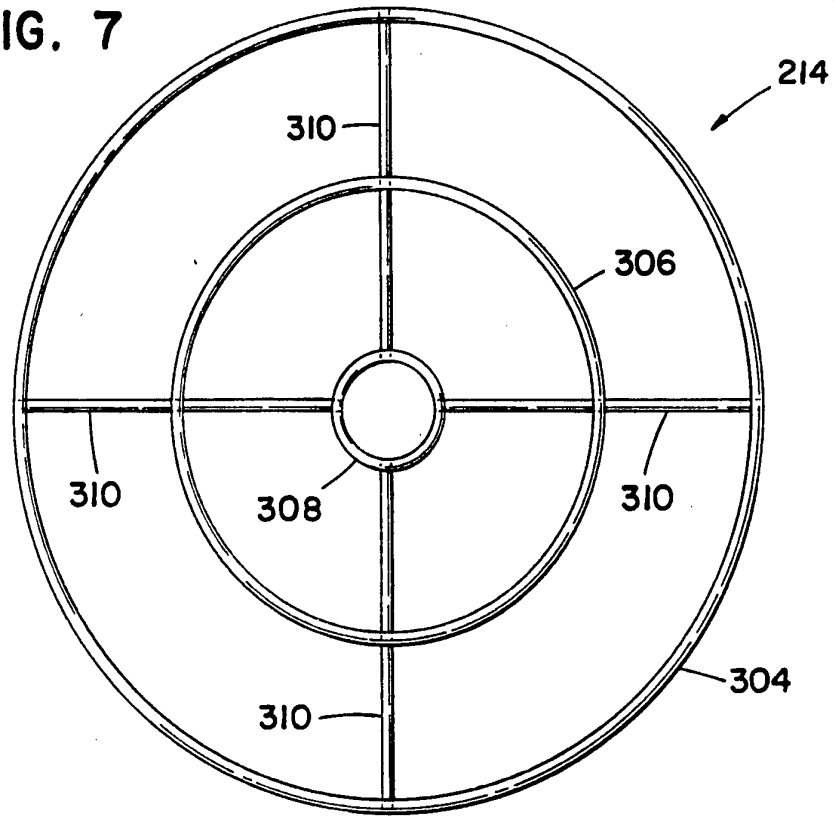

FIG. 8

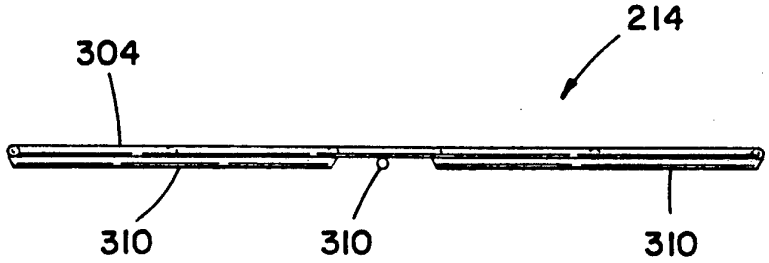

FIG. 9

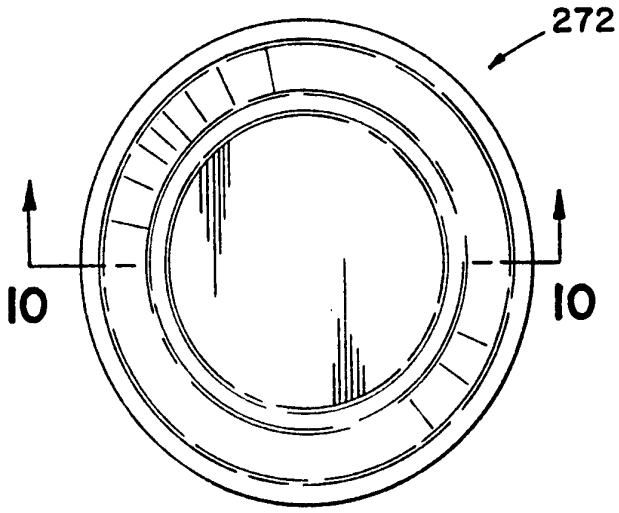

FIG. 10

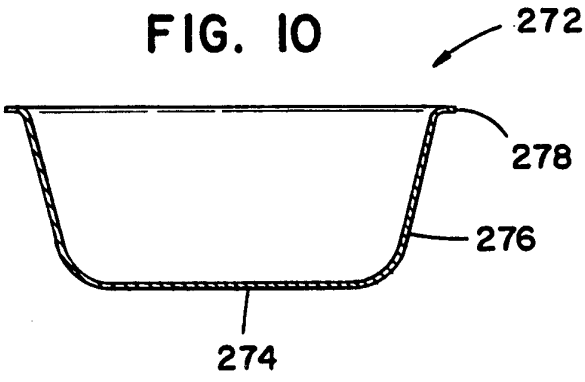

