

- [54] **FOOD PACKAGE FOR HEATING AND VENTING**
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- [73] Assignee: **Nabisco, Inc.**, New York, N.Y.
- [22] Filed: **May 4, 1971**
- [21] Appl. No.: **140,103**

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- [52] **U.S. Cl.**..... **426/87**, 206/459, 206/498, 206/806, 206/815, 229/54 R, 229/3.5 MF, 426/88, 426/107, 426/110, 426/113, 426/118, 426/114, 426/123
- [51] **Int. Cl.**..... **B65b 25/22**
- [58] **Field of Search**..... 99/171 H, 171 LP, 171 TC, 99/171 CT, 171 R, 171 M; 206/46 F, 56 AA, DIG. 8, DIG. 24, 459, 498, 806, 815; 229/3.5 MF, 54 R; 426/87, 88, 107, 110, 113, 114, 118, 123

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[57] ABSTRACT

Several packages are disclosed which contain food and which are used for storing, heating and serving the food. The food may be heated by inserting the package in an electric toaster or other similar heating device.

4 Claims, 39 Drawing Figures

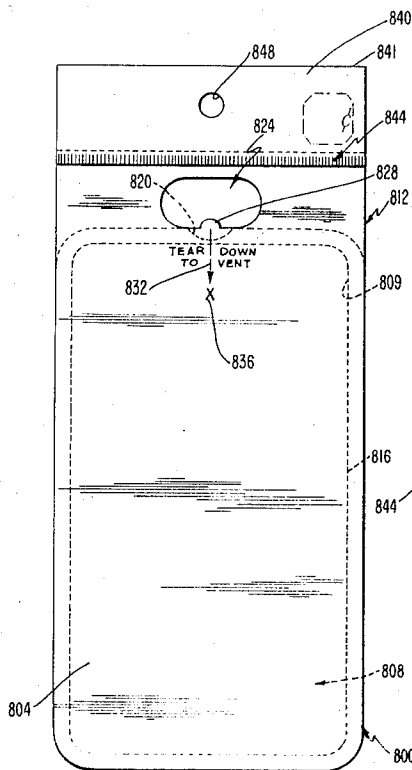


Fig. 1

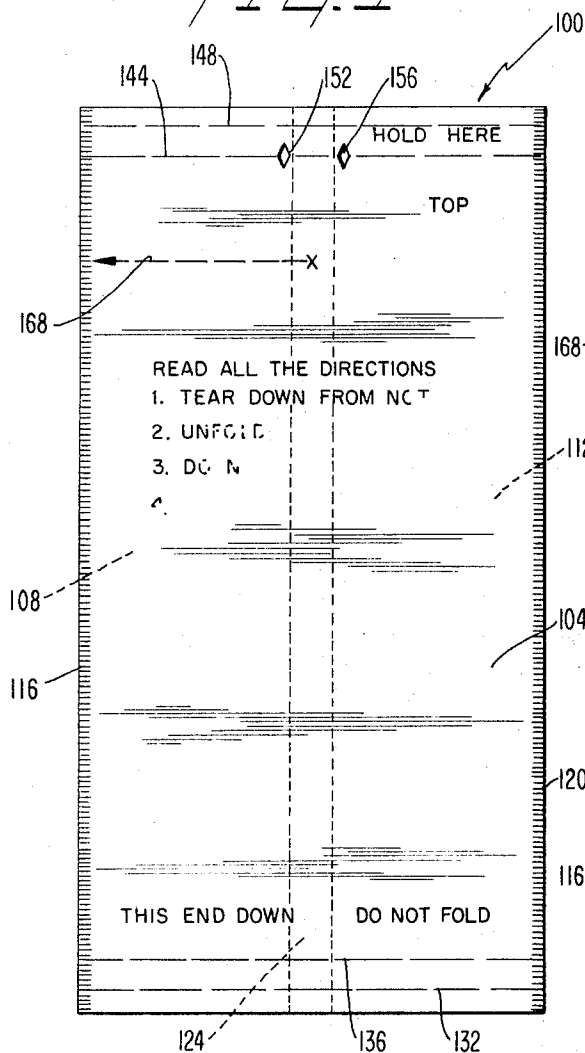


Fig. 2

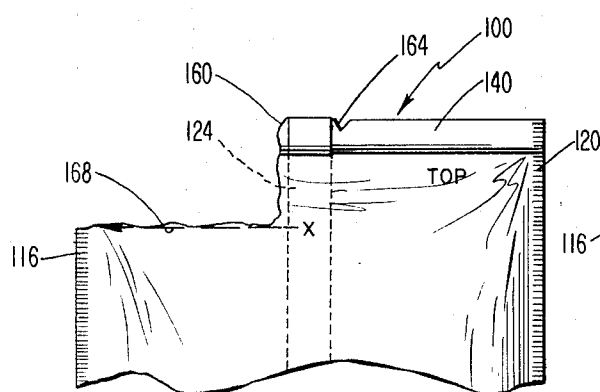
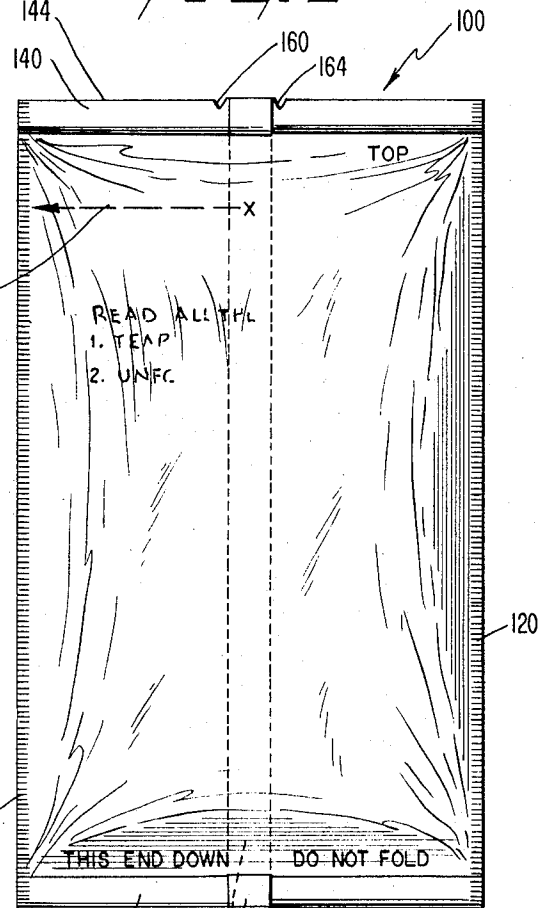


Fig. 3

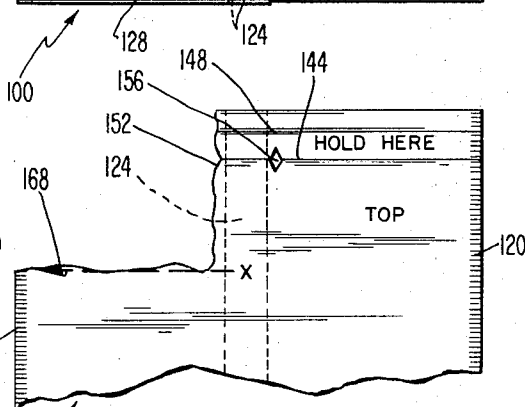
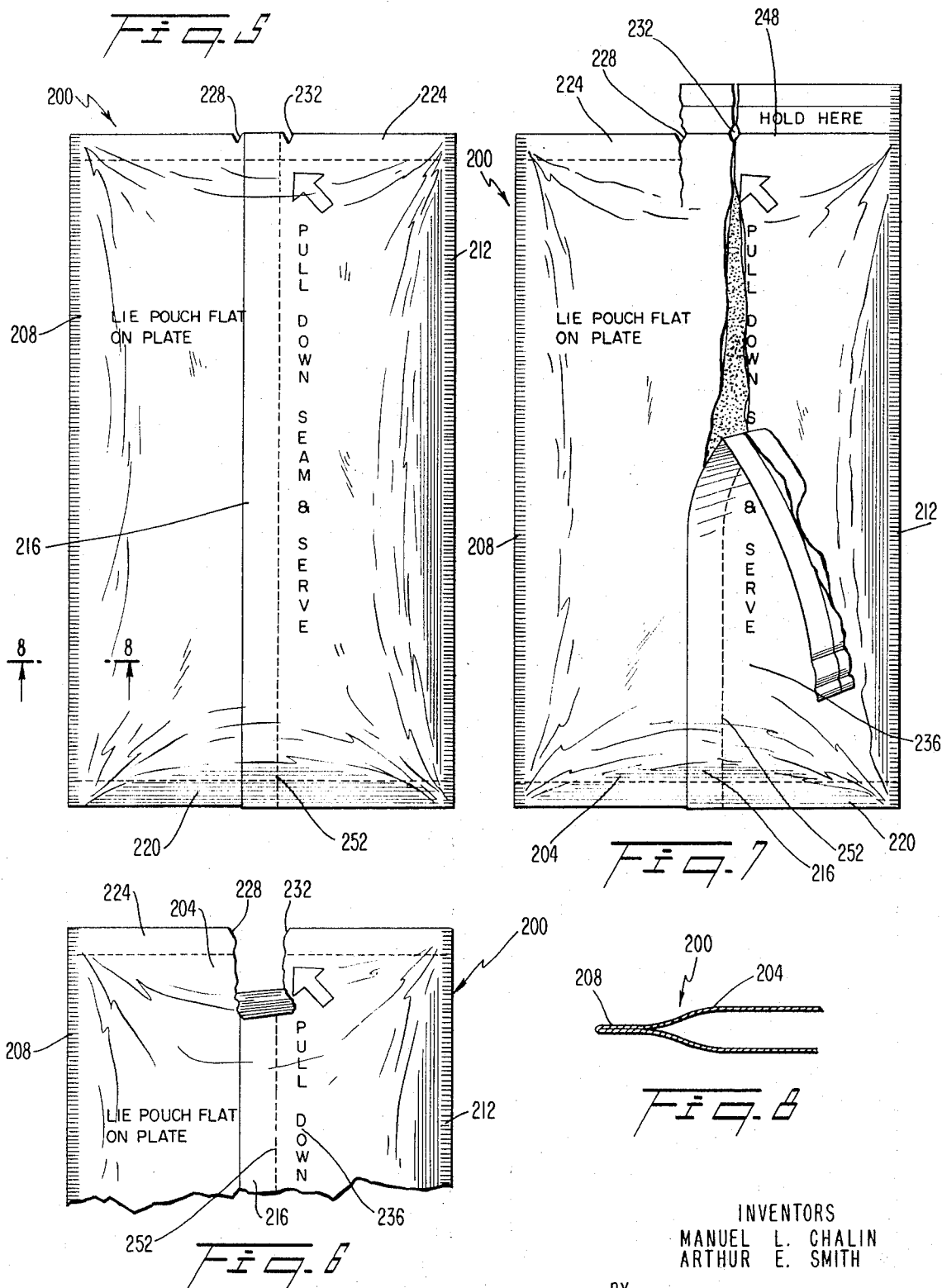


