Nov. 19, 1968 R. G. CARPENTER ET AL 3,411,265

METHOD OF PACKAGING

Filed Sept. 28, 1956 2 Sheets-Sheet 1

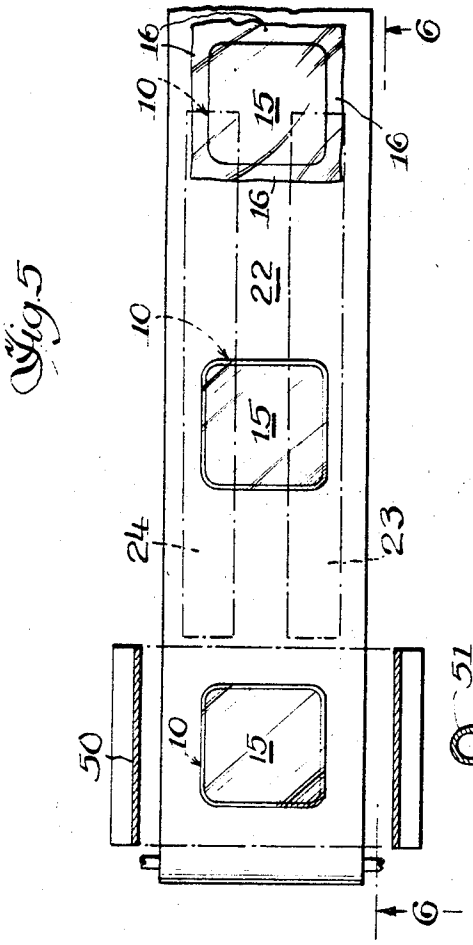

Fig. 5

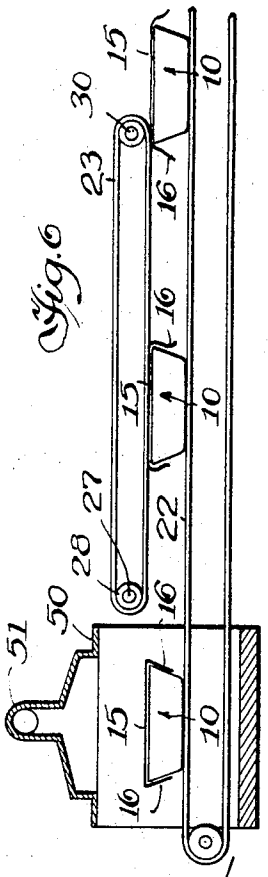

Fig. 6

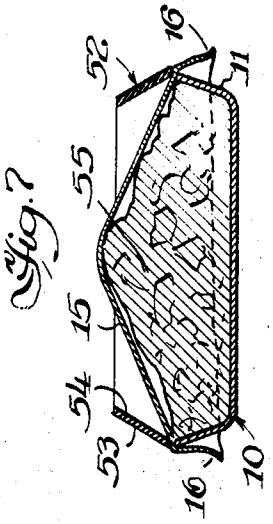

Fig. 7

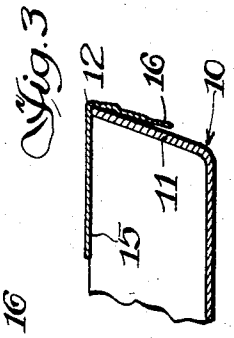

