June 2, 1964 F. J. SANTANGELO 3,135,455

COMPOSITE STERILIZABLE CONTAINER

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Fig. 1.

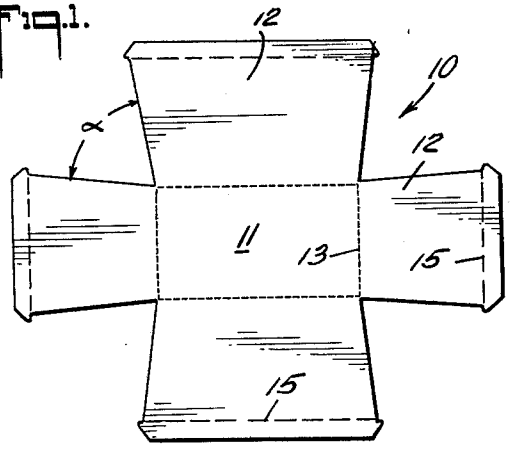


Fig. 2.

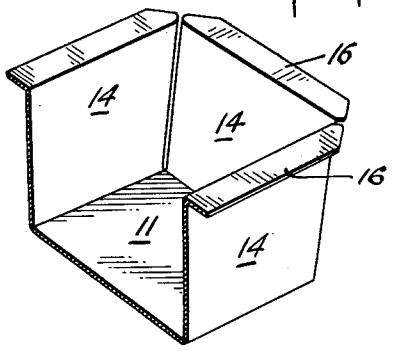


Fig. 3.

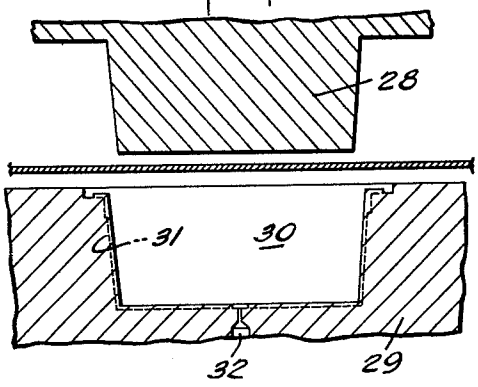


Fig. 4.

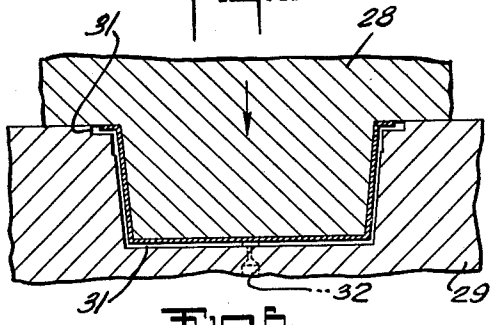


Fig. 5.

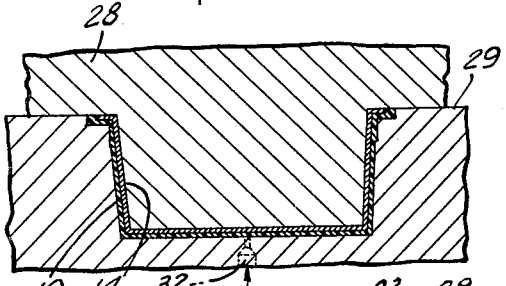
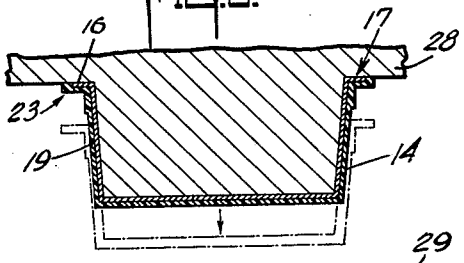


Fig. 6.



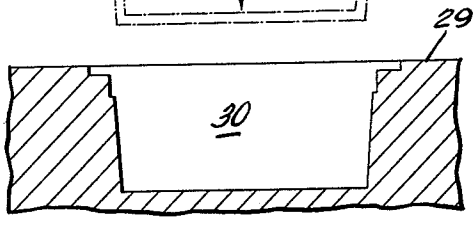


Fig. 7.

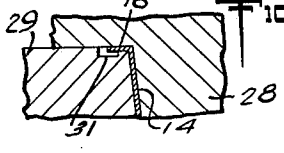


Fig. 8.