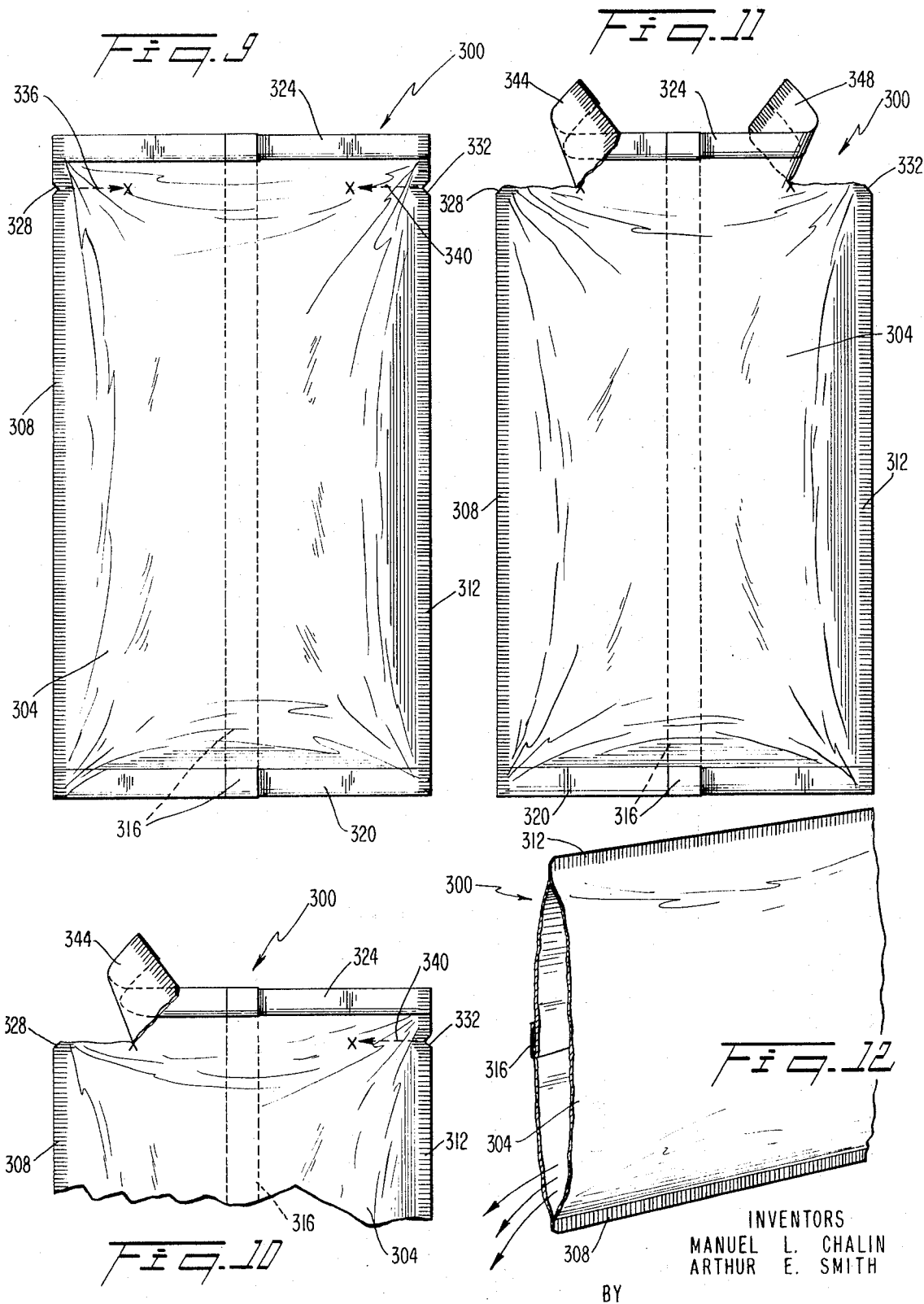
Fig. 4

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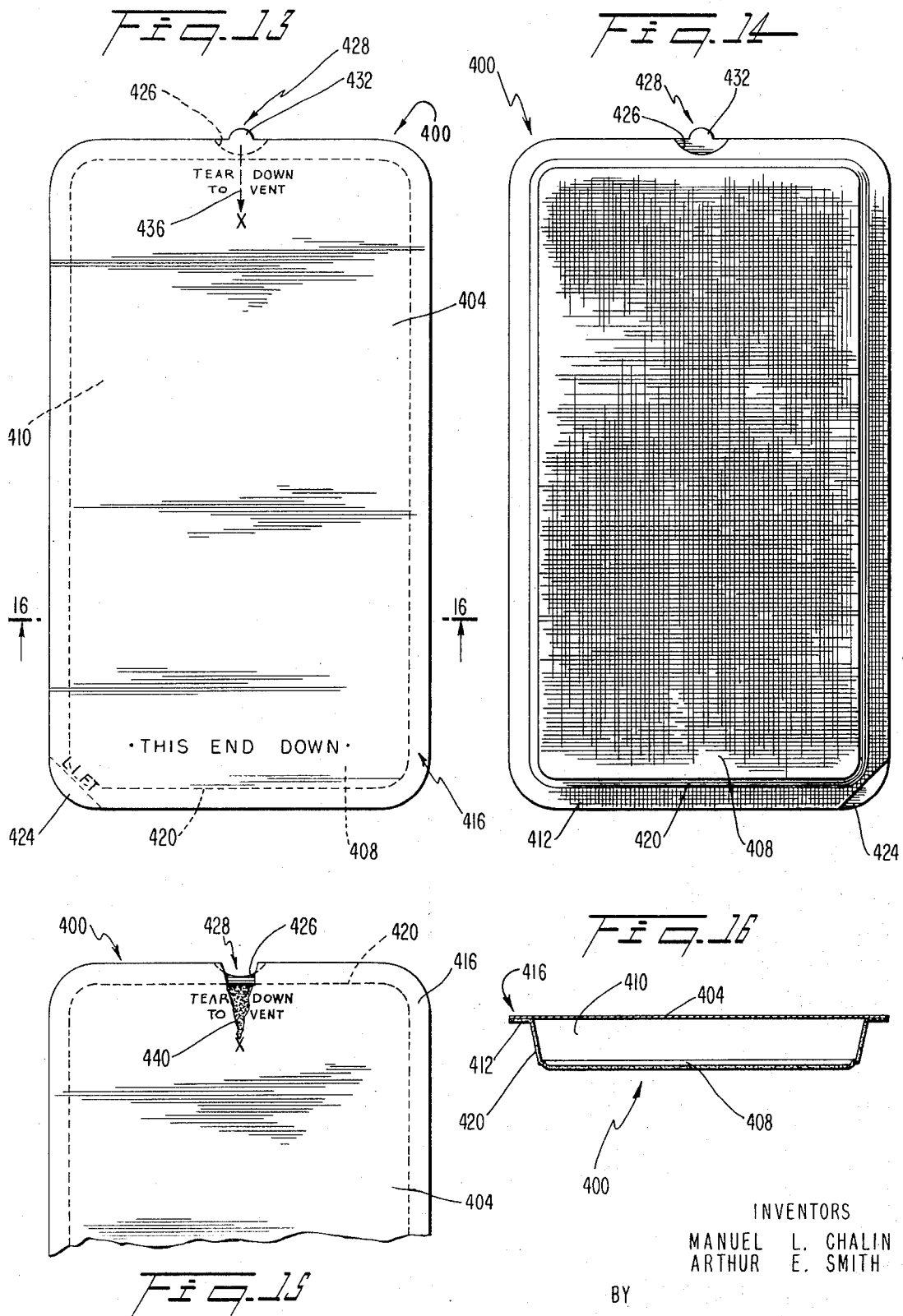




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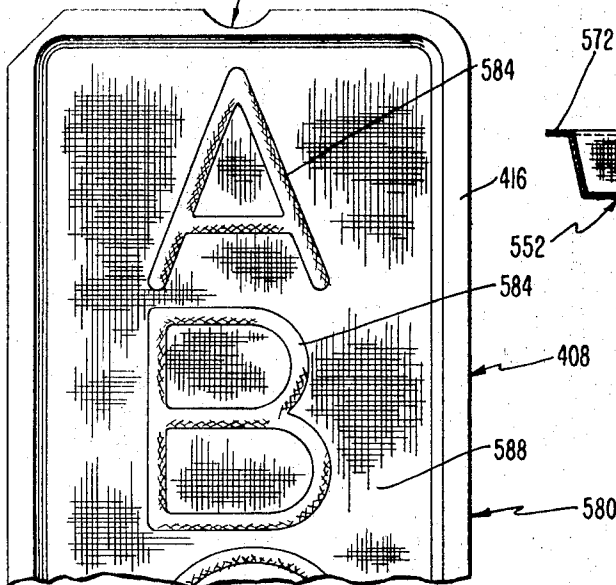
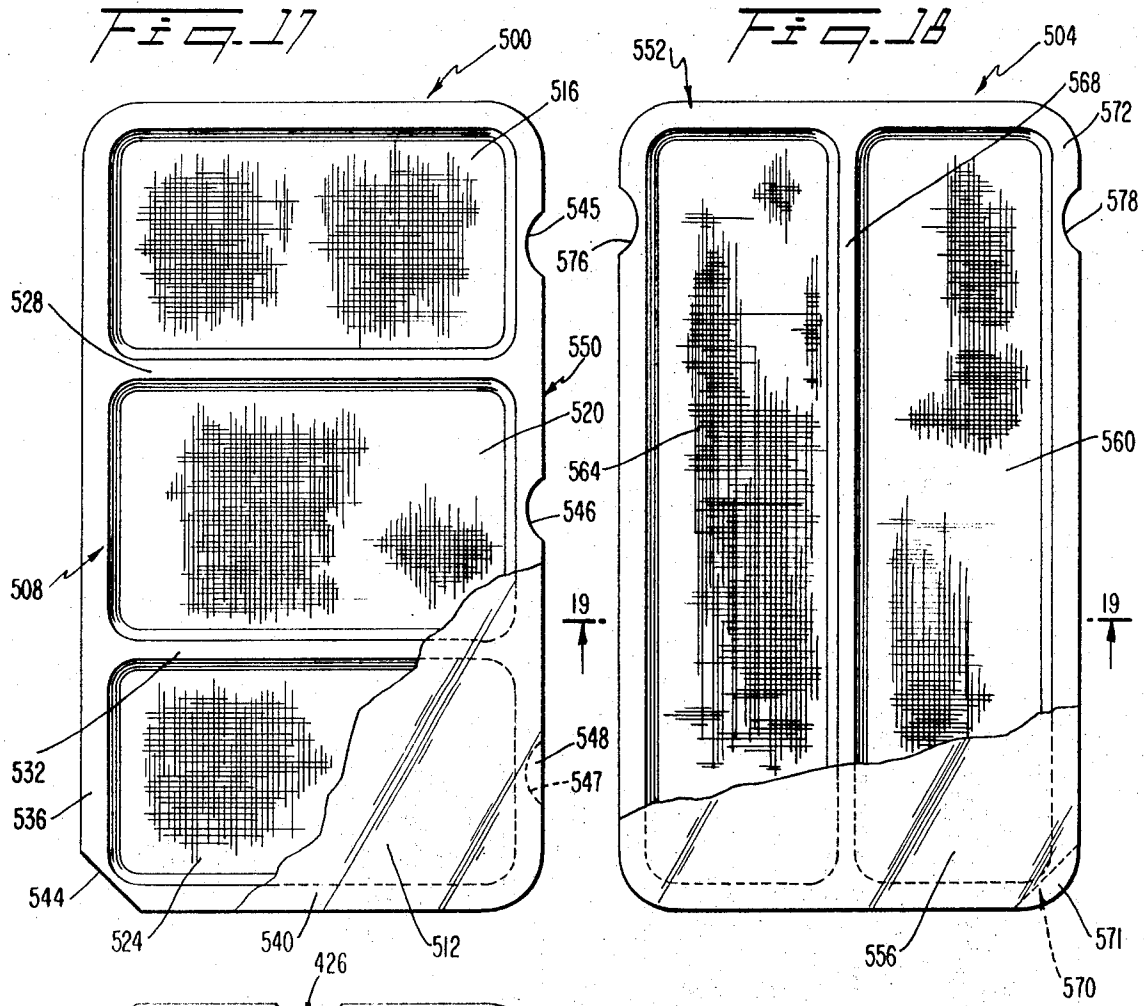
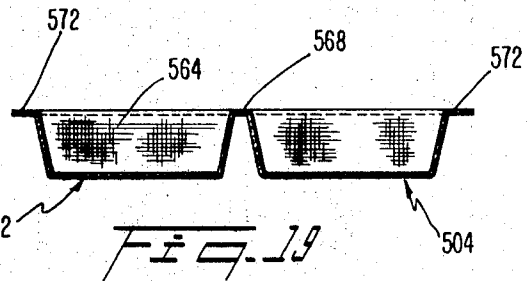


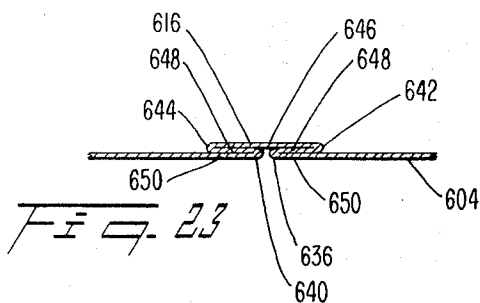
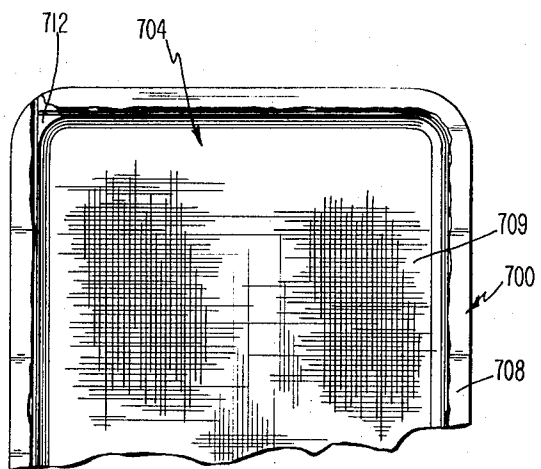
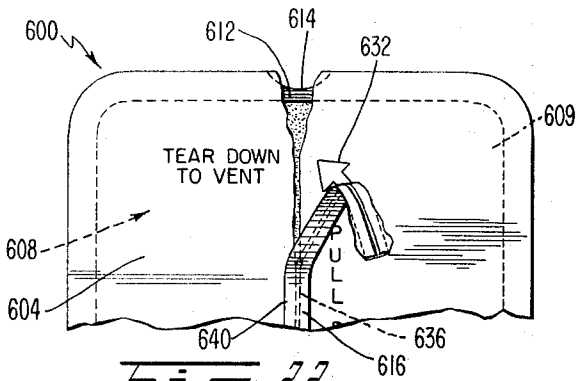
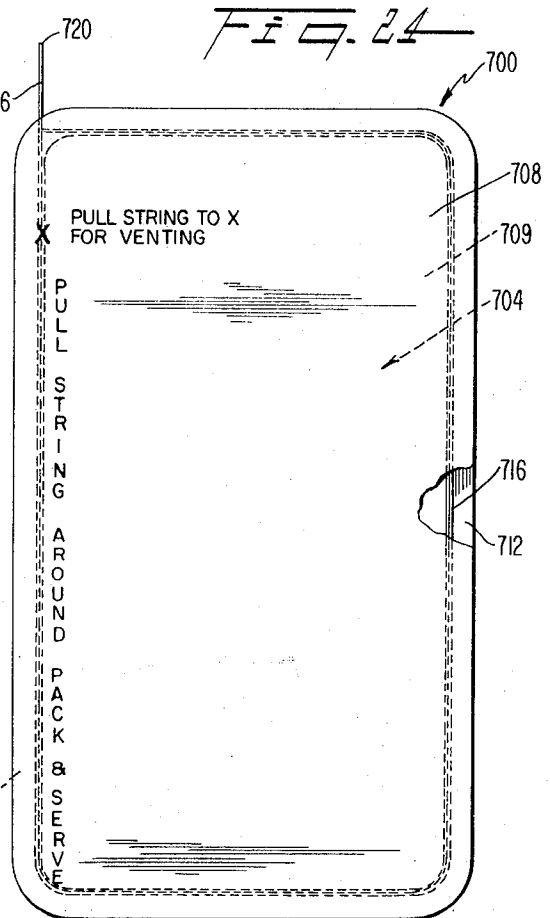
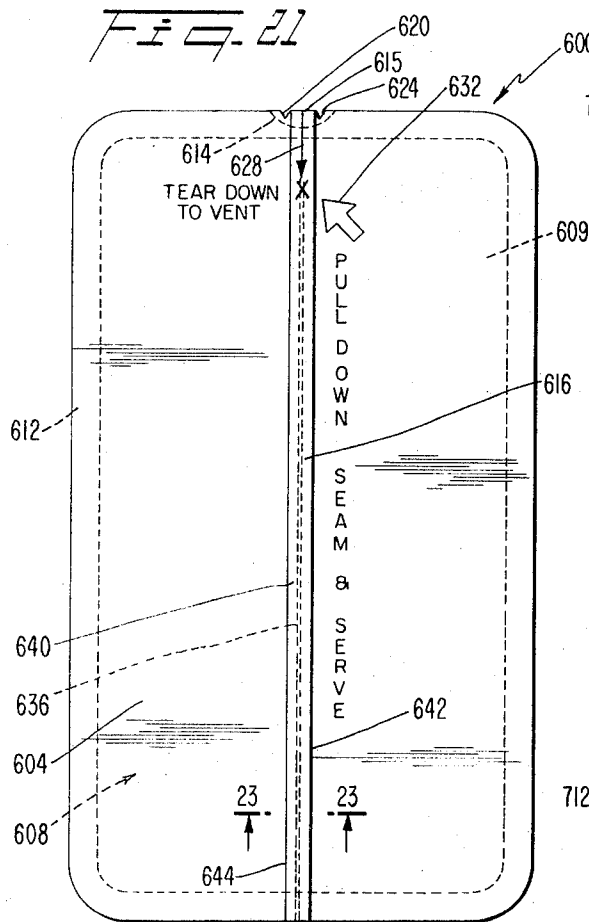
Fig. 20