FIG. 11

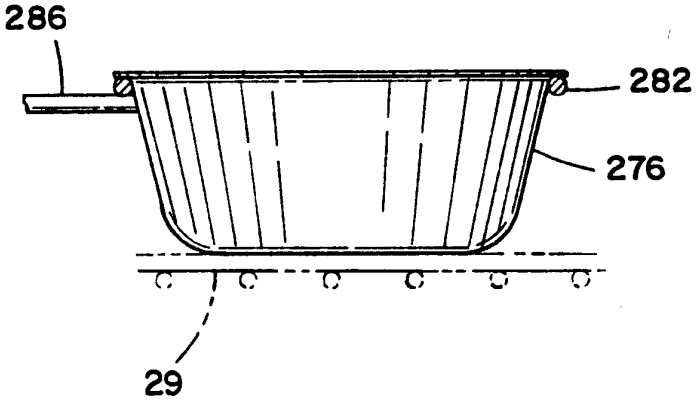

FIG. 12

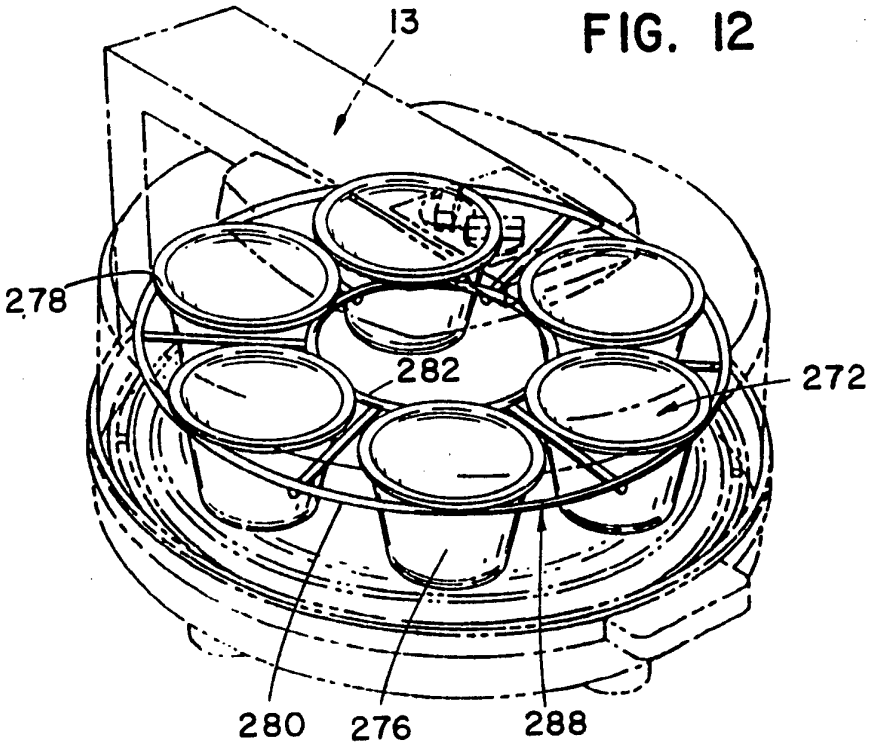

FIG. 13

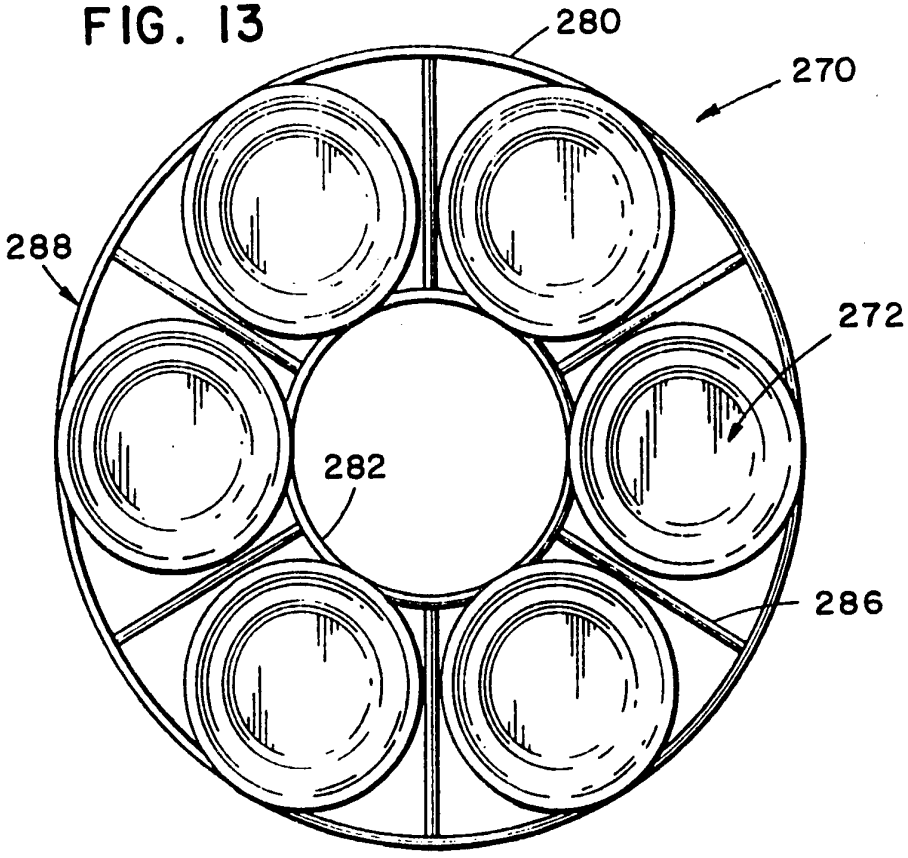

FIG. 14

