Dec. 25, 1962 M. A. SCHWARTZ 3,070,225

PACKAGE AND METHOD OF MAKING SAME

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Fig. 1.

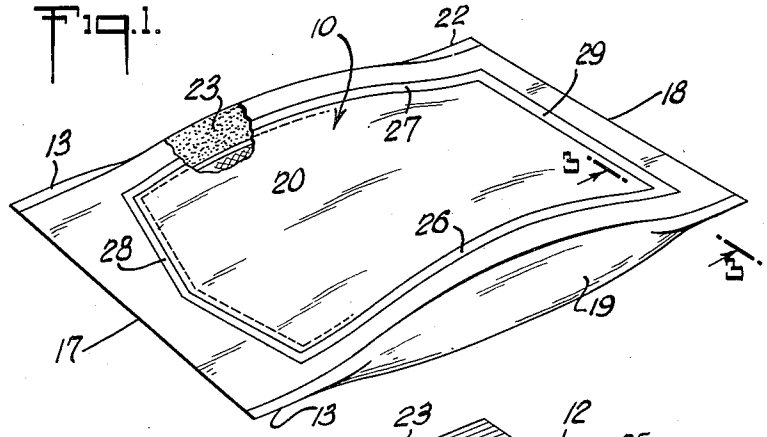


Fig. 2.

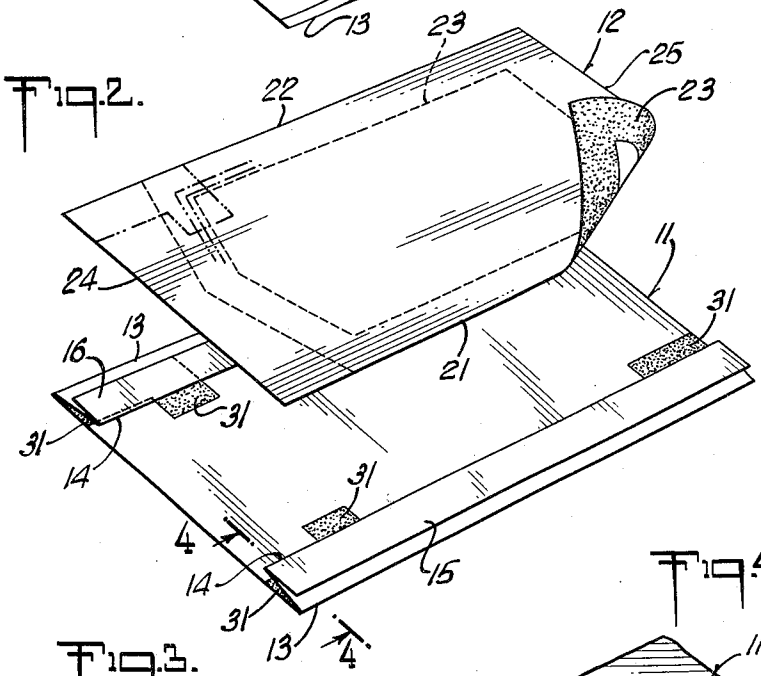


Fig. 3.

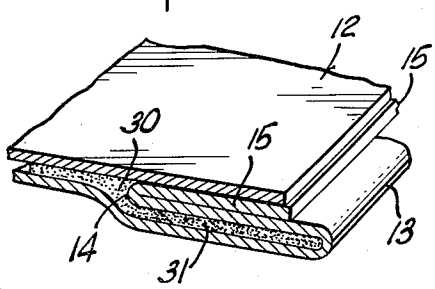
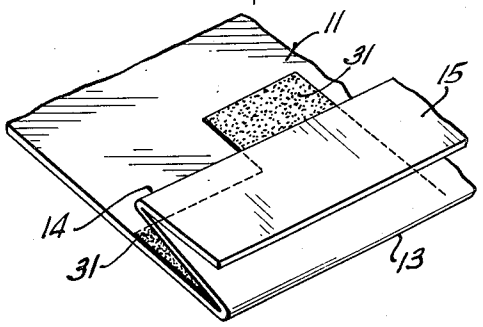


Fig. 4.



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PACKAGE AND METHOD OF MAKING SAME

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Fig. 5.

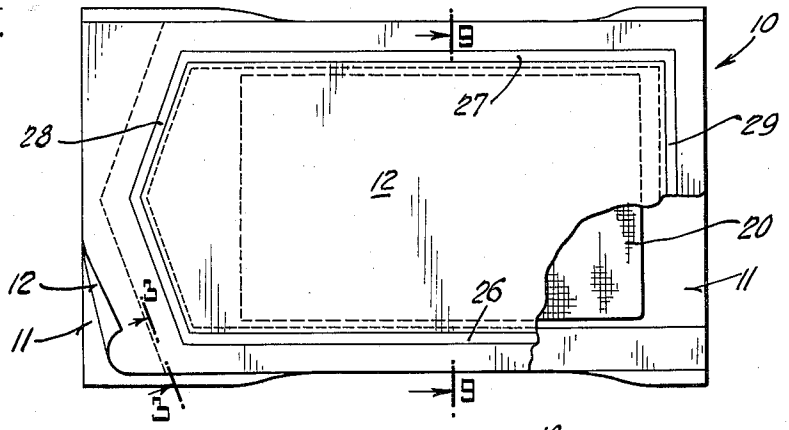


Fig. 6.