Fig. 3

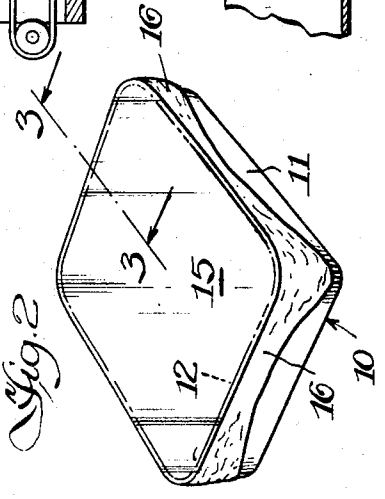

Fig. 2

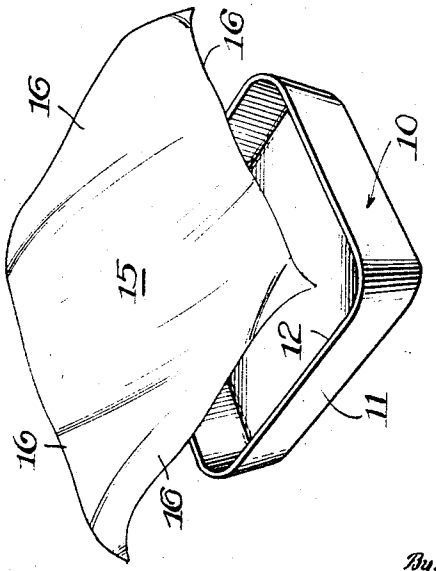

Fig. 1

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METHOD OF PACKAGING

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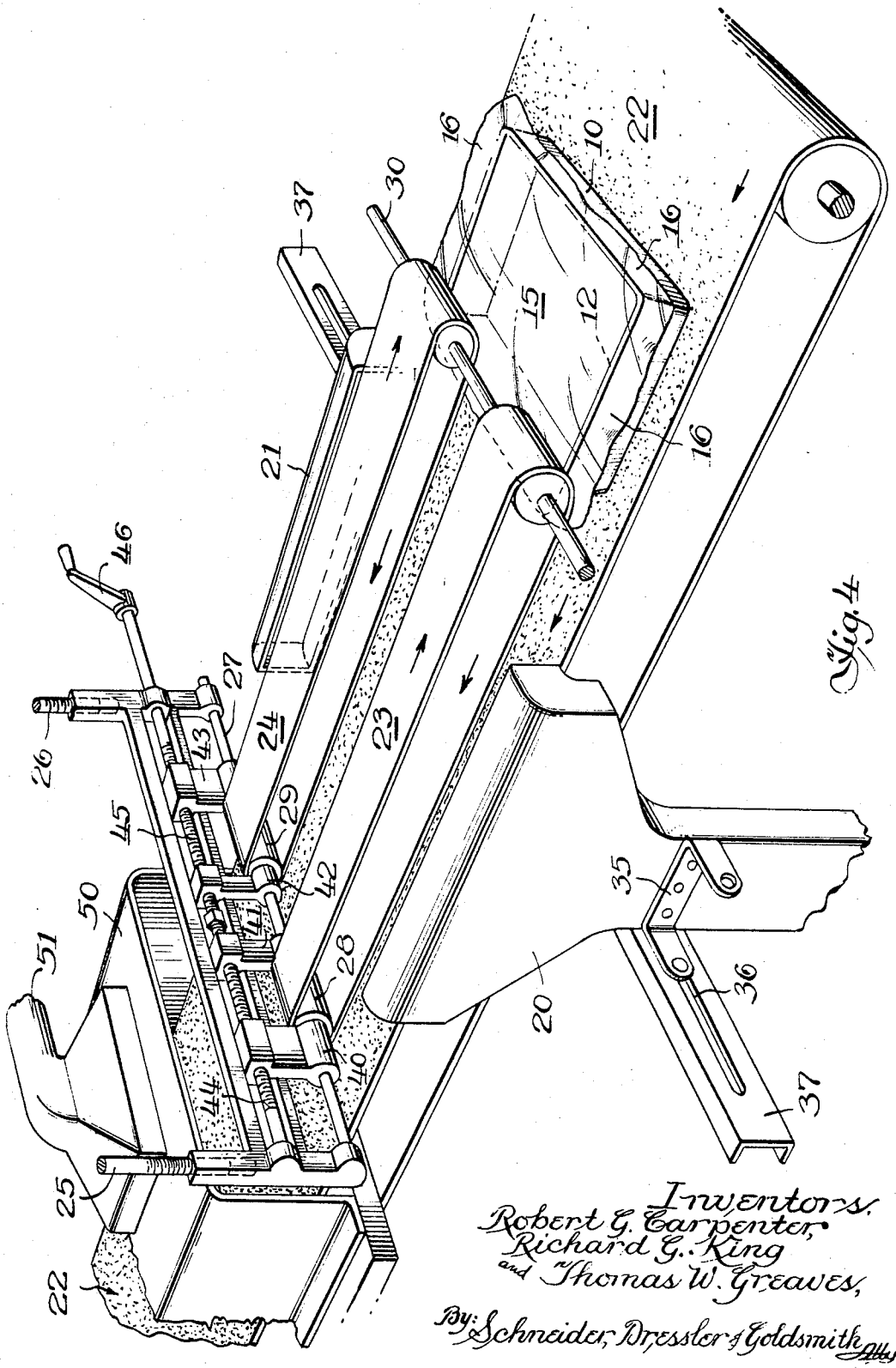