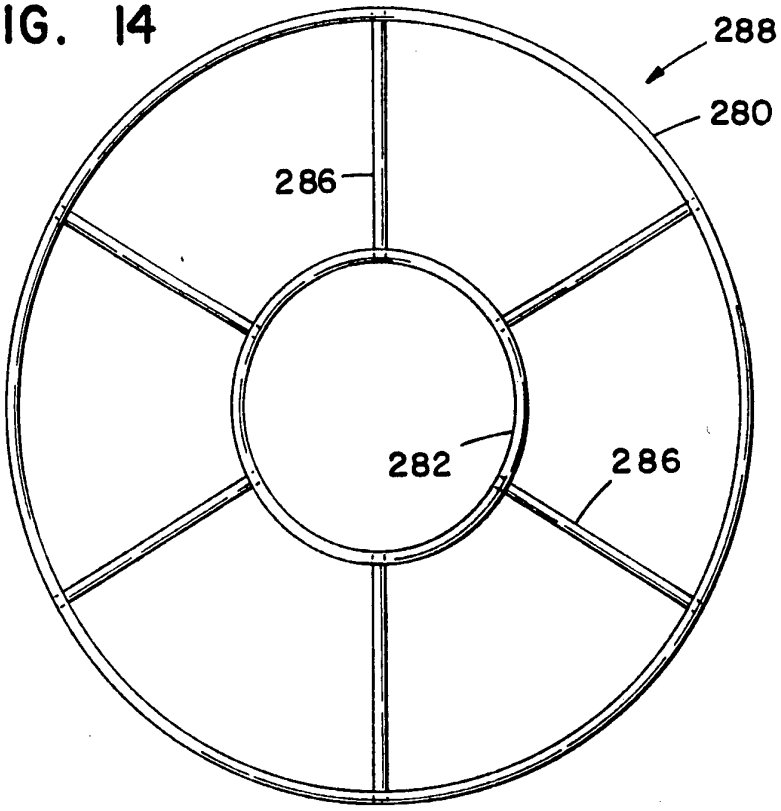

FIG. 15

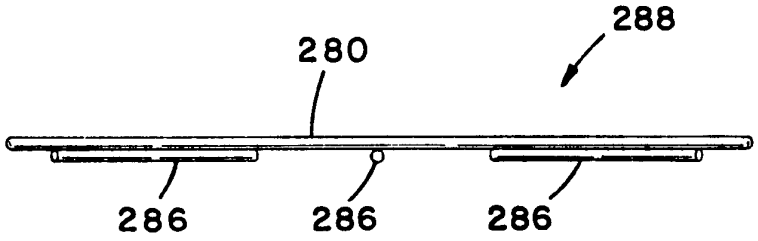

FIG. 16

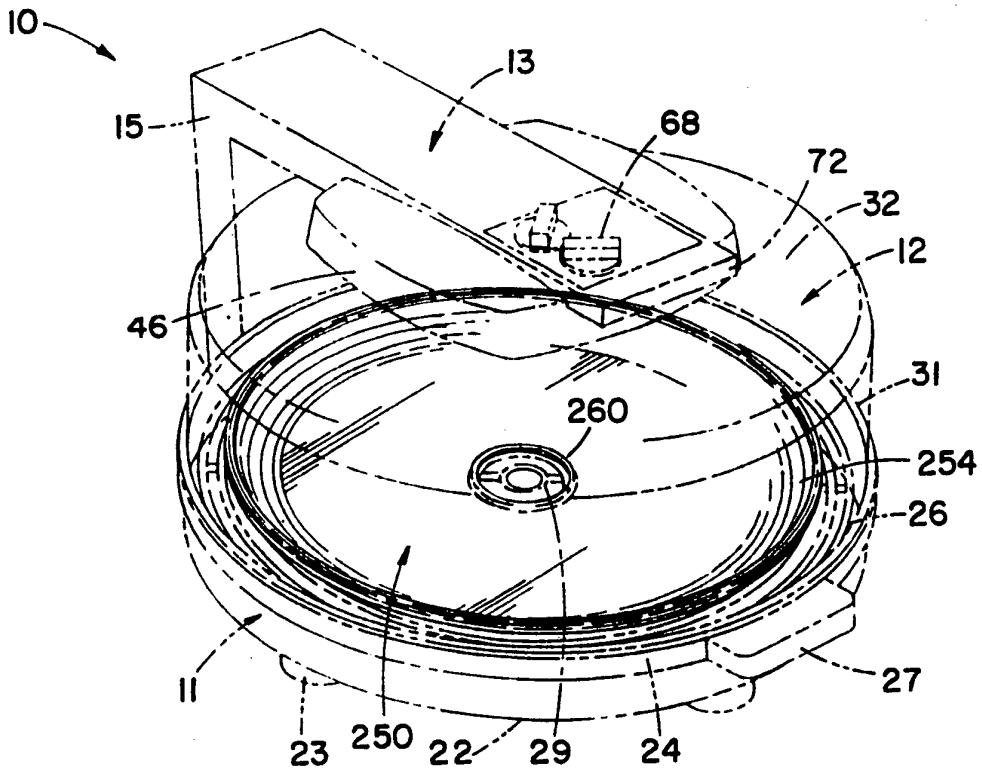
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FIG. 17

