United States Patent

[11] 3,566,857

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[45] Patented **Mar. 2, 1971**

[54] **SELF-HEATING CONTAINER**
10 Claims, 12 Drawing Figs.

[52] **U.S. Cl.** **126/262**
[51] **Int. Cl.** **A47g 23/04**
[50] **Field of Search** 126/262, 43

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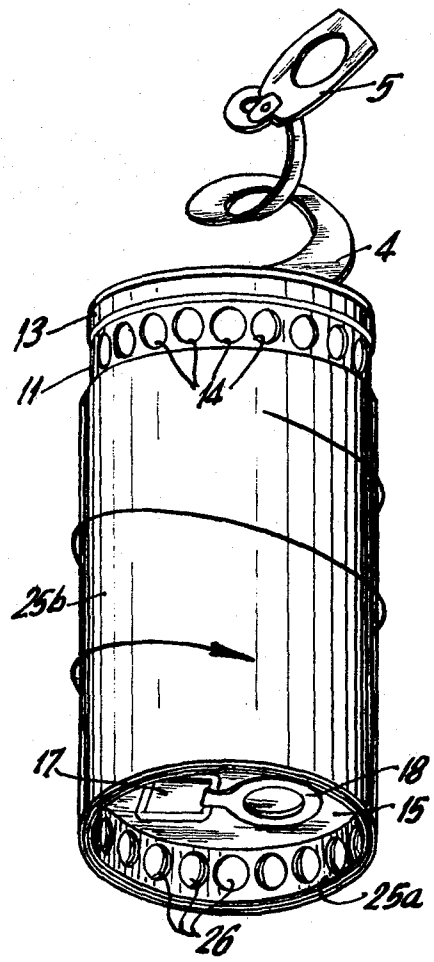
Primary Examiner—Charles J. Myhre
Attorney—March, Le Fever & Wyatt

ABSTRACT: A package product is completely ensealed within a container formed of heat-conducting material and joined along its upper rim to the upper edge of a shell to thus be disposed within the upper portion of said shell. The shell, preferably, has the same cross sectioned configuration as the body of said container, the configuration of said shell being larger than that of said container body so as to provide an air gap therebetween. The shell is provided with vents communicating with said air gap, and the bottom of said shell is enclosed by an end structure supporting interiorally of the shell a supply of fuel preferably in solid form. Surrounding said shell and substantially coextensive therewith is a slideably fitted sleeve formed of heat insulating material provided with ports near its bottom edge. In the normal position of the sleeve relative to the shell, the ports or vents in each are covered by the structure of the other. To prepare the package for its heating function, the sleeve is displaced relatively to the shell either downwardly or circumferentially a sufficient distance to fully expose the ports or vents in both the sleeve and shell which complete an air circulation path through the shell after its bottom end closure is ruptured, the fuel ignited and the package placed to rest on any suitable flat surface. To extinguish, the sleeve and the shell are displaced relative to each other to close the ports and thus shut off any air to the fuel supply.