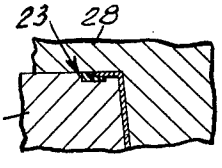


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Fig. 9.

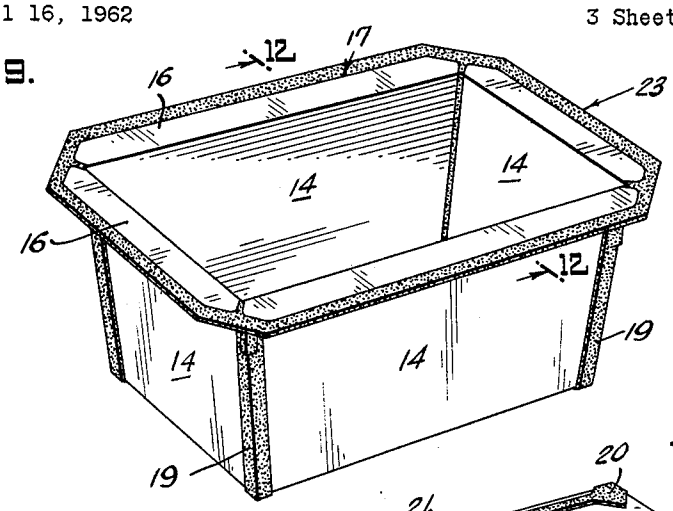

Fig. 10.

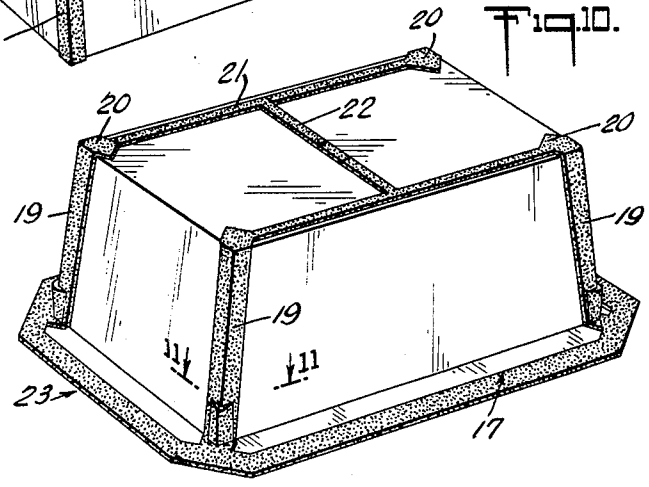

Fig. 11.

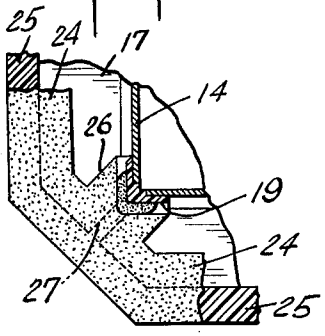

Fig. 12.

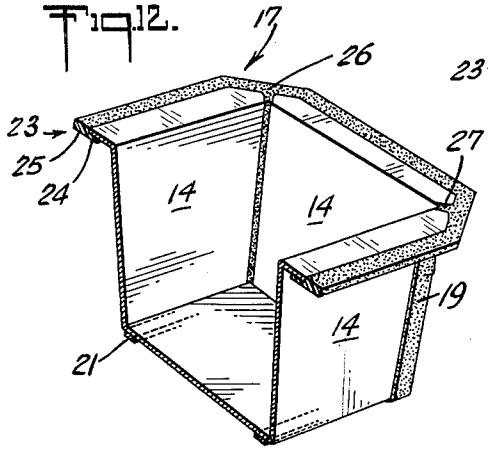

Fig. 13.

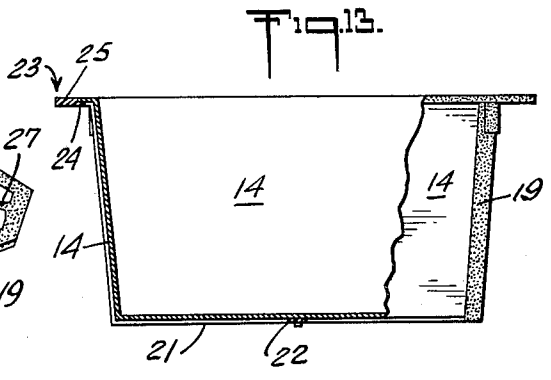

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Fig. 14.