Fig. 4

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METHOD OF PACKAGING

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9 Claims. (Cl. 53—42)

This invention relates to packages for products to be safeguarded against contamination, and more particularly a package including a tray or other container with a cover sheet overlying the container.

Packages of this type are useful, for example, for meats, fruits, vegetables, and other items to be sold in a retail store. When the cover sheet is transparent, a prospective purchaser can see the product clearly before he makes his purchase. At the same time, the food or other product is safely guarded against contamination or damage which might be caused by falling dust and dirt or by handling of the item.

The cover sheet may be clear, tinted, or opaque, as desired. It may carry a trademark or other identification of the brand. If the container and the cover sheet are of carefully chosen materials, the appearance of the product in the retail establishment can be greatly enhanced by use of this type of package.

All these advantages make this general type of package especially valuable for use in retail stores organized on a self-service basis.

The conventional package of this type has a cover film which extends down the sides of the container and across the bottom. The material so extending is folded to conform the extra material to the shape of the sides and bottom of the container. The material folded across the bottom of the container must then be glued or secured in some other appropriate manner beneath the bottom of the container.

This requires very much more material for the cover sheet than is necessary in the present invention. In addition, it detracts from the appearance of the package, as it introduces an unsightly excess of cover sheet material which must be bunched and folded underneath the container. Moreover, the folding of the extra material of the cover sheet is an awkward and time-consuming step.

This invention avoids all these disadvantages. The package of this invention requires only a minimum of cover sheet material. The package has a neat and attractive appearance. It may be produced easily and quickly. The method and apparatus of this invention make it possible to produce the package in the retail establishment or before delivery is made to the establishment, as desired.

The package of this invention comprises a tray or other container, which in the usual case has upwardly extending walls, and a cover therefore of material adapted to shrink in response to elevated temperature. The cover sheet is of large enough dimensions that a substantial part of its outer edge portion laps over the outer edges of the uppermost portion of the container, preferably on all sides, to provide material which upon shrinking in response to application of heat wraps around and grips said container edges snugly.

The shape and size of the container used with this invention will vary, as explained below, depending upon the shape and size of the product to be packaged.

If the nature of the product and the prospective use to which the package is to be put make it desirable, the edge portions of the cover sheet may be affixed to the container by a suitable adhesive in order to help secure them in position.

The invention will now be described with reference to the accompanying drawings. In the drawings:

FIGURE 1 is a perspective view of the tray or container of one embodiment of the package of this invention, with the cover sheet shown in position to be placed upon the container;

FIG. 2 is a perspective view of the same embodiment of the package of this invention;

FIG. 3 is a fragmentary sectional view taken along line 3—3 of FIG. 2;

FIG. 4 is a perspective view of one embodiment of the apparatus of this invention;

FIG. 5 is a reduced fragmentary plan view, partly in section, of the apparatus of FIG. 4;

FIG. 6 is a sectional view taken along the line 6—6 in FIG. 5; and

FIG. 7 is a side elevation of a container and cover sheet with a hold-down device supported thereon before the cover sheet is heat treated in accordance with this invention.

