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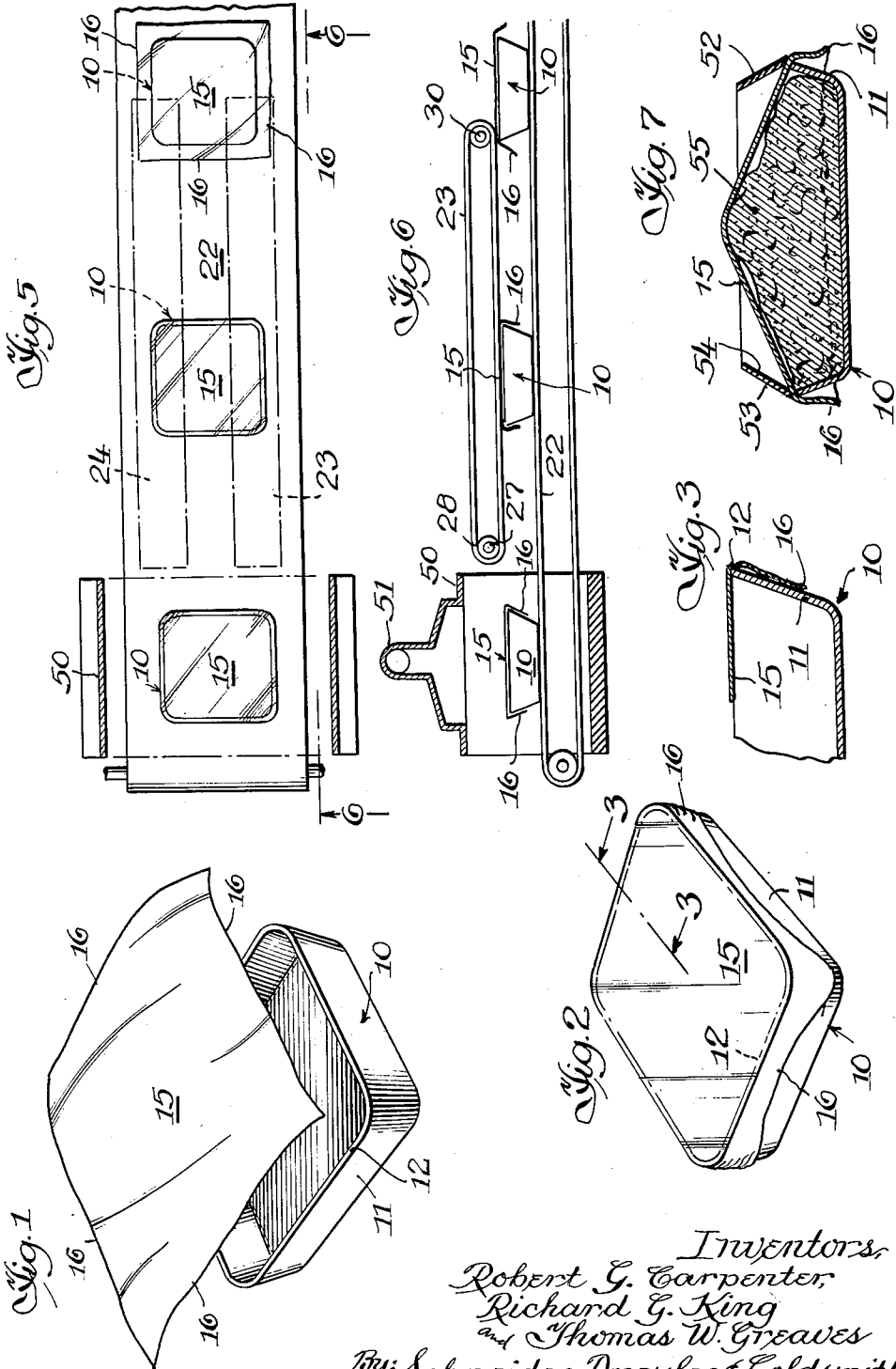
R. G. CARPENTER ET AL

3,034,271

APPARATUS FOR PRODUCING PACKAGED PRODUCT

Original Filed Sept. 28, 1956

2 Sheets-Sheet 1



Inventors
Robert G. Carpenter,
Richard G. King
and Thomas W. Greaves
By: Schneider, Dressler & Goldsmith,
Attys.