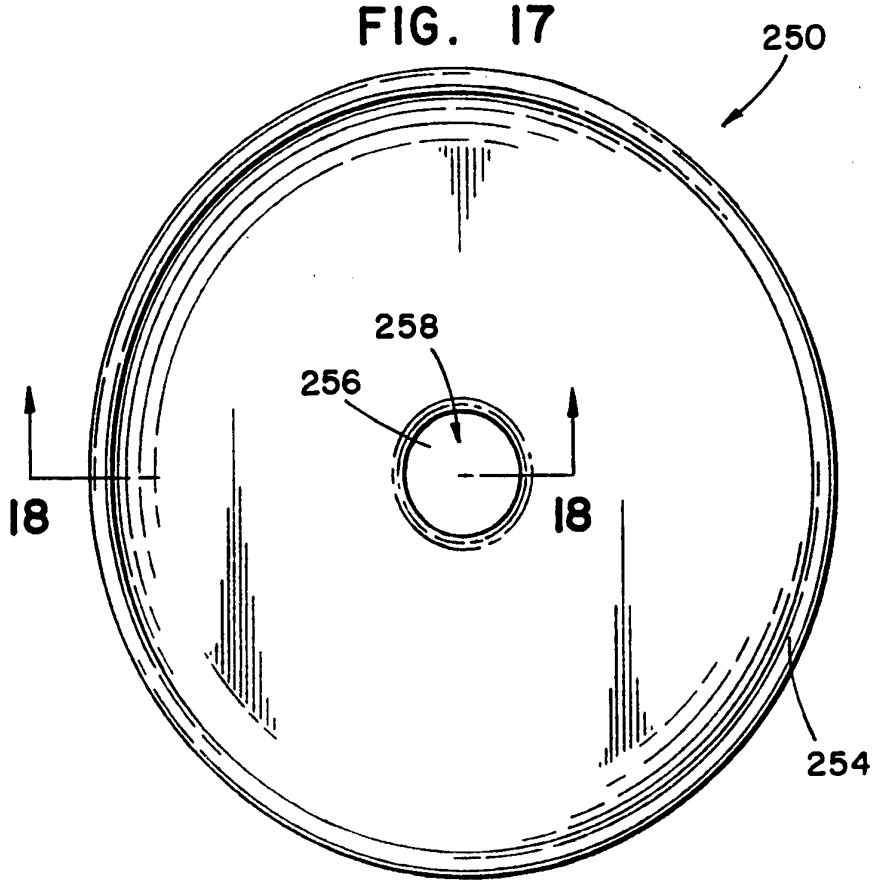
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FIG. 18

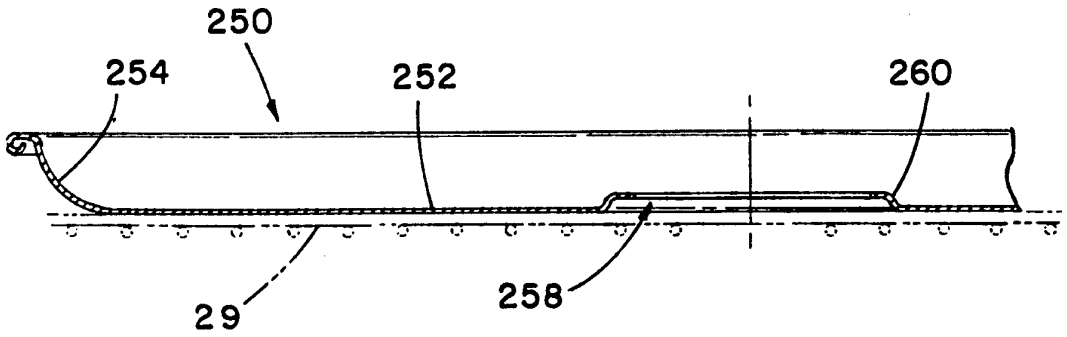
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FIG. 19

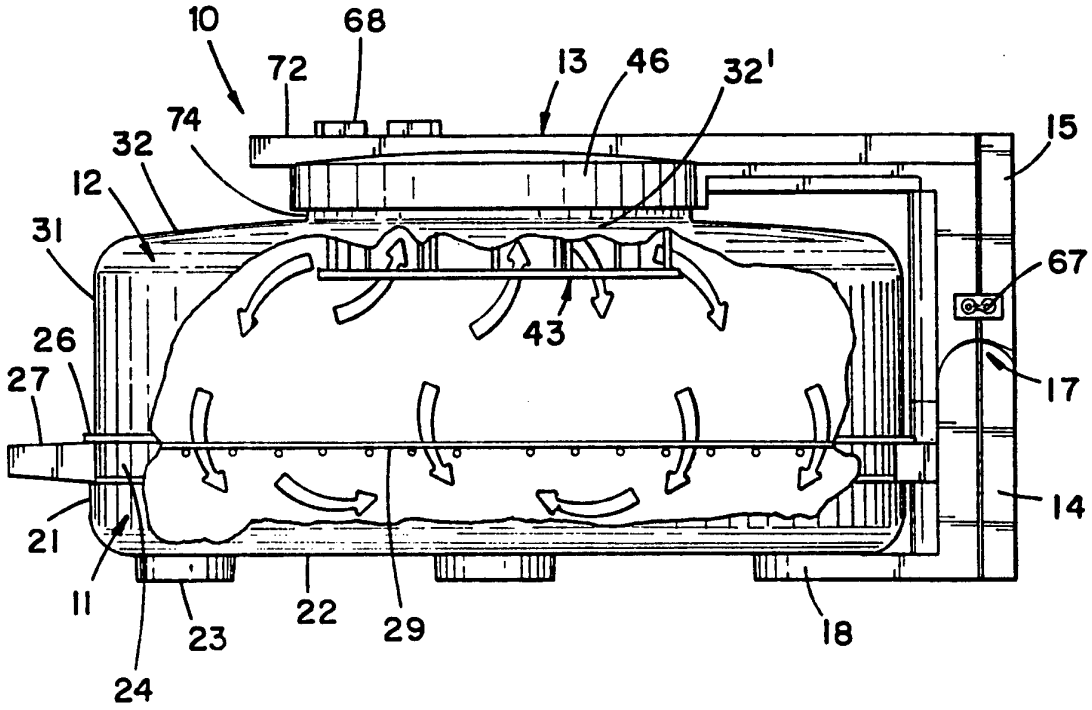
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FIG. 20