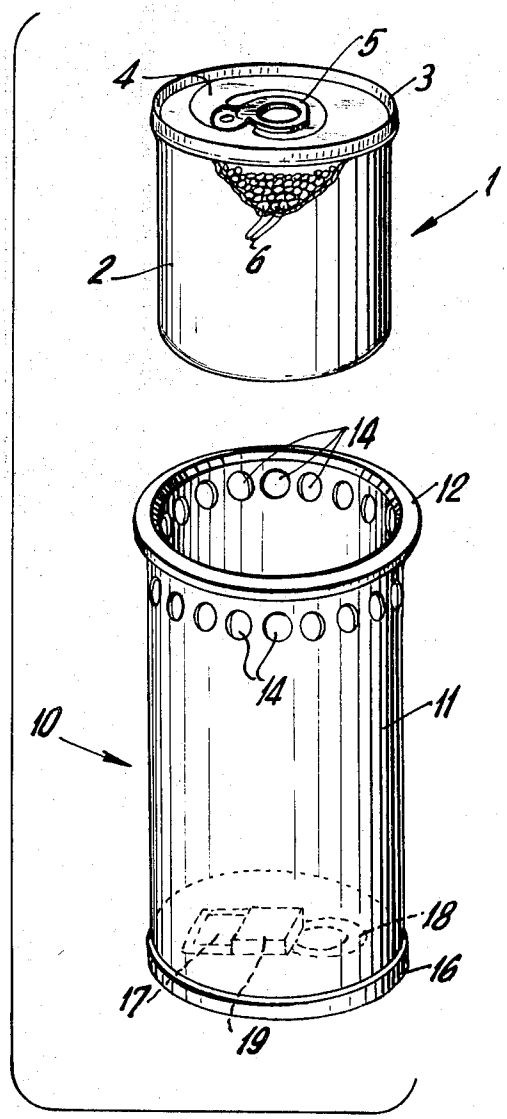


FIG. 1

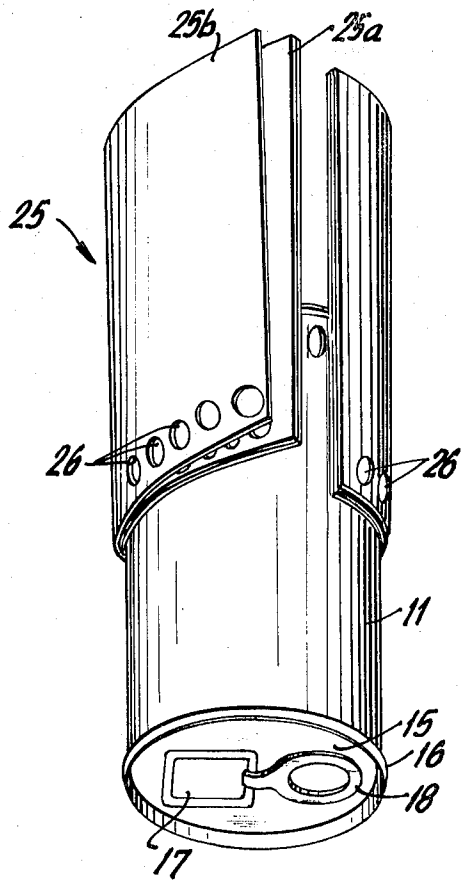


FIG. 2

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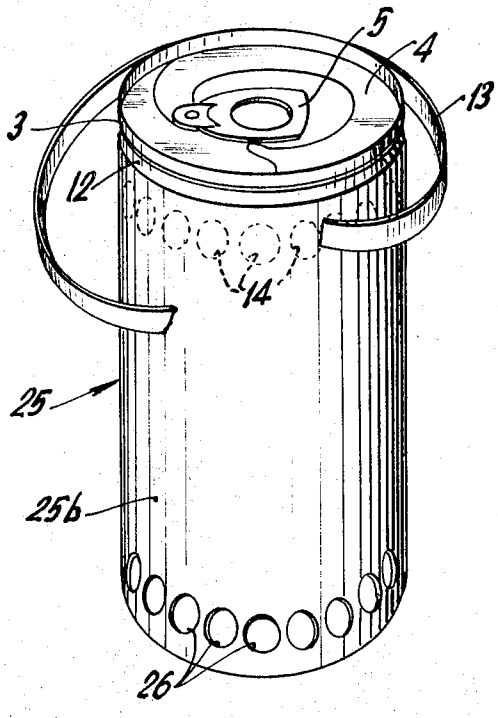