Container **10** shown in FIG. 1 is a relatively shallow rectangular container of pressed fiber or cardboard of a type commonly used in food packaging. The material of which the tray is formed may also be paperboard, plastic, cardboard, or any other suitable material.

As seen, side walls **11** of container **10** are, in the embodiment shown, positioned so as to flare outward continuously as they extend upwardly from the bottom of the tray. It is preferred that wall **11** have such an outward flare at least along its upper edge **12**. However, in some instances, the invention may be practiced with side walls **11** rising vertically and having no flare at any point, and with certain types of products to be packaged the container may be a flat tray with no upwardly extending walls at all.

Cover sheet **15** formed of a material adapted to shrink in response to elevated temperatures. It is preferably quite thin. In the embodiment shown, the material is transparent. In addition to being heat-shrinkable, the material of the cover sheet should be tough and durable, in order to safeguard the contents of the package against contamination or other injury that might occur if the cover sheet became ruptured.

Materials found to be suitable for this purpose include the oriented stabilized rubber hydrochloride sold under the trademark "Snug-Pak," the similar material sold under the trademark "Cross Tensilite," and the copolymer of vinylidene chloride and vinyl chloride sold under the trademark "Saran." In addition, any suitable material of the general class of elastomers may be used that has the property of returning to its original or substantially original dimensions under heat treatment after having been initially extended.

The area of cover sheet **15** must be sufficiently greater than that of the area defined by upper edge **12** of side walls **11** that substantial portions **16** of the sheet will extend beyound the container walls, preferably on all sides.

Cover sheet **15** should be relatively limp, so that edge portions **16** will hang down very close to, and preferably in contact with, the outer edges of the upper portion of the container, which they are to wrap around and grip snugly upon being shrunk by application of heat. Heat shrinking of edge portions **16** reduces the perimeter of cover sheet **15**, and the shrunken perimeter will, if it is close enough to upper edge **12** of container **10** in the embodiment shown, wrap around and grip the container.

It must be noted that shrinking of outer edge portions **16** occurs in all directions in the plane of the cover sheet when heat is applied to those edge portions. In addition, some of the heat applied to portions **16** of the cover sheet may unavoidably be applied to the adjacent inner portions of the sheet. The result is that there is a ten-

dency for the perimeter of cover sheet **15** to rise somewhat as well as to shrink in length, and in an extreme case the shrinking cover sheet might miss contact with the container altogether. Thus, if before shrinking takes place cover sheet **15** is not close enough to upper edge **12**, in the embodiment shown, no wrapping around or gripping of the container by the sheet would occur at all.

To avoid causing edge portions **16** to drape too far away from upper edge **12**, the product to be packaged must not rise too high above edge **12**, especially near the outer portions of the container. Even though the cover sheet employed be formed of a quite limp material, the sheet may not fall sharply enough to drape in contact with or close to edge **12**, if the portions of the packaged product near edge **12** rise too high above that edge. The container used must thus be of sufficient depth that the product to be packaged does not rise too high above the outer edges of the upper portion of the container. The container must also be of sufficient cross-sectional area that any portion of the product rising above the top of the container will not extend laterally beyond the container walls so that the draped cover sheet falls too far from those walls to be able upon shrinking to grasp the walls.

Another factor that has some bearing upon the effectiveness with which the cover sheet wraps around and grips the container is the angle between the plane of the container wall and the plane of the portions of the cover sheet adjacent to the wall. These planes must meet at an angle of less than 180°, and should preferably meet at an acute angle.

The angle in question is determined not only by the drape of the cover sheet before heat is applied to shrink its outer edge portions, but also by the configuration of the outer edges of the upper portion of the container. Generally speaking, the greater the outward flare of those outer edges, the more effectively the shrunken edge portions of the cover sheet will wrap around and grip the container. This is so because the perimeter of the cover sheet after shrinking of its edge portions will be smaller than the perimeter of the uppermost portion of the flared container walls which it is wrapped about and grips.