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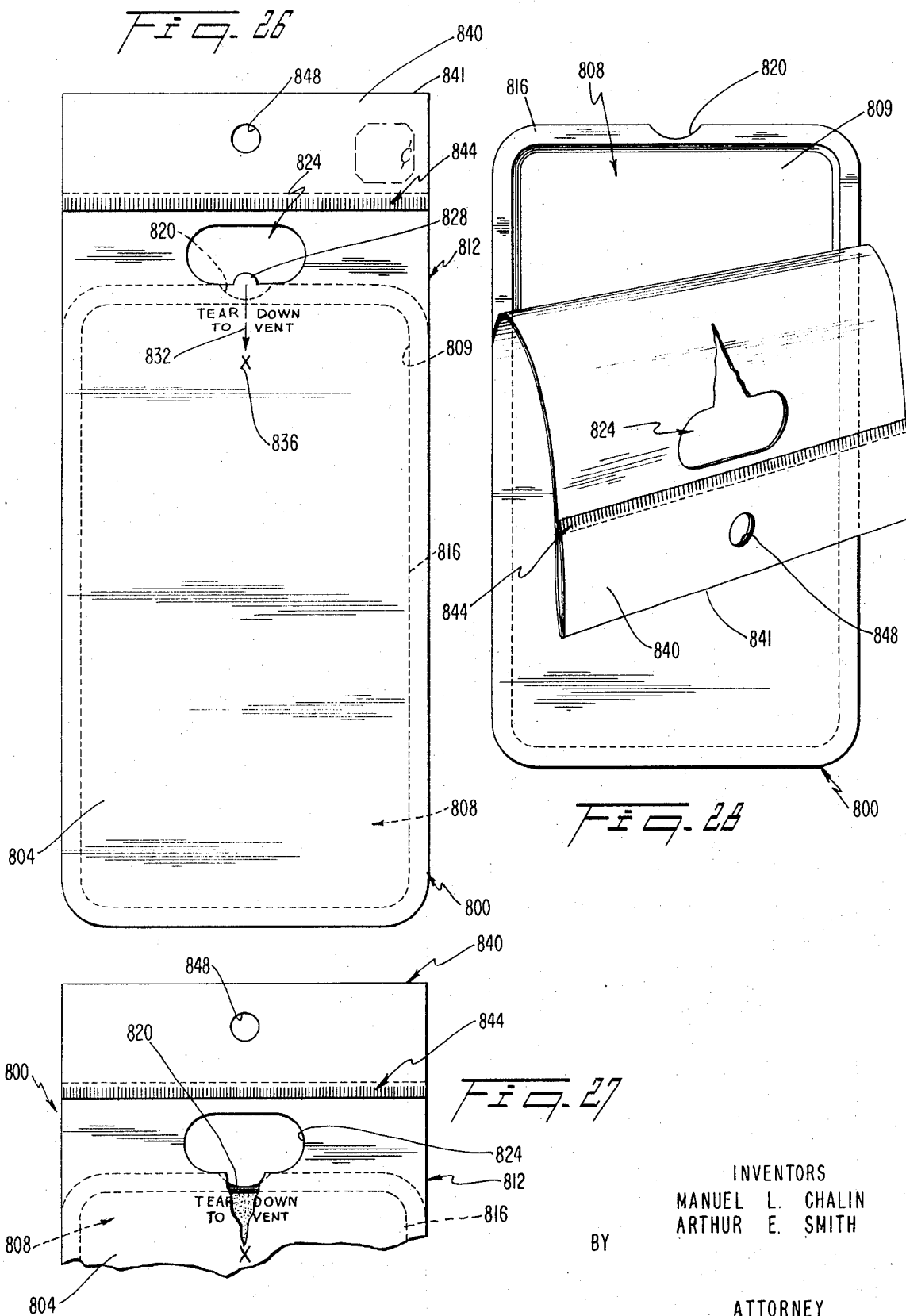
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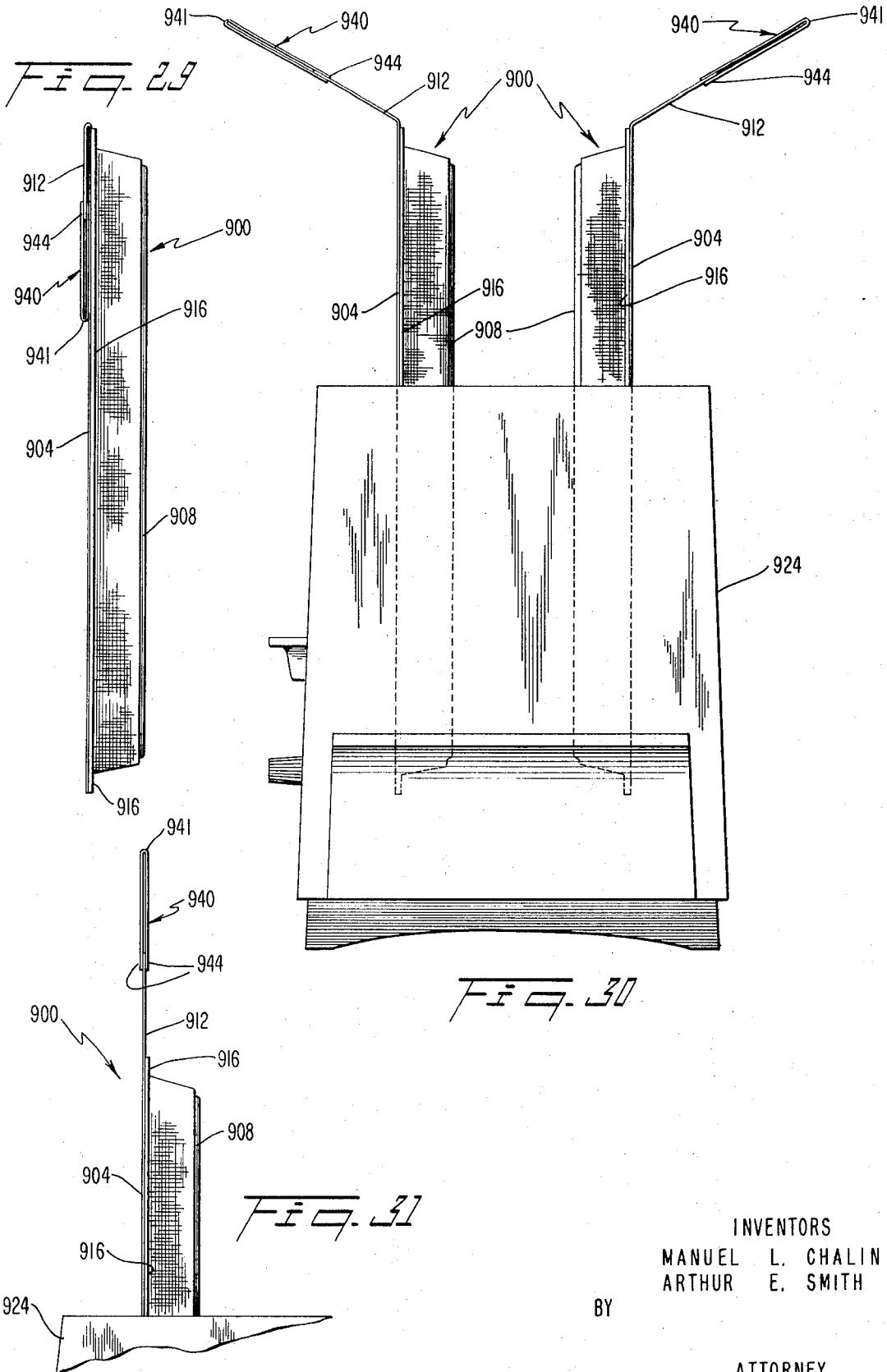


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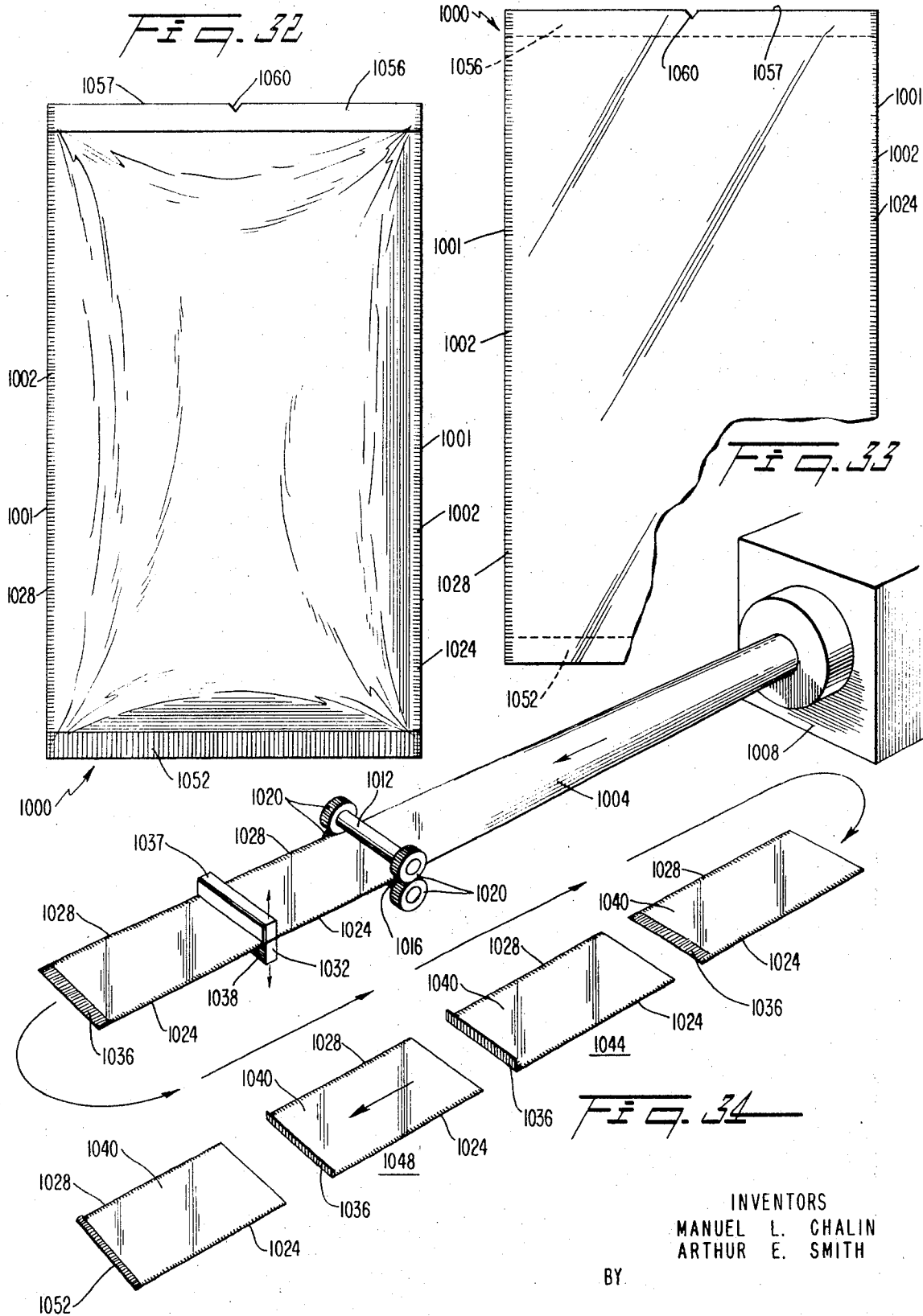