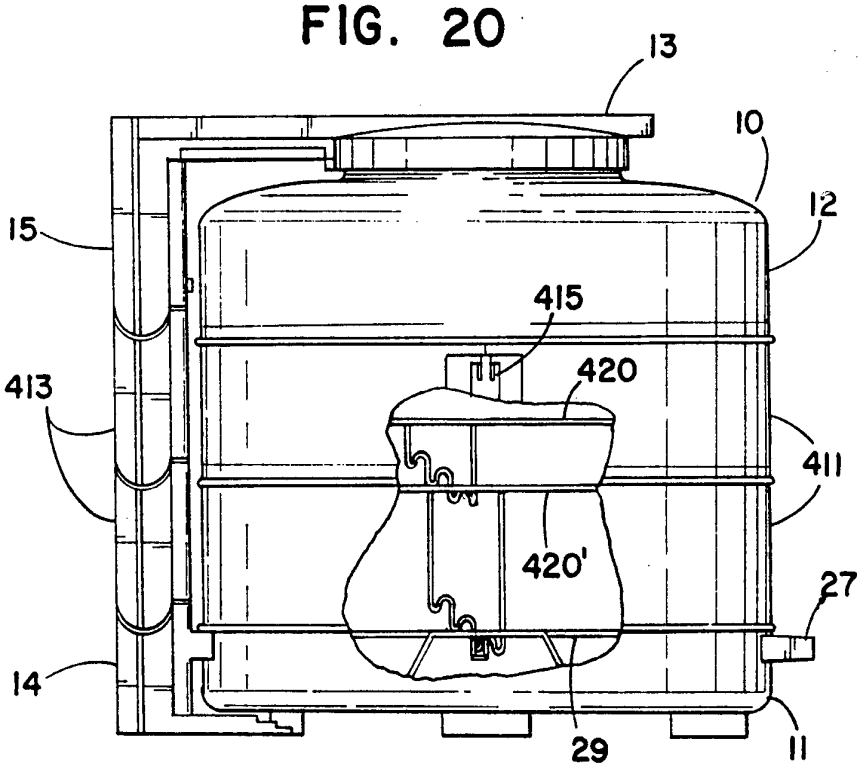

FIG. 21

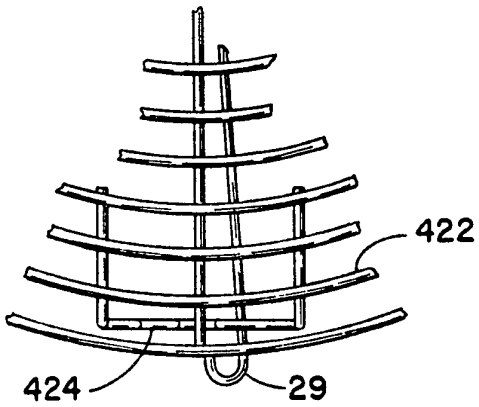

FIG. 22

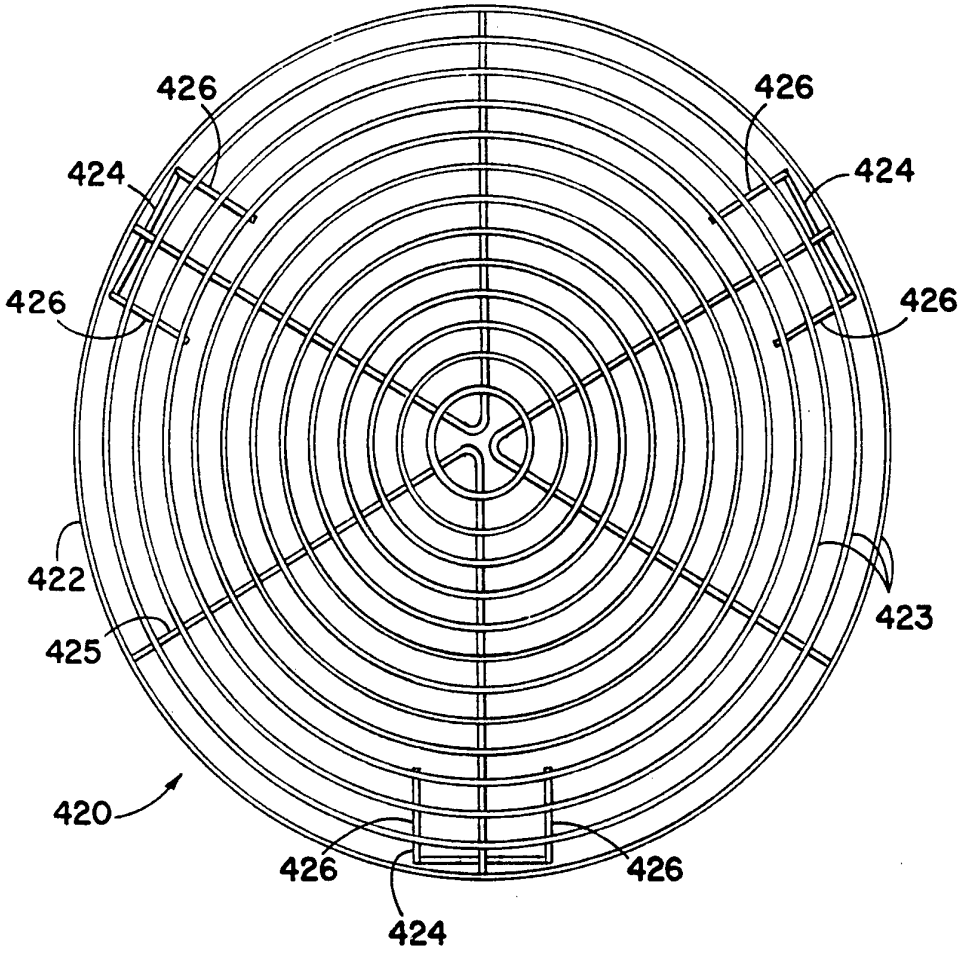
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FIG. 23

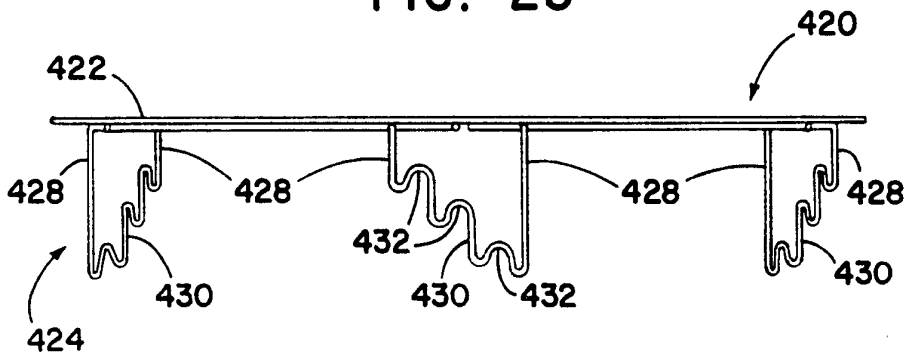
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FIG. 23A