FIG. 3

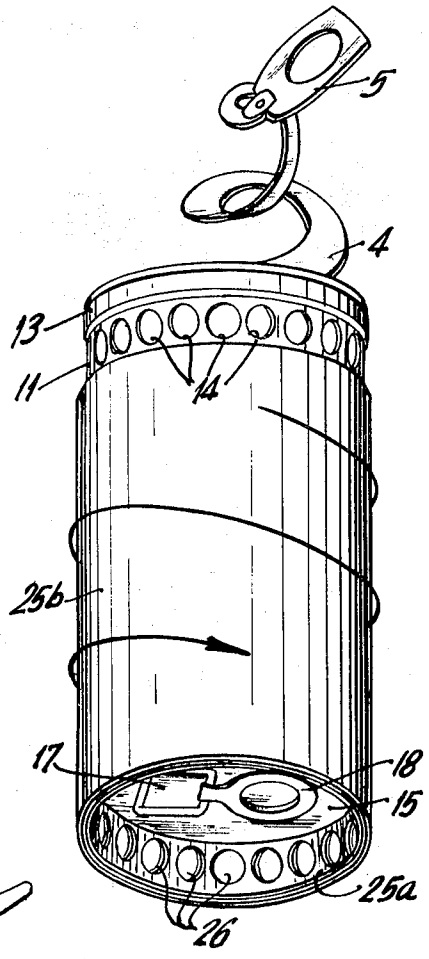

FIG. 4

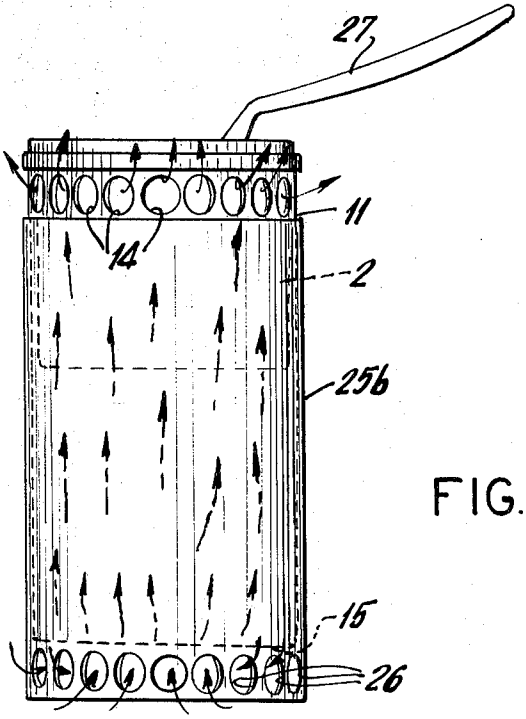

FIG. 5

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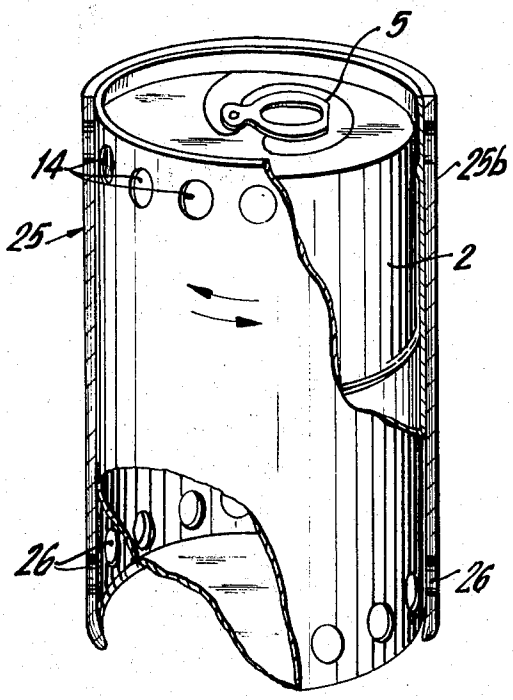

FIG. 6

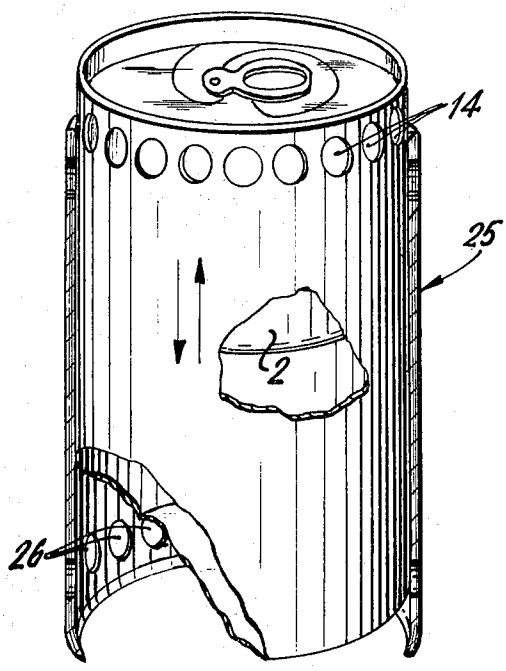

FIG. 7

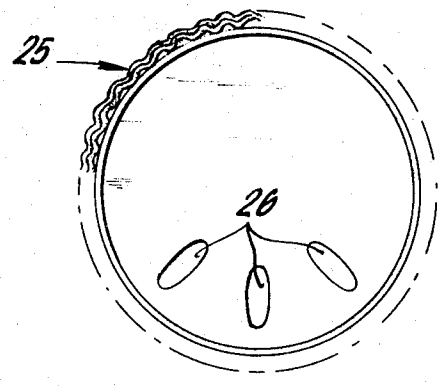

FIG. 8

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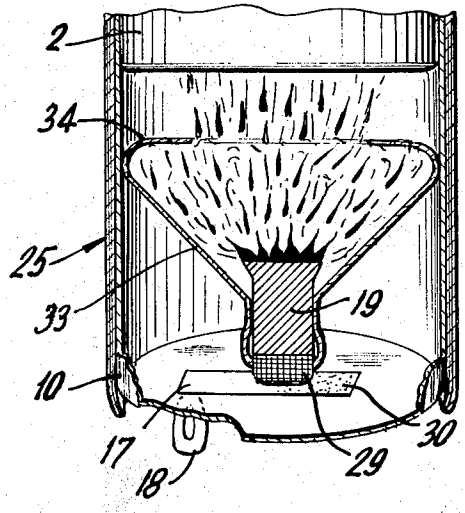