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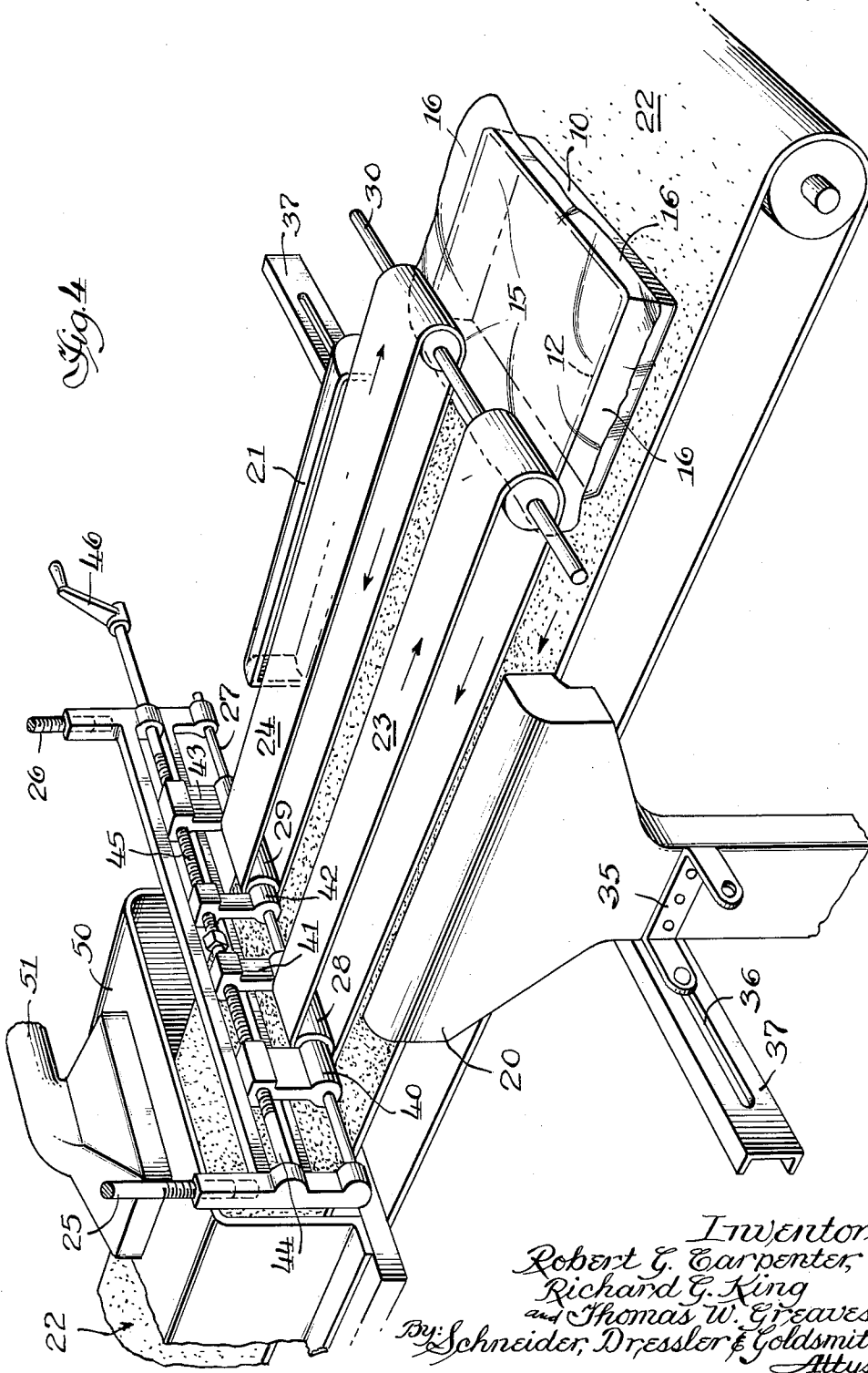
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**APPARATUS FOR PRODUCING
PACKAGED PRODUCT**

Robert G. Carpenter, Palos Park, Richard G. King, Chicago, and Thomas W. Greaves, Geneva, Ill., assignors to W. R. Grace & Co., Cambridge, Mass., a corporation of Connecticut

Original application Sept. 28, 1956, Ser. No. 612,833. Divided and this application Aug. 2, 1957, Ser. No. 675,903

3 Claims. (Cl. 53—184)

This invention relates to apparatus for producing 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.

This application is a division of our copending application Serial No. 612,833, filed September 28, 1956.

Packages of the type produced with the apparatus of this invention 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 extended 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 package produced with the apparatus of 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 produced with the apparatus 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 apparatus of this invention makes it possible to produce the package in the retail establishment or before delivery is made to the establishment, as desired.

The package comprises a tray or other container, which in the usual case has upwardly extending walls, and a cover therefor 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 in-

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vention 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 a package that may be produced with the apparatus 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 package;

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.

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 paper board, 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 side walls 11 may rise vertically and have 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 is 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 beyond 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 tendency 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 an assembled package made with the apparatus 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 package 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 extended 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 journaled 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 arrangement of braces or supports.

In the embodiment shown, individual hold-down device 52 has side walls 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. Apparatus for packaging a product supported on a container comprising a conveyor for moving a container, the product supported therefrom, and a cover sheet of a heat shrinkable material overlying the container and product, directional heating means along a portion of the conveyor free of obstruction and adapted to direct heat across the conveyor to shrink exterior portions of opposed sides of said cover sheet to fit snugly against the container walls, and a heated chamber through which the conveyor carrying the container, product and snug fitting cover sheet passes after passing said directional heating means.

2. An apparatus according to claim 1 including means for holding said cover sheet down against the upper edges of the container walls while said cover sheet is subjected to said directional heating means.

3. An apparatus according to claim 2 wherein said directional heating means comprises a pair of heaters spaced from each other on opposite sides of the conveyor belt and adapted to confine a major part of said heat below the upper edge of the container, said holding means comprising an endless belt spaced above the conveyor and moving in the same direction and at the same speed as the conveyor, said cover being free of said holding means when in said heated chamber.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,034,271

May 15, 1962

Robert G. Carpenter et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 6, line 23, for "therefrom" read -- thereon --.

Signed and sealed this 28th day of May 1963.

(SEAL)

Attest:

ERNEST W. SWIDER
Attesting Officer

DAVID L. LADD
Commissioner of Patent