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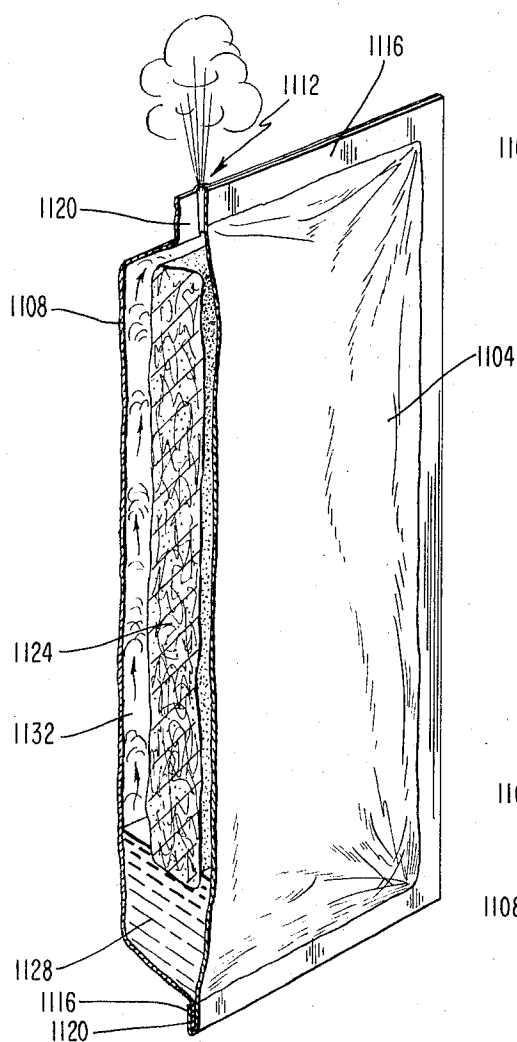


Fig. 35

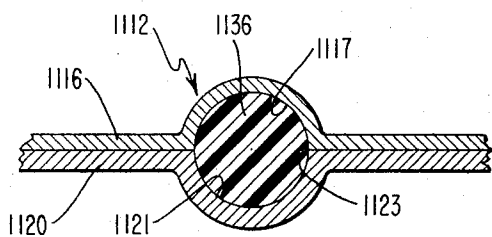


Fig. 37

Fig. 36

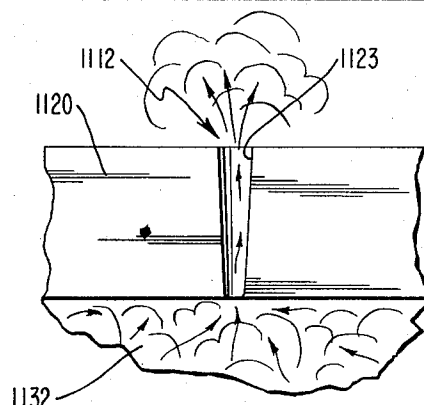
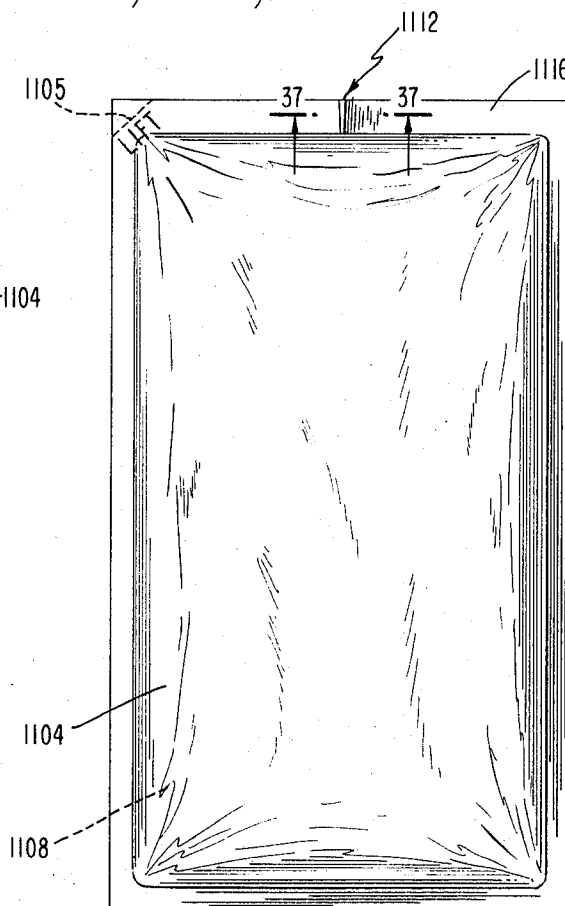


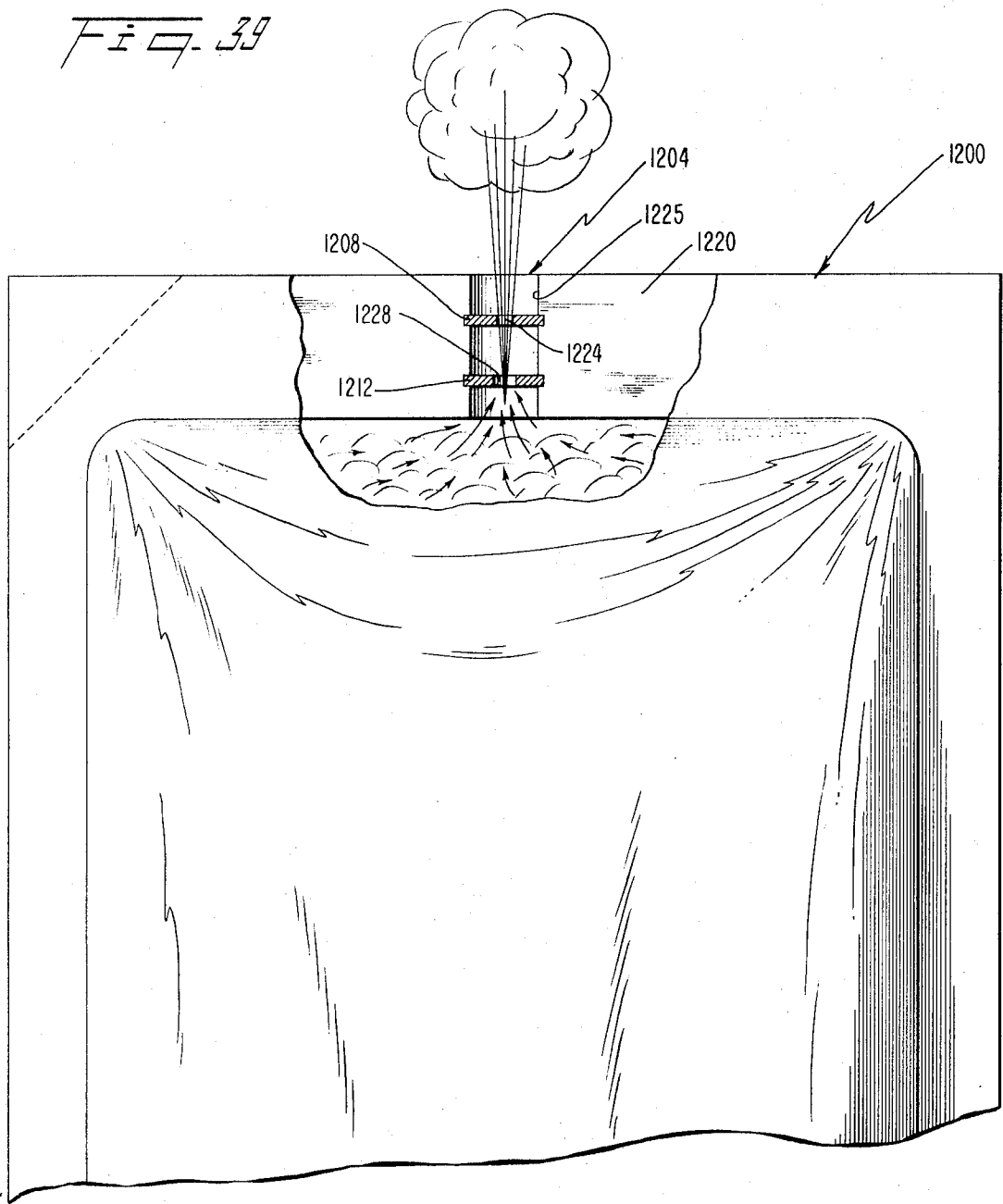
Fig. 38

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FIG. 39



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FOOD PACKAGE FOR HEATING AND VENTING

BACKGROUND OF THE INVENTION

a. Field of the Invention

The present invention relates to food packages, and more particularly to convenience food packages which can be used for storing and cooking or reheating food without removal from the package.

b. Prior Art

A number of ready-to-heat-and-eat packages have been developed for food servings but present a number of problems to the consumer which are corrected by the packages of this invention.

These prior art packages have been designed with the object of both storing and cooking relatively small measured portions of food therein. However, none of these packages have in practice proved adequate in eliminating or reducing the problems connected with food preparation while also providing a container that may be both economically formed and sufficiently rigid and sturdy to withstand the punishment concomitant with the purveying of food which includes handling by the producer, transporter and server.

Some disadvantages of prior packages for both storing and cooking food are that such packages have a considerable tendency to tear to permit air to enter and spoil the food. Also, prior packages have not been formed in such a manner as to facilitate handling without unduly damaging the package and because of their structure the venting of such packages for cooling or heating cannot be easily and precisely accomplished. The removal of food from the prior packages has been difficult and because of the fragile and easily tearable nature of the metallic foil used in the construction of such packages; structural sturdiness has not heretofore been achieved. In addition, the prior packages have been designed for specific foods rather than having a universal design capable of containing a large variety of foods.

Another disadvantage of prior packages is that removal of fluent foods has been extremely difficult since the foods cannot be easily removed from the package by simply lifting them up out of the package due to their fluent nature. Dumping the contents normally requires holding the sides or bottom of the package which are not designed for such handling. Furthermore, many food products must be accurately dispensed, such as soups, gravies and beverages, and the mess that results from dumping the contents from the package is undesirable. In order to remove fluent food products from prior packages it is necessary to either tear or cut the top off the package to permit dumping; however, this is undesirable for the reasons mentioned above and further because of the inconvenience and waste of time. Also, the tearing of prior packages for removal of contents is precise and many times causes spilling and unappetizing servings.

U.S. Pat. Nos. 2,609,301; 2,633,284; 2,807,550; 2,838,404; 2,881,078; 2,912,336; 3,117,875; 3,132,029; 3,185,372; 3,322,319; 3,361,576; 3,392,033; 3,410,700; 3,415,662; 3,442,662; 3,446,632; 3,469,998; and 3,502,487 and Canadian Pat. No. 797,651 disclose packages for storing food and cooking food in the packages in toasters; however, the packages disclosed in these patents all suffer from one or more of the above mentioned disadvantages. For instance, none of these patents disclose a package

that is both compact and yet can be rendered readily accessible in a toaster. None of these patents have overcome the main problems concomitant to packages made of metallic foil, namely, its propensity for undesired tearing, puncturing and mutilation and, in practice, none have proved adequate in eliminating or reducing the problems mentioned above.

BROAD DESCRIPTION OF THE INVENTION

The present invention is directed to food packages and methods for making them. The packages provide a practical system for storing an almost unlimited variety of cooked, partially cooked and uncooked foods in measured or controlled portions, such as individual servings, for prolonged periods of time while maintaining nutritional values and in a form which permits rapid and convenient preparation and serving with little or no loss of tastiness, flavor and freshness. Unlike most packaging systems currently in use, the invention provides unitary food packages containing measured or controlled portions which can be individual servings or low multiples of individual servings. The invention also admits of merchandising a wide variety of foods, for example, in combination packs of individual foods making up a balanced meal which can be fully prepared in situ solely through the use of any conventional toaster.

Illustrative of foods which can be packaged in accordance with the present invention are beef burgundy, hamburgers (seasoned and unseasoned), pizza burgers, beef stew, beef stroganoff, corned beef slices, boneless short ribs of beef hickory smoked beef slices, roast beef slices (with and without gravy), barbecued beef, ham slices and steaks, chicken slices, turkey slices, meat loaf (with and without gravy), veal parmesan, veal cutlet (breaded and otherwise), chicken fried steak, meat balls, meat balls in spaghetti sauce, Swedish meat balls, Salisbury steak (with or without onions) lamb chops, Swiss steak, beef steaks, pork chops, fish, breaded filets, mushrooms (with and without gravy), gravies (chicken, brown, beef etc.), sauces (white, hollandaise, barbecue, etc.), stuffings (turkey, meat, bread, etc.), cocktail franks, corn-muffins, dinner rolls, spaghetti sauce, spag O's with meatballs, shrimp fried rice, chicken chow mein, tamales, chicken a-la king, chicken fricassee, Manhattan clam chowder, New England clam chowder, chili, ravioli, sloppy Joe, beef gravy, cream corn, sweet peas, chocolate fudge sauce, fried clams, clam sticks, fish sticks, shrimp cakes, shrimp marinara, sweet sausage and peppers, instant mashed potatoes, instant sweet potatoes, egg rolls, stuffing, rice, garlic bread, soup (dehydrated), coffee, baby foods, hot chocolate, cereals, tea, pet foods, hot gravies for pet foods, pie fillings, custards, toppings (chocolate, butterscotch, etc.), desserts (puddings, etc.), vegetables (with and without sauces, butter, etc.).

These foods, especially the meats, may be fully prepared, pre-cooked and frozen requiring only thawing and reheating prior to serving. In this connection it has been unexpectedly found that the toasting times and temperatures characteristic of conventional toasters are fully adequate for thawing and adequately reheating frozen foods to temperatures which are high enough for serving and eating. Foods that are amenable to storage without freezing or refrigeration, of course, need not be frozen or refrigerated but simply stored on the shelf in the packages of this invention. Cereals, de-

hydrated soups, hot chocolate powders, tea and other shelf stable foods fall into this category. Also, those foods which are of the instant type requiring only the addition of hot water and those foods which require only a small amount of cooking time need not be pre-cooked. Cereals, rice, hot chocolate powders and tea fall into this category. Additionally, packages of this invention are adapted to sterilization treatments to provide aseptically packaged foods which are shelf stable.

The present invention drastically reduces the time, effort and manpower needed for the preparation and serving of meals. It substantially eliminates the need for measuring out portions, since each package contains a controlled amount of food. It permits a wide range of selectivity for serving a wide variety of personal tastes at one sitting with almost no extra effort and in a minimum amount of time. It also permits more precise control of food intake without wastage of those concerned with diet and allows the preparation of single meals which are well balanced for those who live alone. It substantially eliminates left-overs and cuts clean-up time to a minimum. Cleaning of cooking equipment is obviated, since no pots and pans are used and the package after use is simply discarded. The only heating appliance used is the conventional toaster which, with a minimum of care, is not dirtied. The present invention permits an ultimate of convenience in the preparation of full, well-balanced, appetizing meals without any expenditures for expensive heating or cooking equipment.