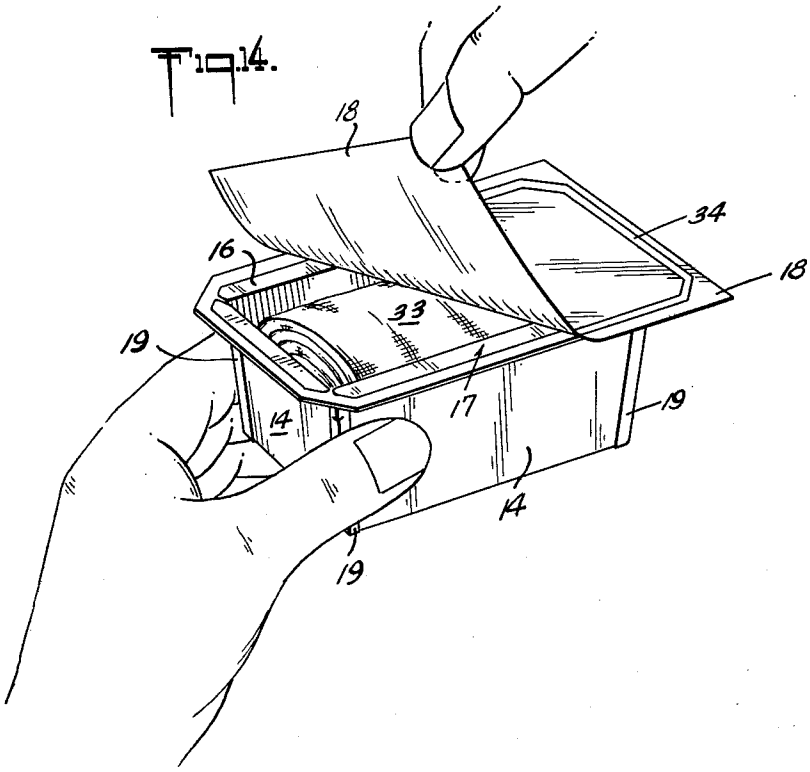
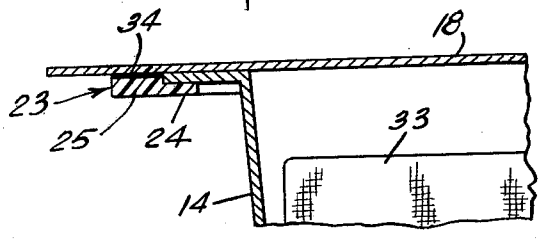


Fig. 15.



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United States Patent Office 3,135,455 Patented June 2, 1964

3,135,455

COMPOSITE STERILIZABLE CONTAINER

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Filed Apr. 16, 1962, Ser. No. 187,814
5 Claims. (Cl. 229—30)

The present invention relates to a package comprising a container and closure therefor and more particularly to a package which, upon opening after sterilization, will present in sterilized condition those surfaces most likely to be engaged by the sterile contents during their normal removal from the package.

According to the present invention, a container made from a composite of plastic material and of sheet material such as paper, cardboard, foil and the like is molded with a flange around its entire upper peripheral edge. the entire marginal portion of which presents a smooth, uniform plastic surface which by application of heat and pressure can be caused uniformly to adhere to a closure sheet such as paper or the like all around the flange. By making the closure sheet of a material through which sterilization can be effected and of a strength sufficient completely to resist tearing and delamination as it is stripped off, a package will result which when opened after sterilization will present those surfaces which normally are engaged by the sterilized contents of the package upon their removal, in a sterilized condition too. Danger of contamination of the package contents during transfer from the package to the wound site is thus avoided,

A better understanding of the invention may be had from the following description read in conjunction with the accompanying drawings, wherein:

FIG. 1 illustrates a flat blank from which a container embodying the invention may be formed;

FIG. 2 is a perspective view of the blank after it has been folded into the form of the container but prior to the molding of the corners—a half only of a container is shown;

FIGS. 3, 4, 5, 6, 7, and 8 illustrate different steps followed in making a container from the blank of FIG. 1;

FIG. 9 is a perspective view looking at the top of a finished container;

FIG. 10 is a perspective view looking at the bottom of a finished container;

FIG. 11 is a sectional view taken on line 11—11 of FIG. 10;

FIG. 12 is a transverse sectional view in perspective taken on line 12—12 of FIG. 9;

FIG. 13 is a side elevation partially in section of the finished container;

FIG. 14 is a perspective view looking at the top of the container and showing the container whose sealed cover has been partially stripped off to expose the contents; and

FIG. 15 is a fragmentary, vertical sectional view, greatly enlarged, through a flange of the container with the cover element sealed in place.