FIG. 9

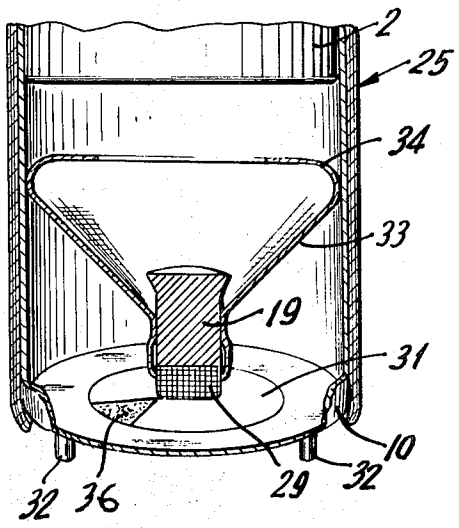

FIG. 10

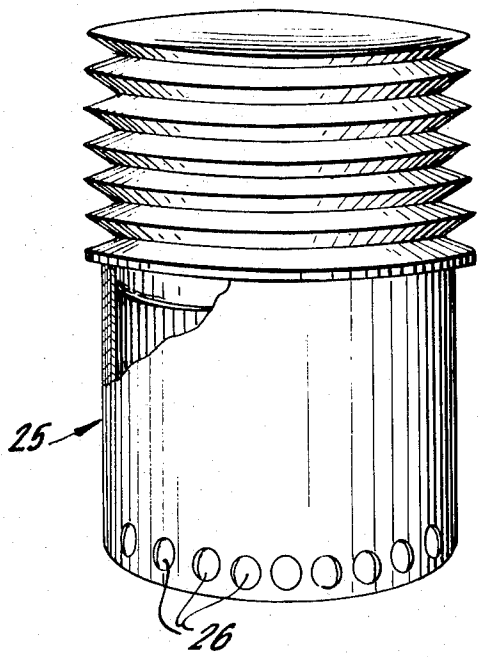

FIG. 12

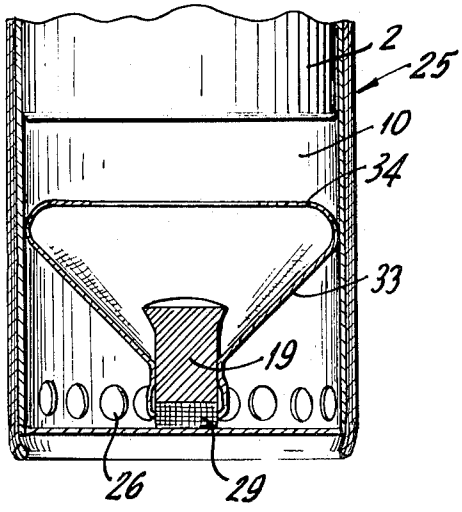

FIG. 11

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SELF-HEATING CONTAINER

This invention relates generally to the convenience-packaging of consumer products normally used or consumed in a heated condition. More particularly, the invention relates to a disposable package for such products which is so constructed as to constitute a form of stove having incorporated therewith a supply of fuel sufficient, when ignited, to heat the product to a desired temperature without fire hazard and which is fabricated from conventional low-cost packaging materials so as not to significantly increase packaging costs, thereby rendering the package in an economic sense, justifiably disposable after use.

The invention is advantageously applicable to products in many different categories and is considered to have especial utility in connection with the packaging of a wide variety of foods products. Many persons such as, for example, military troops, explorers, campers, etc. exist, often for extended periods, under circumstances or at locations whereof no stoves, other forms of heating devices or even fuel of any type is available, thus requiring them to consume their rations or food supply in an unheated, distasteful condition. By use of the present invention, such persons under the same circumstances will be able to heat their rations or food supply rapidly, efficiently and conveniently to a desired temperature, the food product having been maintained in properly sealed containers at all times prior to the heating and consumption thereof. Even for persons not engaged in such pursuits and having ready access to a stove or other heating equipment, the convenience and mobility factor inherent in this invention provides considerable advantages in that it completely eliminates the need to dirty and subsequently wash a cooking utensil, and also a serving dish or bowl, since the novel package can fulfill the function of both and is intended for discard after use. Use of the package of this invention also results in complete meal mobility since the unit is completely self-sufficient as to its source of heat.