The packages of the present invention are not only useful in the home but find extensive utilization in commerce in restaurants, hotels, clubs, cafeterias, vending machines, snack bars, lunch counters, food stands, in hospitals, nursing homes, prisons, schools, colleges, in the armed services, employees cafeterias, and in any kitchen whether private, commercial or institutional.

Specifically, it is an object of the present invention to construct a package for storing and cooking or heating foods that is easy to handle during the cooking or heating operation.

Another object is to construct a package for storing and cooking foods in a toaster having means to facilitate venting and opening to discharge its contents.

A further object is to provide a handle for a package to facilitate the cooking of food in a toaster such that, when the package is in use, the handling tab extends above the toaster to facilitate insertion into and removal from the toaster, but, during shipping, handling and storage prior to use, the handle is folded down or in a retracted position where it is protected from mutilation or damage.

Another object is to provide a package for storing and cooking food which may be constructed with multiple compartments which are facile to vent and open to discharge the contents.

Another object is to provide a food package having built-in signaling means to provide an audible signal when the heating or cooking cycle is completed.

Another object is to provide a method of continuously forming packages for food.

Another object of the present invention is to utilize a longitudinal sealing margin having a longitudinal fold line associated therewith in association with a pair of tear notches provided in a sealed top margin of a package to provide precise venting of the package for cooking and to provide a well-defined tear line which facili-

tates opening and removal of food from the package after cooking.

The package of the present invention is advantageous over previously known packages in that the package is tear resistant, the package can be economically formed, the package retains its configuration due to the cooperation of its structural parts, the package is easily and precisely vented for cooking, food may be more precisely cooked or reheated due to signaling means built into the package, food may be easily removed from the package after cooking, and utilization of the package with conventional toasters is facilitated by the provision of a handle tab which can be in a protected position during shipping and storage but can be extended when the package is prepared for heating.

The present invention is generally characterized in a package for storing food and heating the food by insertion into a toaster or similar heating device comprising a package formed with a pliable, heat resistant, thermally conductive, non-porous coated sheet material, at least as one component, and venting and opening means constructed in said sheet material to facilitate venting and opening of the package.

The present invention also is generally characterized in a package having a handle which is in a folded or retracted position during storage or shipment but which is easily unfolded or extended when in use. The invention also is generally characterized in a package having built-in signaling means for providing an audible signal upon completion of a predetermined heating cycle. The invention also is characterized in methods for making packages described herein and also in methods for making packages having seamless side walls.

Further objects and advantages of the present invention will become apparent from the description of the preferred embodiments as shown in the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevation of a package constructed in accordance with this invention showing both ends prior to folding into their storage positions;

FIG. 2 is a front elevation of the package of FIG. 1, both ends being shown in their folded storage positions;

FIG. 3 is a broken front elevational view of the top portion of the package of FIG. 2, showing the package opened on the left side;

FIG. 4 is a broken front elevational view similar to FIG. 3, except that the remaining portion of the top margin has been unfolded to form a handle;

FIG. 5 is a rear elevation of a package constructed in accordance with this invention having both ends folded in their storage positions;

FIG. 6 is a broken rear elevational view of the top portion of the package of FIG. 5, a vent having been provided in the top thereof;

FIG. 7 is a view of the package of FIG. 5, showing the longitudinal seam partially torn downwardly in the process of opening the package;

FIG. 8 is a broken sectional view of a side margin of the package taken along lines 8—8 of FIG. 5;

FIG. 9 is a front elevation of a package constructed in accordance with another embodiment of this invention having two side tear initiating means;

FIG. 10 is a broken front elevational view of the top portion of the package of FIG. 9, a vent and handle

means having been provided therein by transverse tearing at one of said tear initiating means;

FIG. 11 is a front elevation of the package of FIG. 9, dual vent means and handle means having been provided therein by transverse tearing at both said tear initiating means;

FIG. 12 is a broken perspective view of the package of FIG. 9, the top having been removed by continuing the transverse tearing,

FIG. 13 is a top plan view of a package constructed in accordance with another embodiment of this invention having a tear tab in its cover;

FIG. 14 is a bottom plan view of the package of FIG. 13;

FIG. 15 is a broken plan view of a top, end portion of the package of FIG. 13, a vent having been provided in the cover thereof by tearing at the tear tabs;

FIG. 16 is a sectional view along lines 16—16 of FIG. 13;

FIG. 17 is a top plan view of a package constructed in accordance with a further embodiment of this invention showing the cover thereof partially broken away;

FIG. 18 is a top plan view of another type of package constructed in accordance with this invention showing the cover partially broken away;

FIG. 19 is a sectional view along line 19—19 of FIG. 14;

FIG. 20 is a broken plan view of another type of package constructed according to this invention with the cover removed;

FIG. 21 is a plan view of the top of a package constructed in accordance with a still further embodiment of this invention having a tear strip centrally located in the cover of said package;

FIG. 22 is a broken plan view of the package of FIG. 21 showing the package in the stage of being opened by operation of the tear strip;

FIG. 23 is a partial sectional view along lines 23—23 of FIG. 21;

FIG. 24 is a top plan view of a package constructed in accordance with still another embodiment of this invention having a tear string;

FIG. 25 is a broken top plan view of the package of FIG. 24, the major part of the cover having been removed by operation of the tear string;

FIG. 26 is a top plan view of a package constructed in accordance with a still further embodiment of this invention having a tear tab and an extension handle;

FIG. 27 is a broken top plan view of the package of FIG. 26, the package having been vented by operation of the tear tab;

FIG. 28 is a top plan view of the package of FIG. 26 showing the cover in the process of being removed by operation of the handle extension;

FIG. 29 is a side elevation of a package similar to that shown in FIG. 26 with its handle extension in a folded position;

FIG. 30 is a side elevation of two packages shown in FIG. 29 being heated in an electric toaster;

FIG. 31 is a broken side elevation of the package of FIG. 29 in an electric toaster after being heated, with the handle extension in position for removal from the toaster;

FIG. 32 is a front elevation of a package having seamless sides made in accordance with this invention;

FIG. 33 is a broken rear elevation of the back of the package of FIG. 32;

FIG. 34 is a simplified perspective view illustrating the steps of forming packages of FIG. 32;

FIG. 35 is a broken perspective view of a package of a still further embodiment of this invention having temperature signaling means;

FIG. 36 is a top plan view of the package of FIG. 35;

FIG. 37 is a partial sectional view along lines 37—37 of FIG. 36;

FIG. 38 is a partial sectional view of the temperature signaling means of the package of FIG. 35, during activation;

FIG. 39 is a partial sectional view similar to FIG. 38 illustrating a whistle as signaling means.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The following is a detailed description of the various embodiments of the invention with reference to accompanying drawings. However, it should be understood that the invention is capable of numerous modifications and variations apparent to those skilled in the art without departing from the spirit and scope of the invention. The drawings and detailed description represent the preferred form of each embodiment.

A first embodiment of this invention is a package which has dual tear initiating means located in sealed areas on either side of a longitudinal seam located on a wall of the package and that serve as tear guides. The dual tear initiating means may be located in the top of the package or in opposing side margins near the top. The dual tear initiating means are used initially to tear the package through the sealed areas to form vents prior to the heating step. After the heating step, the tears when initiated from the sides of the package may be torn completely across the package to permit discharge of the food. When the tears are initiated from the top, optionally, one or both may be continued all the way to the bottom of the package to discharge the food, or one of them may be continued a short distance below the top seal at a transverse tear line and then continued along the transverse tear line to provide a pour spout for discharging the food. In the latter case the other tear may be continued to the bottom of the package to discharge any food remaining, after discharge of the contents through the pour spout.

The pliable sheet material used in making the packages shown in the drawings, and described herein, is preferably pliable, heat-resistant, tearable, thermally conductive and non-porous. Preferably there is used as a base layer a metallic foil, for example, having a thickness of approximately fifteen ten-thousandths of an inch. One side of the foil is treated, or otherwise conditioned, to provide it with a heat fusible surface which may be, for example, a heat fusible coating having a thickness of about one ten-thousandths of an inch. The other side of the foil should be treated, or otherwise conditioned to provide it with a dielectric, or electrically insulated surface, in order to insure against the possibility of causing a short circuit which might otherwise result from contact between the unprotected foil and the wiring of an electric toaster. The dielectric surface may comprise a coating of dielectric material having a thickness of approximately two ten-thousandths inch, for example. The dielectric surface may also include a protective or colored coating of a protective material such as an epoxy resin, for example, having a thickness of about one ten-thousandth of an inch or the

coating itself may be sufficient to both protect and insulate the foil in place of the dielectric surface.

Especially preferred as the metallic foil is aluminum foil which can be used in the thickness given above or in thicker or thinner sizes as desired or required for specific applications. Stainless steel foil is also available and can be used if desired. Substantially any heat-conductive sheet material can be used as the base layer. For example, heat-resistant plastic films, such as Mylar, having thin coatings of vapor deposited metals are useful. Also, plastic films formed with substantial amounts of metallic particles dispersed throughout are also useful.

The dielectric surface is for the purpose of electrically insulating the package in the event of contact with the heating elements of the toaster. Substantially all thermosetting plastics and high heat-resistant thermoplastics in the absence of electrically-conductive additives are dielectrics or electrically insulative and any suitable thermosetting or high heat-resistant thermoplastic can be used. For example, epoxy resins can be used. Phenolic resins, melamine-formaldehyde resins, urea-formaldehyde resins and polyester resins are examples of suitable resins that can be employed in making the dielectric surface. These materials are also useful in providing the protective coating.

The inner heat-sealable layer comprises a transparent, heat-activatable adhesive, for example, a thermoplastic material having softening temperatures above those temperatures usually encountered in an electric toaster, for example, above about 212°F. The inner heat-sealable layer is transparent so that the shiny, reflective inner surface of base layer is preserved. High melting polyester resins, polyacrylic resins and the like can be employed. When thermoplastic materials are used in any of the layers, such materials should not melt or soften to any undesirable extent at temperatures normally encountered in toasters and preferably not below 212°F.

Any type of lettering or designs such as labels, instructions, trademarks, etc. may be placed on the front and rear panels of the package. The outer layer which, for example, may be formed of dark blue epoxy which is primarily heat-absorptive may also be over-printed with various patterns of white which is primarily heat-reflective to control heat absorption and distribution inside the package in accordance with the heating requirements of the food product contained in the package. Of course, it will be understood that the above materials are illustrative only and that other materials, which are well known in the art may be substituted.

Sealed package 100 as illustrated in FIGS. 1 through 4 and sealed package 200 as illustrated in FIGS. 5 through 8 represent packages having front and back walls, a longitudinal seam in one of said walls, located intermediate the sides of the package, a folded top margin and dual tear initiation means, both located on the top margin of the package and on both sides of the longitudinal seam. A primary feature of this embodiment is the use of two tear notches, one on each side of the longitudinal seam. A single notch is somewhat unpredictable in that, while it usually allows tearing along the seal, occasionally the tearing proceeds outwardly towards the side edge. This type of package can be generally characterized as a package, for storing food and heating the food by insertion into a toaster, comprising: a package made of pliable sheet material; a longitudinal

seam located in a wall intermediate the sides of the package and which may be folded over one or more times on itself; optionally, side seals along the sides of the package; a bottom seal, which may be folded over one or more times on itself; a top seal, which may be folded over one or more times on itself; dual tear initiation means located on the top edge of the top seal, one being located on each side of said longitudinal seam; and optionally a horizontal tear line located below at least one of the tear initiation means and which is continuous to one side edge of the package. Before insertion into the heating device, one portion of the top seal can be unfolded after tearing through the top seal at one of said tear notches to form a relatively cool holding area which can be used to remove the package from the heating device and in removing the food contents from the package.

Sealed package 100 is illustrated in FIGS. 1 to 4. Package 100 can be prepared from a single sheet or several sheets of pliable sheet material and comprises front panel 104 and two back panels 108 and 112 joined in a longitudinal seam 124. The panels 104, 108 and 112 preferably comprise a single sheet folded on two spaced parallel lines forming the side edges. Marginal portions along each free edge of the sheet parallel to the side edges are folded back to present the marginal portions in face-to-face abutting relationship and the marginal portions are sealed, e.g., by heat, to each other to form a longitudinal seal. The longitudinal seal is then folded upon itself at least once along a line parallel to the longitudinal free edge to form the longitudinal seam 124 and flattened against the package. Alternatively, the package can be made of three sheets represented by 104, 108 and 112 which are sealed together along side edge margins 116 and 120. The longitudinal seam 124 is formed as described above. Further details of the longitudinal seam 124 and methods of forming it are disclosed in application Ser. No. 794,307, filed Jan. 27, 1969, now U.S. Pat. No. 3,615,711, which is incorporated herein by reference.

The longitudinal seam 124 increases the strength of package 100 and acts as a longitudinal strengthening member resisting or preventing the collapse and flexing of package 100. Side seals 116 and 120 are shown as heat seals, but if a single sheet is used to make package 100 then no side seals are necessary, although such seals are desirable to provide additional longitudinal reinforcement to the package 100.

The bottom portion of package 100 is folded twice on itself along lines 132 and 136 to form bottom seam 128. Bottom seam 128 is heat sealed before or after being folded twice into place. Top seam 140 is similar to bottom seam 128, being formed by being folded twice on itself along lines 144 and 148. Top seam 140 is heat sealed before or after being folded twice into place the last fold resulting in a top fold line 144. Tear initiating means in the form of notches 160 and 164 are formed in the top fold line of top seam 140. The tear notches 160 and 164 are located in sealed areas of the top seam 140 on either side of longitudinal seam 124.