The container preferably is made from a blank 10 cut from a flat sheet of paper or similar material (FIG. 1). The blank 10 includes a rectangular bottom portion 11 with marginal portions 12, extending outwardly from each edge of the bottom portion. In forming a container from such a blank, the extending portions 12 are bent along fold lines 13 where they join the bottom portion 11 upwardly to form container sides 14 and then along fold lines 15 outwardly to form the paper portion 16 of a container flange 17 to which a flexible cover 18 is secured to close the container at the top (FIG. 14).

In the particular embodiment shown (FIG. 1), it will be noted that in the blank 10 the angle α between adjacent

edges of portions 12, which ultimately become adjacent sides 14, is somewhat less than a right angle. This gives an outward flare to the sides, after the container is formed, making the container somewhat larger at its mouth than at the bottom to provide for easier removal of the contents which are packaged therein.

The panel elements 11 and 14 comprising the container are held together in their proper relationship by molded plastic structural member 19 formed at each corner of the container (FIGS. 9 and 10). Each molded member 19 includes an upright portion extending from the bottom to the top of the container. The plastic during the molding process enters into and fills up any space that exists between the adjacent edges of the side panels 14 and it extends from the corner edge along the side panels, to which it adheres, for a distance in both directions sufficient to give some strength and contour to the container corners. Each structural corner member 19 further includes a flange portion 20 at the bottom of the container which likewise enters into and fills up any space that exists between the side wall members at the bottom of the container and it also helps to maintain the angular relationship between the radiating portions or legs of the upright portion of structural members 19. The plastic corner structural members 19 are all interconnected by stringers 21 which run along the bottom of the container somewhat inwardly from the lateral edges thereof and which are interconnected by a transverse member 22 located approximately midway between the ends of the container. While the stringers and interconnecting cross piece lend some strength and rigidity to the container, this function is somewhat incidental and these elements exist by virtue of the fact that they constitute the path by which the plastic material finds its way to the corner elements of the container during the container molding operation.

In accordance with the invention, the four upright structural elements 19 are all interconnected at the top of the container by a plastic structural element 23 forming part of the flange 17 presented at the top of the container. The plastic flange section 23 is a unitary element, extends around the entire periphery of the container, and is formed integral with the upright members 19. This plastic flange section 23 has substantially the same cross section throughout its length. This cross section includes a relatively thinner portion 24 which engages beneath and along the marginal region of the paper portion 16 of the flange 17 where the paper and plastic are securely fastened together by an interlocking action that exists between the plastic material and the fiber. The flange section 23 further includes a relatively thicker portion 25 which extends outwardly beyond the peripheral edge of the paper portion 16 of the flange. The molding operation (described later on) is such that the top surfaces of the plastic and paper portions of the flanges 17 are in a common plane and this is the same as the plane at the top of a plastic section 26 at each corner of the container. The plastic sections 26 interconnect the uprights 19 with the peripheral plastic flange portions 25 and have portions 27 filling the interstices between the adjacent ends of the paper flange sections 16 associated wth wall members 14. These interconnecting plastic sections 26 overlap the paper flange portions 16 on the under side of flanges 17 to approximately the same extent as do the plastic flanges at the sides and ends of the container (FIGS. 11, 12).

The formation of the improved container is best illustrated by reference to FIGS. 3 through 8. A pair of co-acting male and female die members 28, 29, respectively, are used. The female die member 29 as best illustrated in FIG. 3, is formed with a die cavity 30 which is generally the shape of the container to be formed. The

die cavity is provided at its corners with mold cavities 31 into which a plastic resin mass is injected after the two die members are brought together with the panel material of the container in between.

In forming the container, the blank is placed over the female die member with its base panel in registry with the base of the cavity in the female die member as illustrated in FIG. 3. The male die member descends as shown in FIG. 4 to push the blank down into the die cavity. As the blank moves into the die, the wall portions 12 are folded upwardly along fold lines 13 and outwardly along fold lines 15 to form the sides 14 and the flanges 16 of the container.