An object of the present invention is to improve upon means for packaging a product normally used or consumed in a heated condition.

Another object is to provide a package for such a product with self-contained means, including a supply of fuel, for heating the product to a desired temperature, said package being safe with no fire hazard involved.

A still further object is to provide such a package at a relatively low cost.

Other objects of the invention, together with the features contributing thereto and the advantages accruing therefrom, will be apparent from the following description when read in conjunction with the accompanying drawings wherein:

FIG. 1 is a view in perspective and exploded to show separately the product container and the shell in which it is mounted;

FIG. 2 is a view in perspective illustrating diagrammatically one form of heat insulating material which, after its edges are joined together, serves as an insulating sleeve and label slideably fitted to the shell structure of the package;

FIG. 3 is a view in perspective of the complete package illustrating one means for securing the product container to the shell;

FIG. 4 is a view in perspective of the package illustrating diagrammatically how the parts are manipulated in preparation for the heating operation;

FIG. 5 is a view in side elevation of the package upon completion of the heating operation with the contained product at the proper temperature for use or consumption.

FIG. 6 is a view in perspective of another embodiment of the invention wherein the annular sleeve of insulating material is rotated in the same plane to open the drafting vents;

FIG. 7 is a perspective view of still another embodiment of the invention, wherein the annular sleeve is telescoped upwardly to expose the drafting vents;

FIG. 8 is a bottom view of one embodiment of the invention showing a corrugated and efficient heat insulating annular sleeve with bottom drafting vents;

FIG. 9 and FIG. 10 are views in side elevation showing two variations in igniting means;

FIG. 11 is a view showing in detail the flame funnel of the heating means; and

FIG. 12 is a perspective view of an embodiment of the invention illustrating the combination of the heating element and a collapsible container affixed thereto.

Referring now to the drawings, one embodiment of the product container 1 can be seen in FIG. 1 and includes a container body 2 of which the bottom and sidewalls are formed from conventional packaging material such as aluminum, tin plate, or the like having good heat conducting properties. The shape of the container body may be of any suitable configuration but, preferably, is substantially cylindrical as shown except for the upper sidewall portion which tapers or flares outwardly slightly to its junction in a rolled under seam or chime 3 with a top end closure preferably providing easy opening means which may be of the type now commonly known as a "Whirlaway Top" comprising, as also shown in FIG. 4, a spiral tear strip 4 secured at its inner end to a pull tab 5. The seam or chime 3 provides the container with an hermetic seal, in order that the product, especially if a food product such as baked beans 6, will be adequately protected and preserved over an extensive period subsequent to the packing thereof.

In the assembled package, the container 1 is disposed within the upper portion of a receptacle or shell 10 having a body 11 formed from heat-resistant packaging material into the same general shape, cylindrical in this instance, as that of the product container body 2, although of somewhat larger dimensions. The diameter of the shell body 11 is substantially the same as that of the product container chime 3 which is slightly larger than that of the major portion of the container body 2 by reason of the slight outward taper or flare therein, as aforesaid. The upper edge or rim 12 of shell body 11 engages with product container chime 3 to support the container 1 concentrically within the shell 10 and thereby create an air gap of uniform width between the cylindrical outer surface of container body 2 and inner surface of shell body 11. Preferably the rim 12 may be in the shape of a turned-in curl to provide a better seal for chime 3, the engaging parts being joined together, to render container 1 and shell 10 an integral structure, by any suitable means. One such means, as clearly seen in FIG. 3, could be a strip of tape 13 coated with an adhesive and wrapped around chime 3 and rim 12. Obviously, other bonding means could instead be used such as solder, cement or the like.

Disposed immediately beneath the rim 12, the shell body 11 is formed with a series of apertures serving as ports or vents 14 communicating with the air gap between shell body 11 and container body 2 to permit the escape to atmosphere of air or gases from within the shell during the heating operation hereafter described. Although shown as circular, the vents 14 may be of any desired shape, size and number such as will permit them to accomplish their stated purpose.