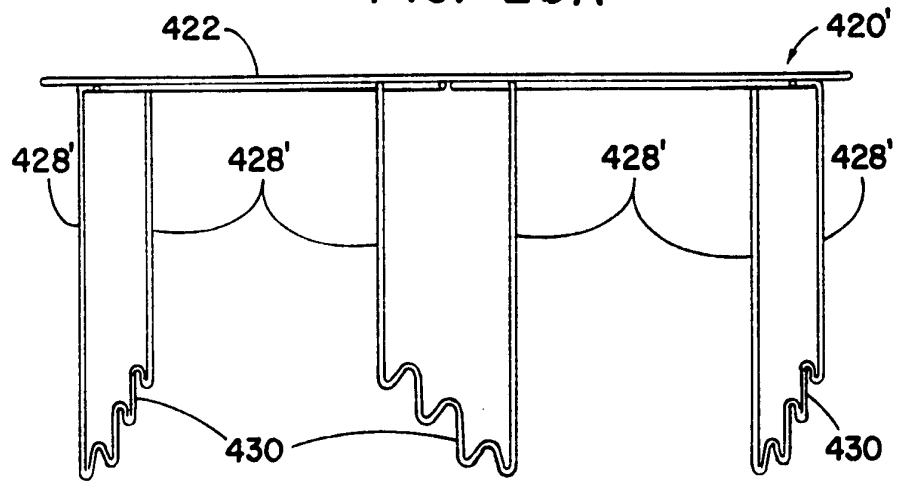


FIG. 23B

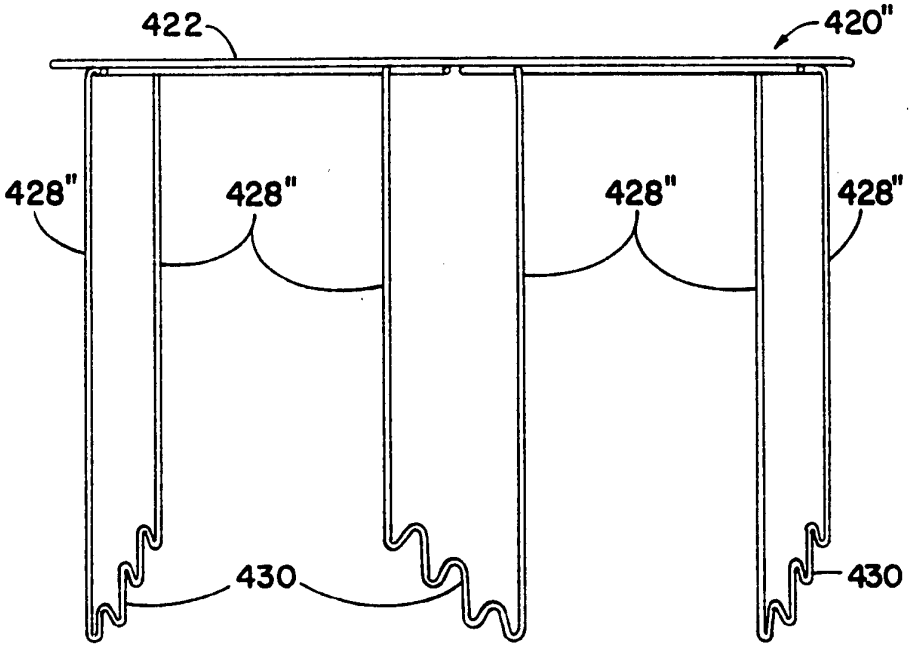