If the product to be packaged is borne upon a support member that is flat, with no upwardly extending walls at all, such a member is, for the purpose of this specification and claims, considered a "container" because it holds the product within defined limits. A flat container may actually produce a more effective gripping between the container and the cover sheet than if it had upwardly extending walls, for the bottom wall of the tray is then the wall gripped by the shrunken cover sheet, and the angle between the plane of the bottom wall and the adjacent portions of the cover sheet will be quite sharp. This will be especially true if the object to be packaged is of relatively low height, such as a slab of sliced bacon packaged for sale in a retail establishment.

FIG. 2 shows one embodiment of the assembled package of this invention in a perspective view. Edge portions **16** of cover sheet **15** have been shrunk into a snug fit against outwardly flaring container walls **11**. The center portion of cover sheet **15** has also been shrunk, to cause that portion of the sheet to assume a taut condition. In the embodiment of FIG. 2, the product contained in the package does not rise above upper edge **12** of container **10**, so the sheet has assumed a perfectly flat shape. In FIG. 2, as in the other figures of the drawing except FIG. 7, the product contained in the package has been omitted for clarity.

FIG. 3 shows in section how outer edge portions **16** of sheet **15** have been caused to wrap around and shrink into a snug fit against walls **11** of container **10**.

It is seen from FIG. 3 that there is a very great savings in the material of which cover sheet **15** is formed by having the cover sheet extend only a short distance below upper edge **12** of container **10**. If the cover sheet were extended farther down side wall **11** and across bottom **17** of container **10**, as is the case in conventional packages of this general type, several times more material would be required. Not only would edge portions **16** be extended along the two axes of the rectangular container but, at least with a rectangular cover sheet, additional material would be consumed at the corners of cover sheet **15**.

FIG. 4 shows one embodiment of the apparatus of this invention for packaging products such as food. Hoods **20** and **21** define a "wrapping zone" through which container **10** and cover sheet **15**, with the desired product supported in the container, may be moved to effect the first step in the production of the package of FIG. 2: the shrinking of edge portions **16** of the cover sheet to cause them to wrap around and fit snugly against the uppermost portions of container walls **11**.

Hoods **20** and **21** each contain hot air blowers (not shown) which blow heated air across the wrapping zone. Hoods **20** and **21**, and the hot air blowers contained in the hoods, are preferably arranged to provide sufficient directional control that the major part of the heat applied to container **10** and edge portions **16** of cover sheet **15** can be confined below upper edge **12** of the container. Any suitable directional heating means, whether relying on radiant heat or blowing of heated gases, may be used.

Endless belt **22** passes through the area between the hoods and the hot air blowers. The direction of movement of the upper reach of belt **22** is from right to left in FIG. 4. As shown in FIG. 4, container **10** is supported on conveyor **22**, with cover sheet **15** overlying the container. Outer edge portions **16** preferably extend in all directions beyond upper edge **12** of container **10**.

Endless belts **23** and **24** are hold-down devices positioned above the general areas through which the walls of container **10** located near the outer edges of belt **22** will pass as the container is carried forward by the conveyor belt. The lower reaches of endless belts **23** and **24** move at the same speed and in the same direction as conveyor belt **22**. As a result, when container **10** and cover sheet **15** move under hold-down devices **23** and **24**, the cover sheet will not slide off upper edge **12** of the container but is held in proper position over the container as it passes through the wrapping zone.

The height of the lower reaches of belts **23** and **24** may be adjustable, in order to accommodate containers of various heights. In the embodiment shown in FIG. 4, this is accomplished by means of threaded adjusting rods **25** and **26**. Axle **27** upon which pulleys **28** and **29** for belts **23** and **24**, respectively, rotate, is journalled in a frame suspended from rods **25** and **26**. Rotation of the latter two rods, by means not shown, causes axle **27** to be raised or lowered as desired. A similar supporting means for axle **30**, at the other end of belts **23** and **24**, is omitted from FIG. 4 for clarity.