The bottom of shell 10 is enclosed by an end closure 15, in FIG. 2 which is joined to the bottom edge of shell body 11 by a seam or chime 16. End closure 15 is formed with a removable tear-out section 17 to which is attached a pull tab 18. On its inner surface and adjacent the removable section 17, the end closure 15 supports a supply of combustible material in the form of a solid fuel pellet 19 containing, for example, a fuel such as smokeless alcohol or the like which when properly encapsulated is safe to handle but can be ignited to burn at a predetermined rate. Preferably there is provided an igniting unit, activated by the pull tab 18 incident to tearing away the removable section of the end closure for lighting the pellet 19, as is described more completely hereinafter.

In some embodiments the pellet, after rupture of the end closure by removal of tear-out section 17, can be readily ignited by any suitable means such as a match, pocket lighter, etc. Once ignited, combustion of the fuel is maintained by oxygen in the air entering shell 10 through the ruptured end closure 15 and exiting through vents 14 in the shell after being heated by the burning fuel, rising and giving up heat to the product container 1.

Surrounding the shell body **11** and coextensive therewith is a snug fitting jacket or sleeve **25** comprised of flexible sheet material having good heat insulating properties. As indicated diagrammatically in FIG. **2** the material of the sleeve may be a laminate of two or more plies *25a*, *25b* which could be, for example, asbestos paper and aluminum foil, respectively, or the like. An additional ply, not shown, of foamed plastic or the like, could be used to provide further insulation, if desired. Preferably, the outer surface of sleeve **25** is of a material or has a coating upon which may be printed appropriate product identification, thereby rendering the sleeve a form of label for the contained product.

Immediately above its bottom edge the sleeve is formed with a series of apertures constituting ports **26** for admitting air from the atmosphere when the sleeve is properly positioned relative to shell for the heating operation. Ports **26**, as in the case of vents **14**, may be of any suitable shape, size or number such as will accomplish the stated purpose.

The sleeve **25** is not permanently adhered to the shell **10** and, although snugly embracing same, may be slideably displaced as by rotation in its original plane (twisting) or withdrawn axially therefrom, in telescopic fashion, at least to an extended position at which the vents **14** and ports **26** are fully exposed or uncovered. When thus extended and the package placed upright on any suitable flat supporting surface, the sleeve acts as a stand or holder for maintaining the shell **10** in elevated relation to the supporting surface. It may be found that application of a twisting force to the sleeve, as indicated in FIG. **4**, will facilitate its withdrawal to the extended position.

FIG. **3** illustrates the normal position of the respective parts wherein vents **14** are covered exteriorally by the sleeve **25**, and the ports **26** in the sleeve are covered interiorally by the body **11** of shell **10**. FIGS. **4** and **5** show the sleeve in its extended position wherein the ports **26** and vents **14** are uncovered to complete an air circulation path upwardly through shell **10**, assuming that the package is resting upright on a flat surface and that the removable section **17** of the shell end closure **15** has been torn away. This circulation path is indicated by the directional arrows in FIG. **5** showing air entering through ports **26**, rising within shell **10** and exiting through vents **14**. By providing an air gap between container body **2** and shell body **11**, and by locating vents **14** such as to communicate with the uppermost area of said gap, the circulating air is caused to contact and envelop substantially the entire surface of the container body thus assuring rapid and efficient heating of the contained product.

In initiating the heating operation the sleeve **25** is first extended before tearing away the removable section **17** of the shell end closure and igniting the fuel pellet **19**. The package is then, preferably, upright on a supporting surface for the duration of combustion. The amount of fuel supplied is predetermined according to the nature of the product. If it should be desired to underheat the product, combustion can be terminated at any time prior to exhaustion of the fuel supply by pushing shell **10** downwardly to its original position fully within sleeve **25**, thereby closing vents **14** and ports **26** to interrupt air circulation and prevent oxygen from reaching the fuel pellet. The package can, if desired, be handled at all times in view of the heat insulating character of sleeve **25**. Removal of the easy-open end closure for the product container **1** can be accomplished at any suitable time so that upon completion of the heating operation the heated product may be used or consumed, directly from the container, if desired, with the aid of an appropriate implement or utensil **27** which, in the present instance, could be a fork or a spoon.

FIG. **6** and FIG. **7** illustrate two embodiments of the invention wherein a circulating draft is established through air vents **26** at the lower end of annular body **10** and **14** at the upper end thereof by the planar rotation of annular sleeve **25** (twisting) and by sliding annular sleeve **25** upwardly, (telescoping) respectively.

FIG. **8** shows graphically—by an end view of one embodiment of the inventive concept—how the heat insulating properties desirable in annular sleeve member **25** can be accomplished by constructing the sleeve member from corrugated material.