FIG. 1 illustrates the package after forming the longitudinal seam 124 and before forming top seam 140 and bottom seam 128. At this point holes 152 and 156 (ultimately forming tear notches 160 and 164 when the package is completed) are punched on line 144. The holes may be pre-punched before folding and forming the longitudinal seam 124 or the notches may be

formed after completion of the package. Bottom seam 128 is normally formed at this point, the food contents are inserted into package 100 through the open top, and then top seam 140 is formed. Alternatively, the food contents can be inserted after forming the top seam 140 and then the bottom seam 128 can be formed. As still another alternative, the food contents can be placed on the pliable sheet prior to folding it to form the side edges and thereafter the sheet can be constructed as described above into package 100 around the food contents in a manner similar to that described in application Ser. No. 794,307.

The use of punched holes 152 and 156 forms dual tear initiation means or notches 160 and 164 as seen in FIG. 2, when top seam 140 is formed. The preferred shape of the dual tear initiation means is a V-shaped notch as shown in FIG. 2, which is formed from diamond shaped holes 152 and 156 before top seam 140 is formed. One tear initiation means is located on each side of longitudinal seam 124.

Before the heating or cooking of the contents of package 100, vents are formed in the top by tearing along one or both sides of the longitudinal seam 124 at one or both of the notches 160 or 164 for a short distance. During cooking the vent allows steam and vapor to escape to the atmosphere. One portion of the folded top portion can be unfolded to provide a handling tab. Package 100 should be inserted into the toaster so that the vent is at the top, thereby avoiding spilling of the package contents during heating. After heating or cooking of the ingredients of package 100, it is removed from the heating means and the tear is continued to and then horizontally along transverse tear line 168 through the side seal 116 to provide a pour spout as best shown in FIG. 3. The remaining portion of top seam 140 can be unfolded, before or after insertion into the heating device, as shown in FIG. 4 to provide a handle to assist in pouring out the contents of package 100. The handle has the advantage of being generally cooler than the rest of package 100. If desired, the handle can be preferably coated with a light colored material so that it is primarily a heat-reflective area and assists in keeping the handle cool enough so that it can be touched, handled, and used to pick up the package during and after it has been heated in the toaster.

Sealed package 200 is illustrated in FIG. 5 through 8. Package 200 can be formed in the same manner as package 100 to have (optionally) side seals 208 and 212, longitudinal seam 216, bottom seam 220, top seam 224 and tear notches 228 and 232. Fold line 252 represents the line along which longitudinal seam 216 is flattened against the package. FIG. 8 illustrates the cross-section of side seal 208.

Before package 200 is placed in a suitable heating device, e.g., a toaster, it is vented to allow steam and vapors to escape to the atmosphere during the heating and/or cooking. The vent is formed by tearing the package at tear notches 228 and 232 along both sides of longitudinal seam 216 from the top of package 200 to points below top seam 224. This is best shown in FIG. 6. The dual tear initiation means 228 and 232 insure that the tears will be vertical and will not be oblique as might occur when only one tear initiation means is used. As can be appreciated from FIG. 6 the top seam 224 is thus divided into two parts, one or both of which may be unfolded to provide a handle. Package 200 is then inserted into the toaster so that the vent is

at the top and the handle extends out of the toaster, thereby avoiding spilling of the contents during heating and avoiding excessive heating of the handle. After heating or cooking of the ingredients of package 200, it is removed from the heating device. The upper part of longitudinal seam 216 is unfolded to release it from the upper parts of the package. The seam 216 then is gripped and pulled the length of the package to tear it completely open as best shown in FIG. 7. Fold line 252 performs the function of guiding the tearing and aids in preventing the tearing from going off in a sharp oblique direction which would mess up the opening operation. Thus, dual tear initiating means located on either side of a vertical seam can serve as vertical tear guides for the seam. The dual tear initiating means is used to tear the top of the package just through the top seal to form a vent for the subsequent food heating step. After the heating step, one or both of the vertical tears is continued to completely open up the package. This can be done by unfolding the top seal folded over to release the upper portions of the longitudinal seam and to present a cool holding area. The vertical seam is then pulled down the vertical length of the package to open the package.

Sealed package 300 is a package having at least one tear initiating means located in a side margin below the top seal. The tear initiating means is used to horizontally tear the package far enough to form a vent for use during the heating steps and to form a handle by folding the torn portion upwardly. Preferably there is one tear initiating means in each side margin of the package. After the heating step, the package is completely opened by using one of the handles to completely tear the top off the package, the tear being generally along a horizontal line.

Package 300 is illustrated in FIGS. 9 through 12. Package 300 can be prepared from a single sheet 304 or several sheets of pliable sheet material and can be formed in the same manner as package 100 to have side seals 308 and 312, longitudinal seam 316, bottom seam 320, and top seam 324.

Package 300 is constructed with dual tear initiating means in the form of tear notches 328 and 332 located in sealed areas of side margins 308 and 312, respectively just below top seal 324. The package of this embodiment of the invention can have just one side tear initiating means, if desired. The tear initiating means is normally a slot or notch preferably, a V-shaped notch. As shown best in FIG. 9 the sealed areas around notches 328 and 332 are enlarged to ensure against leakage. The heat sealed areas around the notches can be enlarged, for example, in a semicircle, extending inwardly from the side edges. The enlargement of the heat sealed areas can be done at the time the side margins 308 and 312 are heat sealed or at the time the tear notches 328 and 332 are formed or at any other convenient time. Horizontal tear line 336 (printed) starts at tear notch 328 and horizontal tear line 340 (printed) starts at tear notch 332 and both extend inwardly to points designated by X's in FIG. 9 for indicating the direction and extend of venting prior to inserting the package in the toaster.

Before package 300 is placed in a suitable heating device, e.g., a toaster, it is vented to allow steam and vapor to escape to the atmosphere during the heating and/or cooking cycle. A vent is formed, for example, by tearing the left top portion of package 300, using tear

notch 328 along horizontal tear line 336 (see FIG. 10). This vents package 300 and handle 344 is formed by folding upwardly on a diagonal fold line the portion above tear line 336. The same thing can be done on the other side of the package 300. Dual vents can be formed (see FIG. 11) by also tearing along horizontal tear line 340. This provides package 300 with dual vents, and forms handles 344 and 348. The handles are usually bent around in opposite directions as shown in FIG. 11, thereby forming relatively rigid handles, since double-folded top seal 324 forms a part of each such handle. Package 300 should be inserted into the toaster so that the vent or vents are at the top, thereby avoiding spilling of the package contents during heating. After heating or cooking, package 300 is removed from the heating device. The handle or handles 344 and 348 can be coated with the heat-reflective material such that the handles can remain relatively cool to the touch. After removal from the heating device, the top portion of package 300 can be removed by grasping a handle (344 or 348) and tearing the top off along the same general directional line on which the horizontal tear lines 336 and 340 are located. FIG. 12 shows package 300 with the top removed and ingredients being poured therefrom.

Package 300 if formed by folding sheet 304 on two spaced parallel fold lines forming the side edges and margins 308 and 312. The mating free edges are folding into a position perpendicular to the general planar position of package 300 and into face-to-face abutment, heat sealed and double-folded inwardly as described for package 100 to form longitudinal seam 316. Before, concurrently with or after forming longitudinal seam 316, the side margins 308 and 312 are heat sealed. At this time tear notches 328 and 332 are punched out of the sealed areas of the upper parts of side margins 308 and 312. Also, horizontal tear lines 336 and 340 can be printed in the same step or they can be pre-printed or subsequently printed. Bottom seal 320 is normally formed next, the food contents inserted through the open tops, and top seal 324 formed. Or, the food contents can be inserted into package 300, and then bottom seal 320 and top seal 324 formed. Alternatively, the food contents can be placed on the sheet 304 prior to folding it to form the side edges and thereafter the sheet 304 can be constructed as described above into package 300 around the food contents in a manner similar to that described in application Ser. No. 794,307.

Sealed packages 400, 500, 504, 580, 600, 700, 800 and 900 illustrated in FIGS. 13 through 31 each comprise a tray of heat-resistant, non-toxic, non-porous, relatively rigid sheet material having at least one depression filled with food. The tray is provided with a flange extending around the periphery of the depression and is overlaid with a cover of pliable sheet material as described hereinbefore. The cover overlies the depression and flange and is sealed to the flange. Tear initiating means are provided in the form of an indent in the flange extending inwardly from the free edge thereof to expose both faces of the cover for gripping purposes to vent the package and/or in the form of a tear strip or tear string (cord) located down a medially portion of the cover or between the cover and the flange around the periphery of the depression.

Sealed package 400 is illustrated in FIGS. 13 to 16 and includes cover 404 of pliable sheet material and tray 408 having a depression 410 and a flange or rim

412 extending around the depression. Cover 404 is generally flat and encompasses the entire top plan configuration of tray 408. The margin along the edge of cover 404 is sealed to flange 412 of tray 408 (after the food has been placed in tray 408), forming rim seal 416. Preferably tray 408 is substantially rectangular having dimensions which allow package 400 to be placed in a heating device, preferably a toaster. Illustratively, side wall 420 of the tray can have a height of $\frac{1}{4}$ to $\frac{1}{2}$ inch. Tray 408 is shown in the preferred form, i.e., rectangular, but it can have any convenient plan shape such as, square, polygonal, elliptical or circular.

The flange 412 is formed with an indent in the form of a removed corner (FIGS. 13 and 14) to expose both face of the corresponding corner of cover 404 thus providing a lift tab 424. It is preferred to provide lift tab 424 at one of the lower corners because it is easier to remove cover 404 after a vent has been placed in the top portion of the package as described hereinafter. The lift tab can be placed on any shape of tray by removing a part of the rim so that a finger grip can be obtained on both faces of the cover which can be used to lift the cover off of the tray. An example would be the use of a small semi-circle or V-notch in the rim or flange of a tray having a circular or other plan shape. It will be obvious that the insert should extend inwardly from the free edge of the flange 412 but should terminate at a point spaced from depression 410 so as to leave ample sealing surface on the flange to ensure proper sealing of the cover 404 to the flange 412.

In addition, another indent 426 in the form of a semi-circular cutout is formed in the flange 412 at the end of the package intended to be the top of the package when inserted into the toaster or other heating device. Thus, exposing both faces of the cover overlying the insert to provide a venting tear tab 428 which can be easily gripped using the fingers. The indent 426 can have any shape, e.g., semi-circular as shown, V-shaped, etc., and the cover at the vent tear tab 428 can be further provided with a small projection 432 to increase the finger-gripping area of the tear tab 428. A vertical tear line 436 is provided on the cover 404 extending from tear tab 428 inwardly to a point designate by X spaced from the edges of said cover and overlying depression 410.

Tray 408 is constructed of a heat-resistant, non-toxic, non-porous, relatively rigid sheet material which does not unduly soften or lose its shape when heated and which preferably has an electrically insulative surface to form the outer surface of the tray. Suitable materials include glass, synthetic resins-bonded glass fibers and/or organic fibers, and coated metallic sheets, e.g. aluminum, of a heavier gauge than the pliable sheet described hereinbefore and provided with a dielectric surface such as described hereinbefore in respect to said pliable sheet material. The sheet material for the tray 408 can be a coated sheet. Specific examples include pyrex glass; pyrex glass which is color tinted, e.g., blue; glass fiber cloth impregnated with heat-resistant epoxy or polyester resins (coated if desired with polyester resin or acrylic resin on the surface intended for the inside of tray 408); chemically-strengthened glass film; cross-linked phenolic fibers; and aluminum foil of about five-thousandths inch thickness and having one surface coated with a clear polyvinyl chloride coating for the inside surface and having the other surface coated with an epoxy resin for the outside coating. The

exterior surface of tray 408 and cover 404 is preferably dark in color or otherwise provided with a heat-absorbing surface. However, those areas of the cover 404 forming lift and vent tabs 424 and 428 can be light colored or otherwise provided with heat-reflecting surfaces on both faces.

The upper surface of flange 412 can be pretreated with a suitable sealing material such as an adhesion promoter or an adhesive composition, such as an epoxy adhesive, or a heat-activatable adhesive as described hereinabove for the pliable sheet material. The cover 404 is preferably coated on its interior surface with a heat-activatable adhesive as explained hereinabove for the pliable sheet material, in which case it is not essential that the upper surface of flange 412 be coated with an adhesive material although it is preferred to do so. Although it is not essential to provide the upper surface of flange 412 with an adhesive coating, an adhesion promoter thereon can be helpful in providing a tight seal.

Prior to inserting package 400 into the heating device, vent tear tab 428 is gripped and pulled toward the other end of the package to tear the cover 404 resulting in a vent 440 in the cover. The vent 440 normally takes the shape of a V-shaped opening as best shown in FIG. 15.

Venting allows steam and vapors to escape to the atmosphere during the heating and/or cooking cycles. Package 400 should be inserted into the toaster or other heating device so that the vent 440 is at the top, thereby avoiding spilling of the package contents. After heating or cooking, cover 404 is easily removed by gripping lift tab 424 and peeling cover 404 off of the flange 412. After top lid 404 is removed, bottom food receptacle 408 serves as an attractive plate or bowl for the heated food which can be conveniently served to diners.

Sealed packages 500 and 504 are similar to package 400 and are characterized by a tray which contains at least two separate food compartments and the cover is sealed to the top surface of each of the ridges and a vent means is associated with each of the separate food compartments. Indicia and/or designs can be molded into the bottom of the trays.

Sealed package 500 is illustrated in FIG. 17 and package 504 is illustrated in FIGS. 18 and 19. Packages 500 and 504 illustrate food receptacles having multiple food compartments.