When the mold is closed with the folded blank between the mold elements (FIGS. 4, 7), mold cavities 31 are disposed all around the peripheral edges of the paper flanges 16 at the top. The cavities are so shaped as to provide during the molding process a plastic peripheral flange 25 of the type previously described. There are also cavities down along the corners of the container which interconnect with the cavities at the top and provide a matrix for the plastic structural elements 19, 20 and 26 at the corners of the container. The cavities at the corner interconnect with cavities in the bottom of the female mold section which run lengthwise of the mold near the lateral edges thereof to form the stringers 21. These longitudinal cavities are interconnected by a transverse cavity at the center of the mold to form the transverse element 22, and this in turn connects with the gate 32 which enters the female mold through the bottom for injection of the plastic material.

Thus when the mold sections 28, 29 are closed with a folded paper blank 10 appropriately located in the mold, the mold cavities 31 all will be interconnected and will be closed by the paper blank except at the corners of the container where there may be some clearance between the edges of the side walls 12 and between the ends of the flanges 16 of the container and except also in that region 25 of the flange 17 at the top of the container which as ultimately molded presents the plastic portion 25 thereof. Both these sections are closed by surfaces of the male die and for this reason can be made as uniform as desired throughout.

Thermoplastic material is injected through the gates 32 into the mold cavities under substantial pressure, generally in excess of about 1000 p.s.i. As a result plastic material is forced into every available space, completely to fill the mold cavities 31 and form the molded plastic structural framework that has been described (FIGS. 5, 8). The plastic, because of the pressure under which it is molded, is forced into very intimate contact with the other container material, which is selected so as to have substantial fiber interlocking compatibility or other adhesive compatibility with the plastic material. A very strong bond between the plastic structural members and the other container material is thus obtained.

The container upon completion is removed from the mold (FIG. 6) and filled with the desired material, as for instance surgical sponges 33, and the package sealed at the top by the cover 18 of appropriate sheet material, say paper. This may be accomplished by placing the container in a die (not shown) where the marginal flanges 17 at the top of the container are supported all around by an underlying platform and the opening of the container covered by the sheet of sealing material. A hot, flat plate may then be pressed down upon the cover 18. This renders the thermoplastic material sufficiently soft so as to interlock or interengage with the fibers of the cover sheet, if the latter is paper, or to adhere to whatever other material is used as a cover to the extent that its adhesive compatibility will permit. An area of seal 34 thus is made all around the periphery of the package as illustrated in FIG. 15.

After sealing, the package preferably is sterilized. Sterilization is effected through the cover material and consequently over the entire top flange of the container (i.e., the paper and the plastic portions 16 and 25 thereof, and will remain in a sterile condition with the package contents until the package is ready for use. At this time the cover sheet, whose grasping is facilitated by marginal extensions of the edges of the sheet beyond the flanges of the container, may be grasped between the fingers of one hand while the package is held beneath the flange 17 by the fingers of the other hand, and the cover stripped off in its entirety without tearing or delamination. Since the top surface of the flange 17 will have maintained its sterilized condition, the package contents will be capable of removal without contamination because during such removal the package contents will come in contact only with the inner walls of the package and the top surfaces of the flanges 17.

For successful operation of the package, it is essential that the material of cover sheet 18 be strong enough to prevent its tearing or delaminating during the stripping operation. For example, if cover 18 became torn or delaminated so as to leave portions thereof adhered to the flange elements 17, such portions being contaminated would in turn expose the contents to contamination during their removal. To insure against delamination if the cover material is paper, and this is usually preferred where sterilization is to be effected, a strong, latex impregnated paper of approximately eighty pounds basis weight (80 lbs. per 500 sheets 24" x 36") is preferred. Such a paper will maintain its integrity as it is stripped off a thermoplastic material to which it has been heat sealed even though there has been an interengaging or interlocking of the thermoplastic material with the fibers. It might be observed in this connection that the rougher the surface of the paper used for the cover, the better will be the seal because a rough paper gives a greater degree of interlock between the thermoplastic material in its soft condition and the fibers.

The invention has been described in connection with one embodiment thereof, but many modifications are included within its spirit. It is to be limited, therefore, only by the scope of the appended claims.