FIGS. **9**, **10** and **11** illustrate one important feature of the invention, namely the "flame funnel" feature which is not shown in FIGS. **1—8**, dealing more particularly with structural features of the invention.

Flame funnel **33** is adapted to fit within the heating chamber of annular body **10** and its larger end is positioned in close proximity to the bottom of container body **1**.

Flame funnel **33** is preferably constructed of a fine mesh wire gauze, but may also be made of a solid noncombustible material which is perforated with multitudinous perforations, so as to perform the following functions.

1. The flame funnel confines the flames from the fuel within the funnel proper since the flame will not penetrate the funnel, and permits a ready passage for air to flow in to support the combustion.

2. The inwardly curved portion **34** of flame funnel **33** confines the flame and prevents it going up the sides of container body **1** so that heating is concentrated at the bottom of container body **1**.

3. The flame funnel prevents the flame from contacting the sides of annular sleeve **10** and thus requires less insulation thereof.

4. When using flame funnel **33**, the fuel is confined in the neck portion thereof and thus more safely confines fuel in the event the pellet becomes broken during transport.

5. The spring action of flame funnel **33** tightly holds the fuel pellet and thus eliminates need for any other fastening means.

6. By positioning the fuel pellet in the neck of flame funnel **33** the rate of combustion is controlled; the further down the funnel neck the pellet is placed, the slower the burning rate.

7. The use of the flame funnel controls the flow of air to the burning fuel and thus prevents a "gusty" flow which might tend to extinguish the flame.

8. Flame funnel **33** holds the burning fuel away from the bottom of annular body **10** and thus maintains the end member **15** at a lower temperature. Thus the unit can safely be rested on any surface during operation without damage to the surface.

9. The flexible nature of flame funnel **33** enables it to be adapted to various size containers. Similarly by adjusting container body **1** upwardly or downwardly in relation to flame funnel **33** more or less of the bottom element **2** of container **1** is contacted by flame from burning fuel pellet **19**.

Although the flame confining device just described is referred to as a funnel, it will be readily recognized that the device may be of any shape which performs the desired functions. For example, it may be U-shaped, of a frustroconical shape; frustropyramidal shape, etc. The term "funnel" as used herein, is meant to cover any such narration in shape.

One important aspect of the present invention is the manner in which fuel pellet **19** is ignited. As was set out above, an external ignition device, such as a match, cigarette lighter, etc. may be applied to fuel pellet **19** through the aperture resulting when pull tab **18** is operated to remove end closure **17**. However, the preferred embodiment of this invention is self-contained with respect to ignition means.

It will be appreciated by those familiar with the art that various embodiments of self-contained ignition means may be designed into the structures illustrated without departing from the concept of self-contained ignition means.

Two of such means are illustrated in FIGS. **9** and **10**.

In FIG. **9** there is shown flame funnel **33** adapted within annular body **10**. Disposed in the neck of flame funnel **33** is fuel pellet **19**. Also adapted in the neck of flame funnel **33** and adjacent to or in close proximity to fuel pellet **19** is igniter **29**. Igniter **29** is comprised of any of the various well-known ignition agents such as phosphorous compounds and the like which, upon being elevated in temperature due to friction with an abrading surface, burst into flame. The common kitchen match head is a specific example of such an igniting composi-

tion. Pull tab 18 is attached to end closure 17 which is coated on the inner surface thereof with an abrasive coating 30. When pull tab 18 is operated closure 17 is adapted to move horizontally and abrasive 30 is engaged in slidable contact with igniter 29, frictional heat generated thereby causes ignition of igniter 29 which in turn ignites fuel pellet 19.

In the embodiment illustrated in FIG. 10, end closure 31 is adapted to be rotated about a central pivot pin, not shown by means of twisting projections 32. This rotational movement forces abrading surface 36 across and in sliding contact with igniter 29 and, as above, igniter 29 is ignited, and in turn combustion of fuel pellet 19 begins.

It is also contemplated that igniter 29 and abrading surfaces 30 and 33 can be comprised of the well-known "safety match" ignition compositions which is illustrated by the compositions used in book matches, for example.

If desired, igniter 29 can be made of a material which spontaneously ignites when exposed to air. Thus when end closure 17, FIG. 9, is removed and air strikes igniter 29, it spontaneously ignites, starting the combustion of fuel pellet 19.

Other self contained ignition systems may also be used. For example, the unit may be designed such that when any portion is moved relative to another portion, a strip of abrading surface is slidably engaged in a firing surface, resulting in ignition. The inventive concept embraces all such embodiments.