Package 500 includes tray 508 and cover 512. Cover 512, partially shown in FIG. 17, can be prepared from the pliable sheet material described above. Tray 508 includes three food compartments, namely, 516, 520 and 524. The three food compartments are transversely oriented side-by-side and contain flat-topped ridges 528 and 532 between them. Tray 508 is formed with a flange 536 and the edge margins of cover 512 are heat sealed to flange 536 and the upper surfaces of ridges 528 and 532 of tray 508 after the food has been placed in food compartments 516, 520 and 524 to form flange seal 540 and ridge seals. As shown, tray 508 is rectangular-shaped having dimensions which allow package 500 to be placed in a toaster. Tray 508 is constructed of sheet material as described for package 400 and the upper surfaces of ridges 528 and 532 can be pretreated or not in the same manner as the upper surface of flange 536.

Cover 512 can be formed of the pliable sheet material described hereinbefore.

Part of one of the corners (see FIG. 17) of flange 536 is removed to form indent 544 thus providing a lift tab in conjunction with the corresponding corner of cover 512, in a manner similar to that described for package 400. The lift tab can be placed on any shaped receptacle by removing a part of the flange 536 so that a finger grip is provided on the cover which may be used to lift or peel the cover 512 off of the tray 508. Also part of flange 536 of tray 508 is removed to form indents 545, 546 and 547 one adjacent each compartment 516, 520 and 524 thus providing tear tabs 548 for each compartment. The indents 545, 546 and 547 can have any shape, preferably semi-circular as shown in FIG. 17, so long as it permits a finger grip on the overlying cover 512. Vent tear tab 548 is similar to vent tear tab 424 of the package 400 and can have the same features. Package 500 is of such dimensions that it can be inserted into the toaster so that the vents are at the top, thereby avoiding spilling of the package contents during heating.

Sealed package 504 shown in FIGS. 18 and 19 includes tray 552 and cover 556 partially shown in FIG. 18, which can be formed from the pliable sheet material described above. Tray 552 is formed of the relatively rigid sheet material described for package 400. Tray 552 includes two food compartments, namely 560 and 564. The two food compartments are longitudinally oriented side-by-side and contain flat-topped ridge 568 between them. Tray 552 is formed with flange 572 and the edge margins of cover 556 are sealed to flange 572 and ridge 568 (after the food has been placed in food compartments 560 and 564) to form a flange seal and a ridge seal as shown. Tray 552 is shaped like a rectangular tray having dimensions which allow package 504 to be placed in a toaster but can have other configurations. Part of one of the corners of flange 572 is removed to form indent 570 and a lift tab 571 in conjunction with the corresponding corner of overlying cover 556. Parts of rim 552 are removed to form indents 576 and 578 and vent tear tabs of the overlying cover 556. Those vent means are similar to the vent means of packages 400 and 500 and are so positioned that, when the package is inserted into the toaster, the vents are at the top above the level of fluid in the package, thereby avoiding spilling of the package contents during heating.

Packages 500 and 504 illustrate two of the many possible arrangements of the food compartments in the food packages of this invention. Each food compartment can have a separate vent means.

Package 580 is illustrated in FIG. 20, the tray 408 being identical to that of package 400. Indicia 584 are molded in bottom 588 of tray 408. Indicia can be letters, numerals, or other design, or combinations thereof and can be inwardly and/or outwardly molded in the bottom 588 by any conventional means. Indicia 584 can be coated with a suitable colored material. Indicia 584 can be used for example, to identify the contents or the manufacturer or supplier.

Sealed package 600 is illustrated in FIGS. 21 to 23 and includes cover 604 and tray 608. Cover 604 can be formed of the pliable sheet material described above and tray 608 can be formed of the relatively rigid sheet material used to form the trays of packages 400, 500, 504 and 580 and is formed with a food-receiving de-

pression 609. Cover 604 is generally flat and encompasses the entire top of tray 608. The edge of top lid 604 is heat sealed to flange 612 of tray 608 (after the food contents have been placed in receptacle 608) forming a flange seal. Preferably tray 603 is rectangular shaped having dimensions which allows package 600 to be placed in a heating device, preferably a toaster.

Part of flange 612 of receptacle 608 is removed (best seen in FIG. 22) so as to form an indent 614 and a vent tear tab 615 of the overlying cover 604. The indent 614 can have any shape, preferably semi-circular as shown in FIG. 22, so long as it permits a finger grip on cover 604. Tear strip 616 is formed in cover 604 by twice folding it double over on itself, so as to form in cross-section two squashed S-portions joined and facing each other as best seen in FIG. 23. Tear strip 616 is formed by folding cover 604 on itself four times along closely spaced parallel lines successively outwardly, then inwardly, then inwardly and then outwardly. This forms two inner folds 636 and 640 and two outer folds 642 and 644 as best seen in FIG. 23. The two inner folds 636 and 640 are slightly spaced from each other and define tear directing lines for subsequent tearing. The outer fold lines 642 and 644 provide reinforcement to the strip 616. Additionally, it can be seen that strip 616 includes two outer layers 646 and 648 which can be sealed together for further reinforcement. Layers 648 need not be sealed to the inner layer 650. Tear strip 616 as shown extends entirely down the length of package 600 from one end to the other. The upper end of tear strip 616 terminates over the indent 614. Dual tear initiation means in the form of tear notches 620 and 624, as seen in FIG. 21, are located on each side of tear strip 616. In order to ensure against leakage any spaces between the inner folds 636 and 640 at the ends of the tear strip 616 that remain open are plugged with a suitable sealing or adhesive material as hereinbefore described.

To vent package 600 before it is placed in the toaster, tear strip 616 is used to tear cover 604 down to some predetermined point, such as the X indicated on top of tear strip 616 shown in FIG. 21. This point can be highlighted by means such as arrows 628 and 632. Dual tear initiating means 620 and 624 help to start the tear and assist in limiting the direction of tearing. The resultant vent is generally V-shaped, as shown in FIG. 22, the bottom of the V-shaped torn portion being located at about the X designated on tear strip 616. Venting allows steam and vapors to escape to the atmosphere during the heating and/or cooking. Package 600 is placed in the toaster with the vent at the top. After heating, package 600 is removed from the heating device or toaster. To open the package and gain easy access to the food contents, tear strip 616 is pulled to tear cover 604 substantially along inner folds 636 and 640 thus dividing the cover into two portions. Each portion of the cover is then peeled or torn from the tray 608 and the heated food is presented for consumption.

After cover 604 is opened and partially or totally removed, tray 608 serves as an attractive plate or bowl for the heated food which can be conveniently served to diners.

Package 700 is illustrated in FIGS. 24 and 25, and package 700 includes tray 704 and cover 708. Cover 708 is formed of the pliable sheet material described above and tray 704 having flange 712 and depression 709 is constructed of the relatively rigid sheet mate-

rial used to form the trays of packages 400, 500, 504, 580 and 600. The edge margins of cover 708 are sealed to flange 712 as described hereinabove for such packages. Tear string or cord 716, made of heat-resistant material such as mylar, is located between flange 712 and the edge margins of cover 708 along the inner edge of flange 712. If desired a groove may be provided along the inner edge of flange 712 for containing cord 716. One end 720 of cord 716 extends outward from flange 712 and cover 708 for a sufficient distance, e.g., one-half to two or three inches to provide a sufficient amount of cord to be gripped by the fingers. A suitable sealing material is applied around these portions of cord 716 extending from the inner edge to the outer edge of flange 712 to ensure against leakage at such areas. An X or similar mark is located on the cover 708 over cord 716 at a point sufficiently along the inner edge of flange 712 so that, when cord 716 is pulled, cover 708 is split along the inner edge of flange 712 thus forming a vent. The package and food contents are heated and/or cooked by insertion of package 700 in heating means, such as, an electric toaster, with the vented end of the package up to avoid spillage. After the heating and/or cooking, package 700 is removed from the heating means. Package 700 is opened by pulling cord 716 completely around the circumference of the inner edge of flange 712. The bulk of the heat sealed margin of cover 708 is left attached to flange 712, as seen in FIG. 25. After cover 708 is removed, bottom food receptacle 704 serves as an attractive plate or bowl for the heated food which can be conveniently served to diners.

Sealed packages 800 is illustrated in FIGS. 26 to 28 and includes cover 804 and tray 808 having a flange 816. Cover 804 can be formed of the pliable sheet material described above and is generally flat. Tray 808 can be formed of the relatively rigid sheet material used in packages 400, 500, 504, 580, 600 and 700 and is formed with a food-receiving depression 809 and an indent 820 in the form of a semi-circular cutout in the flange 816 at one end of the package. Cover 804 overlies the depression 809 and flange 816 and extends beyond the outer edge of the flange 816 at the end containing indent 820 to form an extension 812. Cover 804 is sealed to flange 816 of tray 804 as described above for package 400, after the food has been placed in depression 809. Preferably tray 808 is rectangular shaped having dimensions which allows package 800 to be placed in a heating device, preferably a toaster. Tray 808 is shown in a preferred form, i.e., having a rectangular plan shape but it can have any convenient plan configuration such as, square or circular etc.

Handle 840 is attached to the outer free edge of cover 804. Handle 840 is a sheet of material that is folded over on itself on line 841 and has both free edges 844 parallel to the fold line adhered to the free edge of the extension 812 of cover 804. Handle 840 can be constructed of any suitable material such as cardboard, plastic or the same sheet material of cover 804. Handle 840 can contain a hole, such as, hole 848, for hanging package 800. Both of the visible surfaces of handle 840 can be used for labeling for such information as price, company name, and name of product and instructions. Handle 840 is desirably formed of a heat insulative material such as cardboard or plastic material so as to remain cool to the touch when the package is inserted into the heating device.

Flange 816 contains indent 820 at one end as seen in FIG. 28 and indent 820 is preferably located centrally between the sides of the package. Extension 812 of cover 804 contains an oblong hole 824 extending outwardly from the edge of flange 816 and from that portion of cover 804 which fits over indent 820. Hole 824 is so shaped as to form a lift tab 828 extending into hole 824. Lift tab 828 serves as a means of grasping the appropriate part of cover 804 when a vent is to be formed as shown in FIG. 27. Line 832 illustrates the direction for pulling down lift tab 828 to a point inwardly beyond flange 816 over depression 809, for example, to the spot designated by X. The torn part normally is V-shaped and is removed by tearing. Venting allows steam and vapors to escape to the atmosphere during the heating and/or cooking. After package 800 has been heated and removed from the heating means, it is opened by removing cover 804 from tray 808 by grasping handle 840 and pulling it over the tray to peel or tear cover 804 from the flange 816 as illustrated in FIG. 28. After cover 804 has been removed, tray 808 serves as an attractive plate or bowl for the heated food which can be conveniently served to diners.

Sealed package 900 is illustrated in FIGS. 29 to 31 and is similar to package 800. Package 900 includes cover 904 and tray 908 having a flange 916 and a food-receiving depression. Cover 904 can be prepared from the pliable sheet material described above and is generally flat. Tray 908 can be formed of the relatively rigid sheet material used in packages 400, 500, 504, 580, 600, 700 and 800. Cover 904 overlies the food-receiving depression and flange 916, and extends beyond the outer edge of flange 916 to form an extension 912 which is folded back over cover 904 and tray 908 on a fold line closely adjacent to the free edge of tray 908 from which it extends. Cover 904 is sealed to flange 916 of tray 908, as described for package 400, after the food has been placed in tray 908. Preferably tray 908 is rectangular shaped having dimensions which allow package 900 to be placed in a heating device, preferably a toaster. Handle 940 is attached to the outer free edge of cover 904 and is formed of sheet material that is folded over on itself on line 941 and has both free edges 944 parallel to the fold line adhered to the free edge of extension 912 of cover 904. Handle 940 can be constructed of any suitable material such as cardboard, plastic or the sheet material of cover 904. Both of the visible surfaces of handle 940 can be used for labeling for such information as price, company name, name of product and instructions. Labeling information can be placed on both sides of handle 940 and preferably appears on the side facing outwardly when extension 912 is in its folded position as shown in FIG. 29 since such side is clearly visible when the package is stored or displayed for sale. As shown in FIG. 29, package 900 is compact and thus easily stored, shipped and displayed for sale.

When it is desired to heat or cook the package, extension 912 is partly unfolded to be disposed at an angle to the general plane of the package as shown in FIG. 30. In this position handle 940 is disposed away from the main heat of the heating device 924 and remains cooler than the remaining portions of the package. Also, handle 940 can be made of heat insulative material such as plastic or cardboard and can be colored or coated with a heat reflective surface so as to remain cool. After the heating or cooking cycle, extension

912 can be fully unfolded as shown in FIG. 31 to facilitate removal of package 900 from the toaster. After package 900 is removed from toaster or other heating means 924, it is opened by grasping handle 940 and using it as a lever or pulling means to achieve the removal of cover 904 from tray 908. After cover 904 is removed, tray 908 serves as an attractive plate or bowl for the heated food which can be conveniently served to diners.

Each of package 400, 500, 504, 580, 600, 700, 800 and 900 are conveniently made by molding, draw-forming, stamping or otherwise forming the relatively rigid sheet material into the tray having the shape described above. Measured portions of food are placed in the tray. In the case of package 700 the tear string 716 is placed along the interior edge of the flange and releasably held there by means of a suitable adhesive or the tear string can be so applied before the food is placed in the tray or the tear string can be releasably adhered to the interior of the cover along a line that will overlie the inner edge of the flange when the cover is applied. The cover is then applied to overlie the tray, food-receiving depression and flange and the marginal portions of the cover are sealed to the flange. The cover may be preformed before application to the tray or it can be shaped by trimming, cutting, stamping or other suitable procedure after it is applied to the tray. Sealing of the cover to the flange can be accomplished by the application of a suitable sealing material to the flange and/or the cover. Any suitable sealing material such as the heat-activatable adhesives described above can be used. Adhesion promoters are also useful to provide improved sealing results. In packages 600 and 700, plugs of sealing material are advantageously used to ensure the sealing of holes which may occur under the ends of the tear strip 616 of package 600 or which may occur in the area where tear string 716 crosses flange 712 from its inner edge to its outer edge of package 700. It is also advantageous after sealing to curl the edges of the cover and flange under the flange. This adds further sealing strength and assures that raw metallic edges of the cover and tray are disposed in a protected position under the flange. Alternatively, any raw metallic edges may be covered with a dielectric coating or tape. Also, the sealed flange and cover margins may be crimped or otherwise mechanically worked to provide additional strength and reinforcement. The cover, labeling areas and/or tray can be printed with any desirable product and source identifications, instructions for use, ingredients listings, promotional information, etc. It is also preferred to coat those areas designed to be touched or grasped with a heat-reflective coating so as to maintain such areas as cool as possible.