What is claimed is:

1. A sealed container with sterilized contents therein comprising a tray section formed from a single piece of flexible sheet material molded to present a bottom portion with straight upstanding wall portions disposed along the periphery of the bottom portion, said straight wall portions being joined at their ends to define with said bottom portion a tray cavity devoid of ingress channels and accommodating said contents, flanges including as an inner portion thereof the same single piece of flexible sheet material formed integral with and located at the top edges of said wall portions with junctures at their contiguous end edges, and including also as an outer portion of said flanges and integrally bonded with said inner portions thereof, a thermoplastic member molded as a continuous integral unit presenting substantial flat areas contiguous to corresponding areas of the inner flange portions and extending all around the tray cavity, a cover heat sealed to said outer thermoplastic flange portion all around said cavity to close the container during sterilization and to guard the contents thereof free of contamination after sterilization, and a thermoplastic material interconnecting said flanges at the junctures of their contiguous end edges and sealing the container at said junctures, said thermoplastic material filling up completely all of the space at the junctures between the end edges of the flanges and being integral with and forming part of said thermoplastic portion of the flanges, and said cover having sufficient internal strength after sterilization to prevent delamination as said heat seal is broken by a stripping away of the cover from the thermoplastic portion of the flange whereby the entire surface of the flange of the package uncovered by said stripping away is in a sterile condition and free of cover fragments.

2. A sealed container with sterilized contents therein comprising a tray section formed from a single piece of

flexible sheet material molded to present a bottom portion with straight upstanding wall portions disposed along the periphery of the bottom portion, said straight wall portions being joined at their ends to define with said bottom portion a tray cavity devoid of ingress channels and accommodating said contents, flanges including as an inner portion thereof the same single piece of flexible sheet material formed integral with and located at the top edges of said wall portions with junctures at their contiguous end edges, and including also as an outer portion of said flanges and integrally bonded with said inner portions thereof, a thermoplastic member molded as a continuous integral unit presenting substantial flat areas contiguous to corresponding areas of the inner flange portions and extending all around the tray cavity, a fibrous cover member heat sealed to said outer thermoplastic flange portion all around said cavity to close the container during sterilization and to guard the contents thereof free of contamination after sterilization, and a thermoplastic material interconnecting said flanges at the junctures of their contiguous end edges and sealing the container at said junctures, said thermoplastic material filling up completely all of the space at the junctures between the end edges of the flanges and being integral with and forming part of said thermoplastic portion of the flanges, and said fibrous cover member having sufficient internal strength after sterilization to prevent delamination as said heat seal is broken by a stripping away of the cover member from the thermoplastic portion of the flange whereby the entire surface of the flange of the package uncovered by said stripping away is in a sterile condition and free of cover fragments.

3. A sealed container with sterilized contents therein comprising a tray section formed from a single piece of flexible sheet material molded to present a bottom portion with straight upstanding wall portions disposed along the periphery of the bottom portion, said straight wall portions being joined at their ends to define with said bottom portion a tray cavity devoid of ingress channels and accommodating said contents, flanges including as an inner portion thereof the same single piece of flexible sheet material formed integral with and located at the top edges of said wall portions with junctures at their contiguous end edges, and including also as an outer portion of said flanges and integrally bonded with said inner portions thereof, a thermoplastic member molded as a continuous integral unit presenting substantial flat areas contiguous to corresponding areas of the inner flange portions and extending all around the tray cavity, a fibrous cover member heat sealed to said outer thermoplastic flange portion all around said cavity to close the container during sterilization and to guard the contents thereof free of contamination after sterilization, and a thermoplastic material interconnecting said flanges at the junctures of their contiguous end edges and sealing the container at said junctures, said thermoplastic material filling up completely all of the space at the junctures between the end edges of the flanges and being integral and coplanar with and forming part of said thermoplastic portion of the flanges, and said fibrous cover member having sufficient internal strength after sterilization to prevent delamination as said heat seal is broken by a stripping away of the cover member from the thermoplastic portion of the flange whereby the entire surface of the flange of the package uncovered by said stripping away is in a sterile condition and free of cover fragments.

4. A package according to claim 1, wherein the molded thermoplastic is polypropylene and the cover an internally bonded paper of at least eighty pounds basis weight.

5. A package according to claim 1, wherein the thermoplastic material is polypropylene and wherein the cover material is paper whose fibers are internally bonded with latex and which is of at least eighty pounds basis weight.

References Cited in the file of this patent

UNITED STATES PATENTS

1,754,496	Barker	Apr. 15, 1930
2,328,563	Lichter	Sept. 7, 1943
2,332,642	Johnson	Oct. 26, 1943
2,990,948	Zackheim	July 4, 1961