FIG. 24

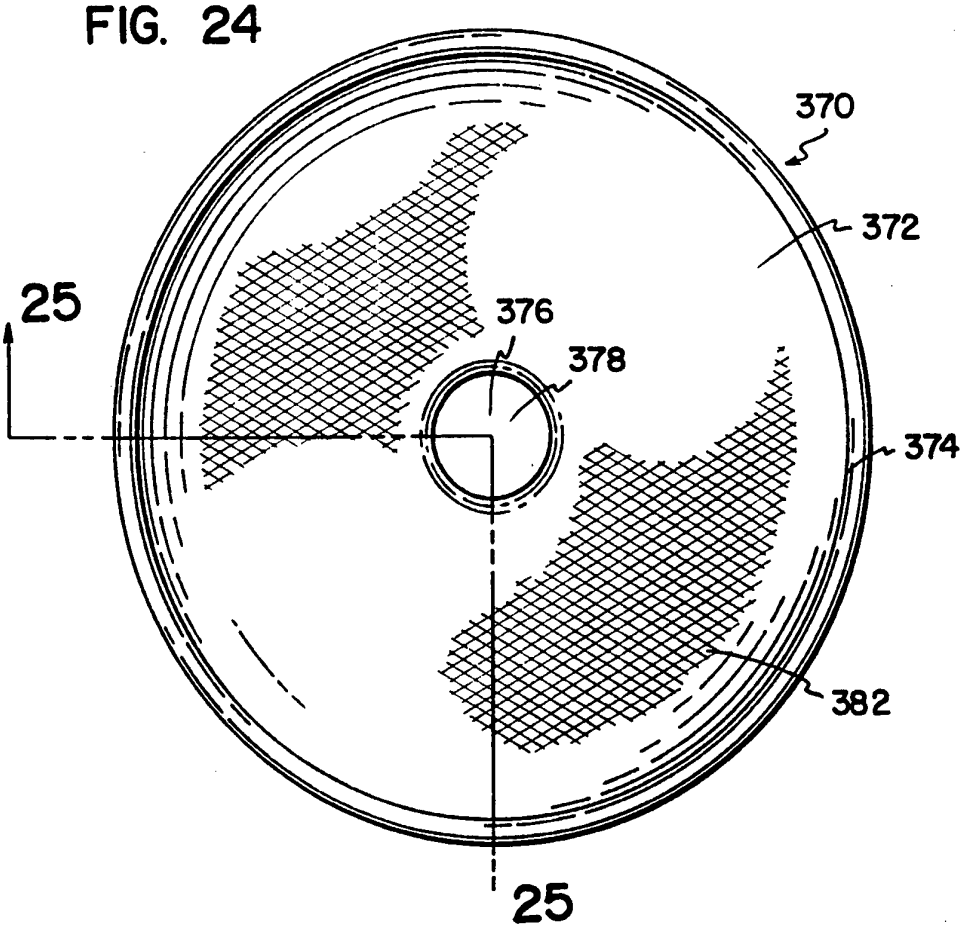
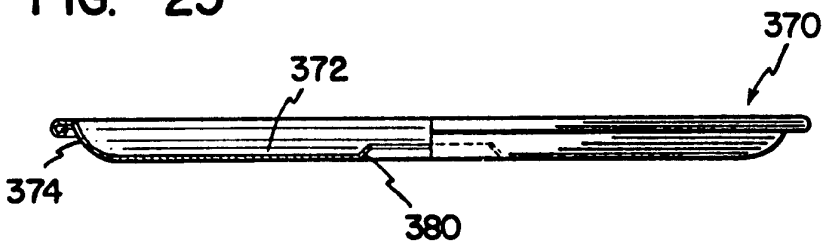