Sealed package 1000 and its method of production are shown in FIGS. 32 to 34. Package 1000 is made with seamless sides and side walls, although the side edge margins may be sealed together to provide reinforcement. This construction eliminates the necessity of a folded longitudinal seam and reduces the possibility of leaks that can occur at a seam. As shown in FIGS. 32 and 33, package 1000 is formed of a flattened tube of pliable sheet material such as that described above. The tube is conveniently formed by extrusion as described in detail hereinafter and is flattened to form side edge folds 1001. Side edge margins 1002 extending along side edge folds 1001 may be heat sealed together (e.g., by means of a heat-activatable adhesive

coating on the inner surface of the sheet material in the area of said margins) and crimped to provide added longitudinal rigidity and reinforcement. One end margin of the package is heat sealed, e.g., by means of a heat-activatable adhesive coating on the inner surface of the sheet material in the area of said margin, to form a sealed bottom margin **1052** which may be crimped and/or folded upon itself, as desired. As shown in FIG. **32** the sealed bottom margins **1052** not folded and FIG. **33** shows it in folded position. The other end margin of the package is heat sealed, e.g., by means of a heat-activatable adhesive coating on the inner surface of the sheet material in the area of said margin, to form a sealed top margin which is then double-folded on transverse fold lines in a manner similar to that by which the sealed top margin **1056** of packages **100**, **200** and **300** are formed. Tear notch **1060** is formed in the top fold line **1057** before or after sealing or folding. The food contents may be inserted into the tube prior to or after flattening the side edge margins or they may be inserted after sealing the side margins and before or after sealing the bottom margin. The side and bottom margins can be sealed and the food inserted through the top or the side and top margins can be sealed and the food inserted through the bottom followed by completion of sealing the package.

Package **1000** is formed by a method which includes continuously forming a tube which is constructed of a pliable, non-toxic, heat resistant, tearable, preferably thermally conductive, non-porous, inert sheet material such as, metallic foil, e.g., aluminum foil. The tube is continuously flattened and continuously heat sealed at spaced intervals across the axis of movement of the flattened tube to form end seals for individual packages. The flattened tube is continuously cut along one side of each of the heat seals to form individual packages. The heat sealing and cutting steps can be done simultaneously. Then, the end (e.g. bottom) seals can be folded over one third on themselves and that one-third folded portion is folded over again. Each of the individual packages is continuously filled with individual portions of food and the open end (e.g. top) of each package is continuously sealed.

The tube, preferably, is continuously flattened by means of a pair of rollers through which the tube is passed. Preferably the edge margins on both sides of the tube (as the tube is being flattened) are heat sealed on their internal surfaces to each other by means of heated pairs of rollers on each end of the pair of rollers used to flatten said tube. Also, preferably each of those heated edge-located rollers contain a set of teeth which rotatably mate with the teeth of each opposing roller in that pair of heated rollers whereby the heat sealed edge are also crimped.

The tube is preferably formed using an extruder. However, the tube can be formed, for example, from a sheet of material that is continuously folded over on itself, where the mating edges of the sheet are continuously overlapped and sealed or welded together or by continuously mating two sheets of material, and then or later continuously sealing the mating edges of the two sheets.

The continuous sealing of the open end of each of the filled packages involves heat sealing of the transverse margin of one side wall of each package to the transverse margin of the other side wall adjacent the open end.

In a preferred method of making package **1000** aluminum tube **1004** is extruded from extruder **1008** as a tube of circular cross-section, as seen in FIG. **34**. Aluminum tube **1004** then passes between transverse rollers **1012** and **1016** extending across the upper and lower surfaces of the tube. Rollers **1012** form aluminum tube **1004** into a flattened cross-section configuration. On both ends of transverse rollers **1012** and **1016** are edge margin sealing rollers **1020**, which are maintained at heat sealing temperatures. The sealing operation performed by sealing rollers **1020** can take the form of pressure welding wherein mating pairs of the rollers are urged toward each other under considerable pressure, e.g. 50,000 to 400,000 psi. It is of course not desired to seal or weld the medial portions of the flattened tube and transverse rollers **1012** and **1016** should be spaced from each other a distance substantially equal to the double thickness of the flattened tube, when sealing rollers **1020** are in pressure contact. The required pressure for pressure welding decreases with increasing temperature which is normally maintained below the melting temperature of the aluminum, or in the case of aluminum alloy, any of its constituents. This and other methods of welding the aluminum tube are described in the textbook "Welding Alcoa Aluminum" published **1958** by the Aluminum Company of America, Pittsburgh, Pennsylvania. To assist the welding or sealing operation the sealing rollers **1020** may be heated or heat may be applied to the aluminum tube before it reaches said rollers. The innate heat of the aluminum from the extrusion operation can also be utilized in assisting the welding operation. The sealing rollers **1020** can each contain series of peripheral teeth which mate with the teeth of the mating roller on that side of the station. This forms crimped side margin seals **1024** and **1028**, the crimping providing additional strength and rigidity.

Flattened aluminum tube **1004** then passes to station **1032**, which transversely heat seals or welds aluminum tube **1004** to form an end seal **1036** transversely cuts aluminum tube **1004** adjacent the newly formed end seal **1036**. Station **1032** includes upper and lower heat sealing bars **1037** and **1038**, respectively and which preferably contain mating teeth so that the end seal is crimped. The sealing operation also can take the form of pressure welding as described above wherein the sealing bars **1037** and **1038** are urged together under the welding pressure and can be heated to assist the formation of a suitable weld or seal. It will also be obvious that flattened tube **1004** is moving in a longitudinal direction while sealing bars **1037** and **1038** are operating on it by vertical movement. Thus, the sealing bars **1037** and **1038** are provided with longitudinal movement commensurate with that of the tube **1004** as well as the vertical movement needed for welding or sealing. This is accomplished by a suitable cam arrangement causing the bars to move longitudinally with the tube as the bars begin to come into pressure and cutting contact by vertical movement toward each other, and to continue to move longitudinally with the tube during pressure contact and as the bars move out of pressure contact by movement away from each other. Such arrangement also provides for return to the first position for movement into pressure contact with a new section of tube.

After aluminum tube **1004** is severed at station **1032**, it forms package unit **1040** having sealed side edge margins **1024** and **1028** and one sealed end margin

1036. Package unit 1040 passes to folding station 1044, which folds sealed end margin 1036 over on itself for the first fold, and then passes to folding station 1048, which then folds the folded sealed end margin over on itself again for the second fold, thus forming the folded sealed bottom margin 1052. Package unit 1040 is then passed to a filling station (not shown), where the food contents are placed in the package, sealed top margin 1056 is formed, tear notch 1060 is cut (punched) in sealed margin 1056, and sealed margin 1056 is double folded over on itself. In the case that aluminum tube 1004 is replaced with a tube made from the pliable, heat-resistant, tearable, preferably thermally conductive, non-toxic, non-porous sheet material described above, extruder 1008 is replaced with a machine that continuously forms sheets made of the above substitute material into tubes and continuously welds the mating sheet edge margins. The welding can be done with edges that abutt or overlap each other using techniques described in "Welding Alcoa Aluminum" mentioned above.

FIGS. 35 through 39, illustrate sealed packages 1100, 1200 and 1300 which are equipped with built-in signaling means keyed to operate when the food contents of the packages have reached a predetermined temperature and the food is rendered ready for serving. These packages can be of any suitable construction such as described for the packages illustrated and described hereinbefore. The signaling means is mounted externally on the package and is exposed by heat convection or heat conduction to the temperature existing within the package. When the interior of the package reaches a predetermined temperature the signaling means is activated to give an audible signal.

Sealed package 1100 is shown in FIGS. 35 to 38 and comprises cover 1104 having peripheral margins 1116, tray 1108 having a peripheral flange 1120 and whistle means 1112 disposed between said flange and said margins. Margins 1116 are sealed to the flange 1120 and, as shown in FIG. 35, are folded or wrapped over and under flange 1120 in a U-shaped manner (at least along one side or end thereof). Margins 1116 and flange 1120 are preferably heat sealed together. The package is also formed with an insert 1105 in the flange 1120 to expose both faces of cover 1104 overlying said insert to provide for finger-gripping the cover when it is desired to remove the cover.

Cover 1104 and 1108 can be prepared from the pliable tray sheet material described above and tray 1108 can be formed from the relatively rigid sheet material described above. Preferably tray 1108 and cover 1104 are rectangular shaped, having dimensions which allow the package 1100 to be placed in a heating device, preferably a toaster. Cover 1104 is sealed to the flange 1120 in the manner described above for packages 400, 500, 504, 580, 600, 700, 800 and 900. The package 1100 contains food 1124 as shown in FIG. 37, which can be immersed in water 1128 although this is not essential. Moisture in other forms or other vaporizable material can be used in place of the water, such that when the package is heated a gas, e.g., steam, is formed which expands on continued heating for operating the whistle means 1112 as described in more detail below. Whistle means 1112 is formed in the joint between flange 1120 and that part of the overlying cover margin 1116 by forming a groove 1121 of semi-circular cross-section in the flange extending from an outer edge to

an inner edge thereof and by forming a similarly shaped groove 1117 in the margin extending from its outer edge inwardly to a point over the depression of tray 1108. The margin 1116 at the location of whistle means 1112 is not folded over and under flange 1120. When the margin 1116 and flange 1120 are joined at the location of the whistle means 1112, the grooves 1117 and 1121 are in registry thus forming a substantial circular channel 1123 extending from the interior of package 1100 to its exterior. The grooves 1117 and 1121 are so shaped that the channel 1123 tapers from a smaller inner inside diameter to a larger outer inside diameter as best shown in FIG. 38. Channel 1123 is filled and sealed with a meltable plug 1136 of paraffin wax, edible plastic material or the like selected by its melting or softening point to melt or soften at a predetermined temperature corresponding to the extent of cooking or heating needed for the particular food contents. In use package 1100 is inserted into the toaster or other heating device with the whistle means 1112 at the top extending upwardly and outwardly. After a predetermined heating time meltable plug 1136 melts dependent upon the temperature of the heating means, and the melting temperature of meltable plug 1136. The scheme is that meltable plug 1136 melts after the predetermined time, which corresponds with the desired heating and/or cooking time of food 1124, and steam 1132 (or other expanded gas in the package) escapes through whistle 1112 making an audible noise that signals the concerned person(s) that the package is ready for removal. It is to be noted that venting prior to insertion in the heating device is not necessary, whistle means acts as a safety valve as well. After package 1100 is removed, cover 1104 is removed by gripping it at those portions overlying the insert 1105 and pulling it back over the package to peel or tear it from flange 1120.

Sealed package 1200 as illustrated in FIG. 39 utilizes another form of whistle means and can generally have any of the package structures heretofore illustrated and described. For example, whistle means 1204 can be used in place of whistle 1112 of package 1100. Whistle means 1204 comprises two parallel discs 1208 and 1212 having two centrally-located holes 1224 and 1228 respectively, mounted in a channel 1225 in a wall 1220 or seam in the package. The channel extends from the interior to the exterior of the package and is filled and sealed with a meltable plug as described for package 1100. Preferably, the meltable plug is located at the inner and/or outer extremity of channel 1225 and is not located between discs 1208 and 1212. As steam is produced by heating the package 1200 in a toaster, the heat melts the plug from the channel and steam emits through holes 1224 and 1228 in discs 1208 and 1220, respectively, producing an audible sound.

It is preferable, when the food contents are relatively large solid pieces such as slices, slabs or patties of meat such as hamburger patties, corn beef slabs, ham slabs and the like, to place a series of holes into or through the food pieces. This permits hot liquids and gases in the package during heating to reach the inner portion of the food piece thereby reducing the cooking, heating or reheating time of the entire contents of the toaster package when inserted into the heating device, e.g., an electric toaster. The holes can be punched in the piece by passing it through rollers, one or both of which have a plurality of docker pins which form the small holes;

or, preferably, the piece can be shaped and the holes can be formed at the same time by passing the piece through such shaping and docking rollers. The piece can be used in any of the suitable toaster packages of this invention or those disclosed heretofore or those to be disclosed hereafter.

As used herein, the term aluminum is intended to include aluminum alloys especially of the type now being made and sold by aluminum manufacturers in the form of foil or sheet for use in food packages.

What is claimed is:

1. A sealed food package, for storing food and heating the food in situ, comprising a tray of heat-resistant, non-toxic, non-porous, relatively rigid sheet material having a depression filled with food, a sealing flange around the periphery of said depression, said sealing flange having an indent extending from a free edge of said flange toward and being spaced from said depression, and a cover of pliable, heat-resistant, thermally conductive, non-porous sheet material, overlying said depression, flange and indent, said cover being releasably sealed to said flange around the entire periphery

of said depression and having both faces thereof exposed in the area which overlies said indent to provide a gripping area, whereby the package may be vented by tearing said cover inwardly from said gripping area prior to heating, said cover containing an extension outwardly from a free edge of said flange to provide a handle, said extension overlying said free edge having said indent, and said cover containing a hole in said extension adjacent said indent to facilitate gripping the cover overlying said indent to vent said package.

2. Sealed package as claimed in claim 1 wherein said extension is folded onto said cover overlying said flange and depression during storage and unfolded during use.

3. Sealed package as claimed in claim 1 wherein said extension contains labeling information and is formed with a hole for hanging said package in display or storage.

4. Sealed package as claimed in claim 1 wherein said extension is provided with a folded section of sheet material having its end margins sealed to the end margin of said extension.

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