To compensate for various widths of container **10**, hoods **20** and **21** may also be adjustably positioned, as by means such as shown in FIG. 4. In the embodiment shown, angle brace **35** is adjustably mounted in slot **36** of support member **37**. For clarity, only one support member **37** is shown. A similar arrangement of parts is provided on the other side of the apparatus, so that hood **21** may be moved toward or away from hood **20** as desired.

When the spacing between hoods **20** and **21** is adjusted to accommodate various widths of container **10**, it may also be desirable to adjust the spacing between endless belts **23** and **24**. For this purpose, guide members **40** and **41** are provided on either side of pulley **28** and guide members **42** and **43** are provided on either side of pulley **29**. Guide members **40** and **41** are supported above by threaded engagement with rod **44**, and guide members **42** and **43** are similarly supported on rod **45**, which is threaded in the opposite direction from rod **44**. Rods **44**

and 45 are rigidly connected, and may be rotated by means of crank 46 at the outer end of rod 45.

It is seen that rotation of rods 44 and 45 will vary the spacing between endless belts 23 and 24 as guide members 40 and 41 for the first belts, and members 42 and 43 for the second, move backward and forward in response to the action of the threads. Similar guide members and threaded rods are provided at the other end of belts 23 and 24, but are omitted from FIG 4 for clarity.

After a container 10 and cover sheet 15, with the product to be packaged supported in the container, pass through the wrapping zone and beyond hold-down devices 23 and 24, they are carried still further by conveyor belt 22 through heated chamber 50. In the embodiment shown, this is a hot air tunnel which is fed through input pipe 51.

The plan view of FIG. 5 shows how a series of containers 10 and cover sheets 15 may be moved by conveyor belt 22 under hold-down devices 23 and 24. The container and overlying cover sheet shown in the right hand portion of FIG. 5 are just coming under the hold-down devices, after the cover sheet has been properly positioned upon the container. The immediately preceding container 10 and cover sheet 15 are shown as passing through the wrapping zone between hoods 20 and 21 (shown in FIG. 4). The next preceding container and cover sheet are seen as they pass through hot air chamber or tunnel 50. It will be noted that cover sheet 15 may have an uneven appearance not only when it first enters the wrapping zone, but also as it passes through that zone. However, when the container and cover sheet are subjected to the action of the hot air tunnel, the central portion of cover sheet 15 is caused to shrink into a taut, flat condition.

As shown in FIG. 5, conveyor belt 22 may be terminated just beyond the hot air tunnel. At that point, a take-off table or a pick-up conveyor belt may be provided.

FIG. 6 shows in side view the series of containers 10 and cover sheets 15 which are seen passing through the wrapping zone and the hot air tunnel in plan view in FIG. 5. Overhanging edge portions 16 have been caused to shrink snugly against the upwardly extending walls of container 10 in the wrapping zone. The center portion of cover sheet 15 has been caused to become taut in hot air tunnel 50.

In FIG. 7, a container 10 is shown in section, covered by cover sheet 15 with overhanging edge portions 16, and hold-down device 52 placed upon the container and cover sheet. Hold-down device 52 is an individual hold-down device that may be used with each separate package to be produced with the apparatus of this invention. It may be placed upon the container and cover sheet and held there simply by gravity or by a suitable arangement of braces or supports.

In the embodiment shown, individual hold-down device 52 has sidewalls 53 that have substantially the same shape as side walls 11 of container 10. Top portion 54 of device 52 is open, to permit product 55 and cover sheet 15 to extend above the upper portion of the hold-down device when necessary.

If it is desired to make the seal between edge portions 16 and walls 11 of container 10 a tighter seal, this can be accomplished by treating the upper portions of the outside surfaces of walls 11 with a thermo-setting adhesive before cover sheet 15 is placed on container 10 for heat shrinkage of edge portions 16. In such case, edge portions 16 will not only be shrunk tightly against walls 11, but will be affixed to those walls by the action of the thermo-setting adhesive when the adhesive responds to the application of heat in the wrapping zone and in the hot air tunnel 50.