FIG. 25



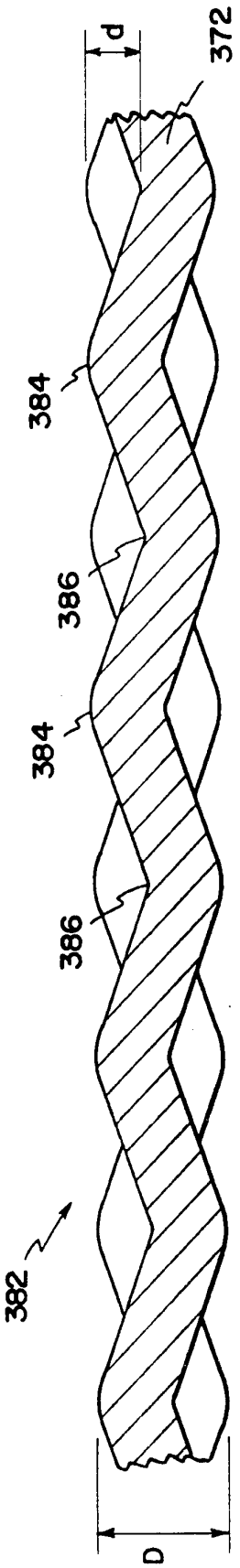


FIG. 26

FIG. 27

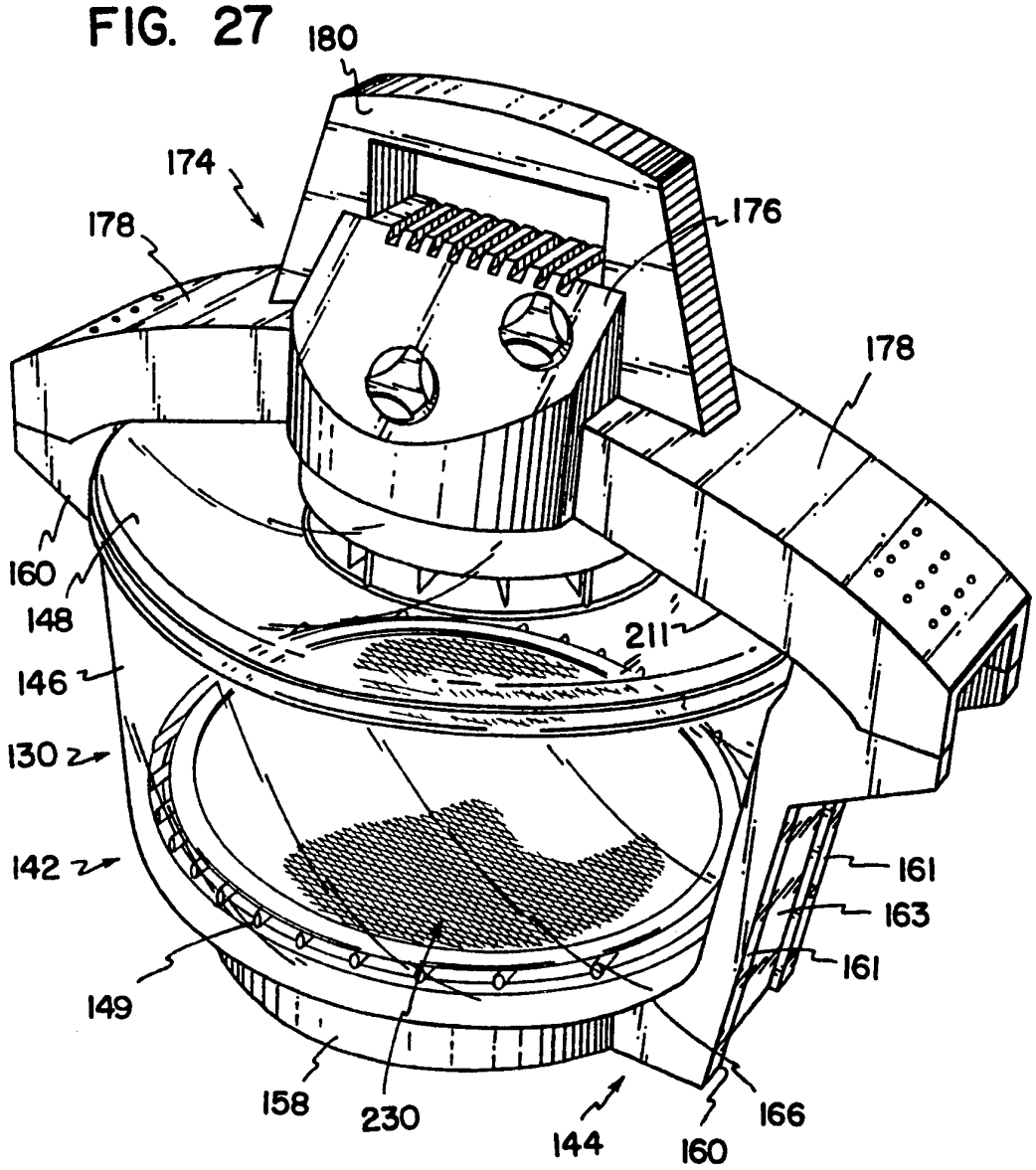

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FIG. 29

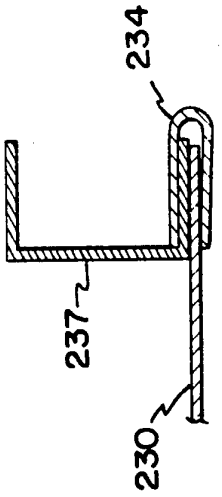

FIG. 30

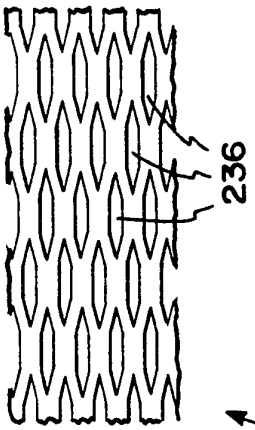

FIG. 28