While there has been shown and described what is considered a preferred embodiment of the invention, changes in form and detail could obviously be made without departing from the spirit of the invention. It is therefore intended that the invention be not limited to the exact form and details shown and described, nor to anything less than the whole of the invention herein disclosed as hereafter claimed.

I claim:

1. Packaging means adapted for heating a product packaged therein comprising:
   - a container having a tubular body fabricated from heat conductive packaging material and provided with a top end closure for sealing said product within said container;
   - a shell having a bottom end closure and an elongated tubular body fabricated from a heat-resistant packaging material and supporting within its upper end, when in an upright position, the body of said container in inwardly spaced relation to the body of said shell to define an air gap therebetween, said shell body being formed with vents communicating with said gap to enable to escape of air from said shell; and
   - a supply of fuel disposed within the opposite lower end of said shell body and supported by said bottom end closure below said container, said fuel when ignited causing heated air to circulate upwardly within said shell into contact with the body of said container and thence out through said vents and in so doing conveying heat to the body of said container and the product contained therein, said bottom end closure having a removable section manually severable therefrom to form a rupture through which air may enter into said shell, and including means operatively associated with said removable section and activated by the severance of said section from said bottom end closure for igniting said fuel.

2. The invention according to claim 1 wherein said igniting means comprises a self-contained igniter adapted to reach ignition temperature when abraded with a friction-providing surface.

3. The invention according to claim 1 wherein said igniting means is adapted to be abraded by a friction surface disposed on the inner surface of said removable section when said section is severed from said bottom end closure.

4. The invention according to claim 1 including a bottom end closure for said shell supporting said fuel within the shell, said end closure having a rotatable section manually rotatable to form an aperture therein through which air may enter said shell.

5. The invention according to claim 1 including means operatively associated with said rotatable section and activated by the rotation of said section for igniting said fuel.

6. Packaging means adapted for heating a product packaged therein comprising:
   - a container having a tubular body fabricated from heat-conductive packaging material and provided with a top end closure for sealing said product within said container;
   - a shell having an elongated tubular body fabricated from a heat-resistant packaging material and supporting within its upper end;
   - when in an upright position, the body of said container is in inwardly spaced relation to the body of said shell to define an air gap therebetween, said shell body being formed with vents communicated with said gap to enable escape of air from said shell end;
   - a supply of fuel disposed within the opposite lower end of said shell body and below said container, said fuel when ignited causing heated air to circulate upwardly within said shell into contact with the body of said container and thence out through said vents and in so doing conveying heat to the body of said container and the product contained therein; and
   - a sleeve of heat insulating material surrounding the body of said shell and slideably fitted thereon, said sleeve being displaceable relative to said shell from a normal position coextensive with said shell body in which position the sleeve covers the vents formed in said shell body, to a displaced position wherein said vents are uncovered wherein said sleeve, when in its displaced position and resting upright on a flat supporting surface, constitutes a stand for holding said shell upright in elevated relation to said supporting surface and wherein said sleeve is formed with ports adjacent its lower edge to admit air for circulation through said shell when said sleeve is serving as a stand for said shell.

7. The invention according to claim 6 wherein said ports are covered by the body of said shell when said sleeve is in its normal position.

8. The invention according to claim 6 wherein the outer surface of said sleeve is capable of being printed upon to enable use of said sleeve as a label for the contained product.

9. Packaging means adapted for heating a product packaged therein comprising:
   - a container having a tubular body fabricated from heat conductive package material and provided with a top end closure for sealing said product within said container;
   - a shell having an elongated tubular body fabricated from a heat-resistant packaging material and supporting within its upper end, when in an upright position, the body of said container in inwardly spaced relation to the body of said shell to define an air gap therebetween, said shell body being formed with vents communicated with said gap to enable escape of air from said shell;
   - flame-confining means disposed within the lower end of said shell body and below said container for confining and directing flame to the bottom portion of said container;
   - a supply of fuel disposed within said flame-confining means, said fuel when ignited causing heated air to circulate upwardly within said shell into contact with the body of said container and thence out through said vents and in so doing conveying heat through the body of said container and the product contained therein; and
   - wherein said flame confining means is a funnel and wherein said fuel is positioned at the lower end thereof, said funnel comprises a flexible wire gauge having its upper edge extending inwardly toward the center thereof.

10. The invention according to claim 9 wherein the lower portion of said funnel is attached to receive igniting means.