The above detailed description of this invention has been given for clearness of understanding only. No unnecessary limitations should be understood therefrom, as modifications will be obvious to those skilled in the art.

We claim:

1. A method of packaging a product in a container which comprises: supporting the product upon a container; placing a substantially flat limp cover sheet of heat-shrinkable material over the container and product, with substantial edge portions of the sheet extending beyond the outer edges of the uppermost portion of the container; and applying heat to said edge portions to shrink them into a snug fit against said uppermost portion of the container.

2. A method of packaging a product in a container which comprises: supporting the product in a container having upwardly extending walls; placing a substantially flat, limp cover sheet of heat-shrinkable material over the container and product, with substantial edge portions of the sheeet extending beyond the container walls; and applying heat to said edge portions to shrink them into a snug fit against said walls.

3. A method of packaging a product in a container which comprises: supporting the product in a container having upwardly extending walls, said walls flaring outwardly at their upper edges; placing a substantially flat, limp cover sheet of heat-shrinkable material over the container and product, with substantial edge portions of the sheet extending beyond the upper edges of the container walls; and while holding the cover sheet against the upper edges of the container walls on opposing sides of the container, applying heat to said edge portions of the cover sheet to shrink them into a snug fit against said outwardly flaring container walls.

4. A method of packaging a product in a container which comprises: supporting the product in a container having upwardly extending walls, said walls flaring outwardly at their upper edges; placing a substantially flat, limp cover sheet of heat-shrinkable material over the container and product, with substantial edge portions of the sheet extending beyond the upper edges of the container walls; while holding the cover sheet against the upper edges of the container walls on opposing sides of the container, applying heat to said edge portions of the cover sheet to shrink them into a snug fit against said outwardly flaring container walls; and thereafter heating the remaining portion of the cover sheet to shrink it into taut condition over the container and the product therein.

5. A method of packaging a product in a container which comprises: supporting the product in a container having upwardly extending walls, said walls having thermosetting adhesive on the upper portions of the outside surfaces of said walls; placing a substantially flat, limp cover sheet of heat-shrinkable material over the container and product, with substantial edge portions of the sheet extending beyond the upper edges of the container walls; and while holding the cover sheet against the upper edges of the container walls on opposing sides of the container, applying heat to said edge portions of the cover sheet to shrink them into a snug fit against said outwardly flaring container walls and simultaneously affix them to said walls.

6. A method of packaging a product in a container which comprises: supporting the product upon a container; placing a substantially flat, limp cover sheet of heat-shrinkable material over the container and product, with substantial edge portions of the sheet extending beyond the outer edges of the uppermost portion of the container; and, while holding the cover sheet against the outer edges of the uppermost portion of the container on opposing sides of the container, applying heat to said edge portions of the cover sheet to shrink them into a snug fit against said walls.

7. A method of forming a cover upon a container and simultaneously sealing a container comprising the steps of placing a limp sheet of fragile, transparent, thin, flexible, unformed, heat shrinkable, oriented plastic film on top of a container to be sealed, said sheet being sub-

stantially larger than the mouth of the container and extending beyond said mouth circumferentially, retaining said sheet in position above and across the mouth of the container, and applying heat to said sheet to obtain shrinkage of the sheet and sealing of the container.

8. A method of forming a cover upon a container and simultaneously sealing a container comprising the steps of placing a limp sheet of transparent, thin, flexible, unformed, heat shrinkable, oriented plastic film on top of a container to be sealed, said sheet being substantially larger than the mouth circumferentially, retaining said sheet in position above and across the mouth of the container, and applying heat to said sheet to obtain shrinkage of the sheet and sealing of the container.

9. A method of forming a cover upon a container and sealing a container comprising the steps of placing a limp sheet of transparent, thin, flexible, unformed, heat shrinkable, oriented plastic film on top of a container to be sealed, said sheet being substantially larger than the mouth of the container and extending beyond said mouth circumferentially, retaining said sheet in position above and across the mouth of the container, and applying heat to said sheet to obtain shrinkage of the sheet and sealing of the container.

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