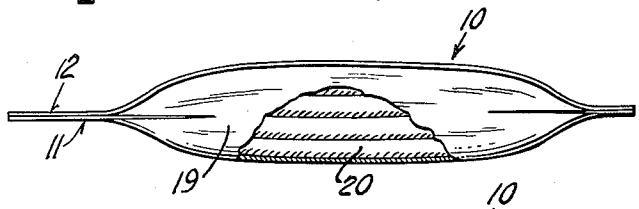


Fig. 7.

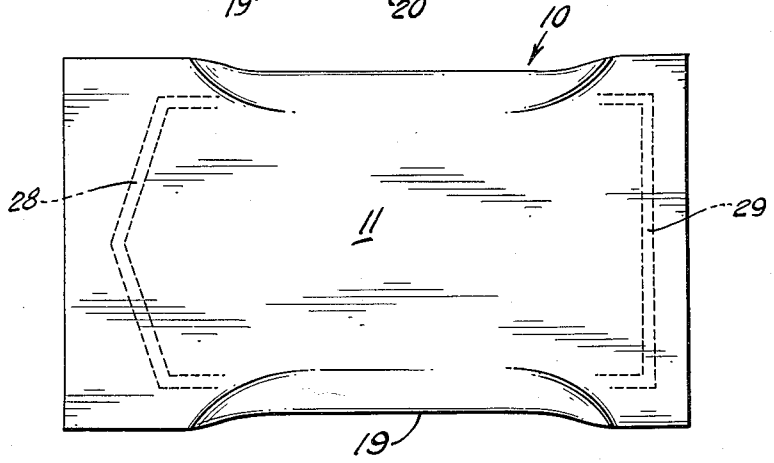


Fig. 8.

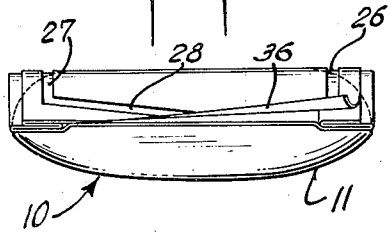
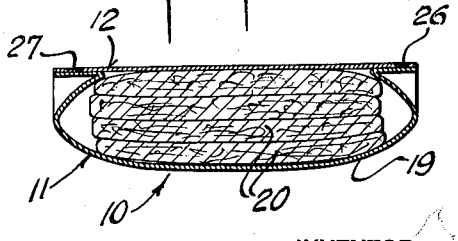


Fig. 9.



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PACKAGE AND METHOD OF MAKING SAME

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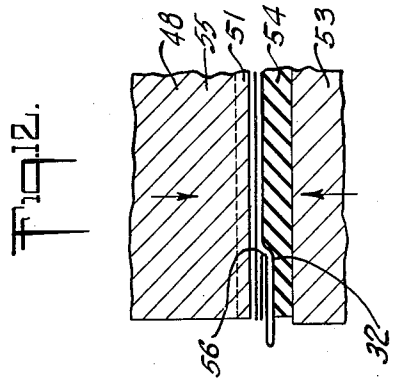


Fig. 12.

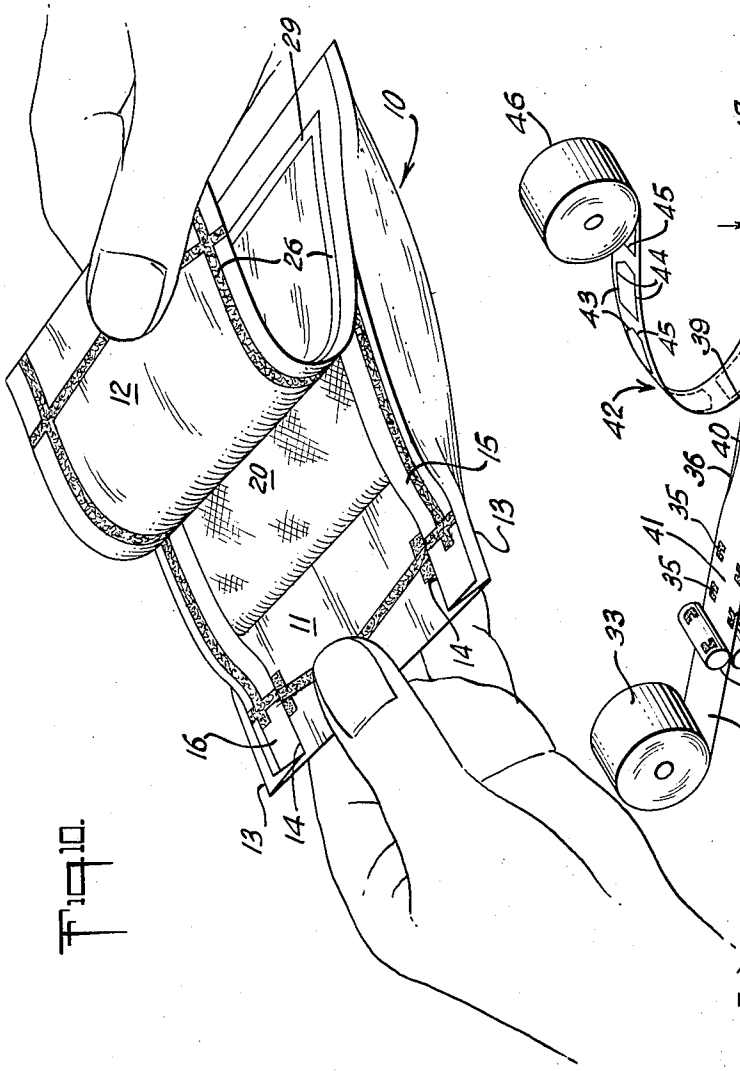


Fig. 10.

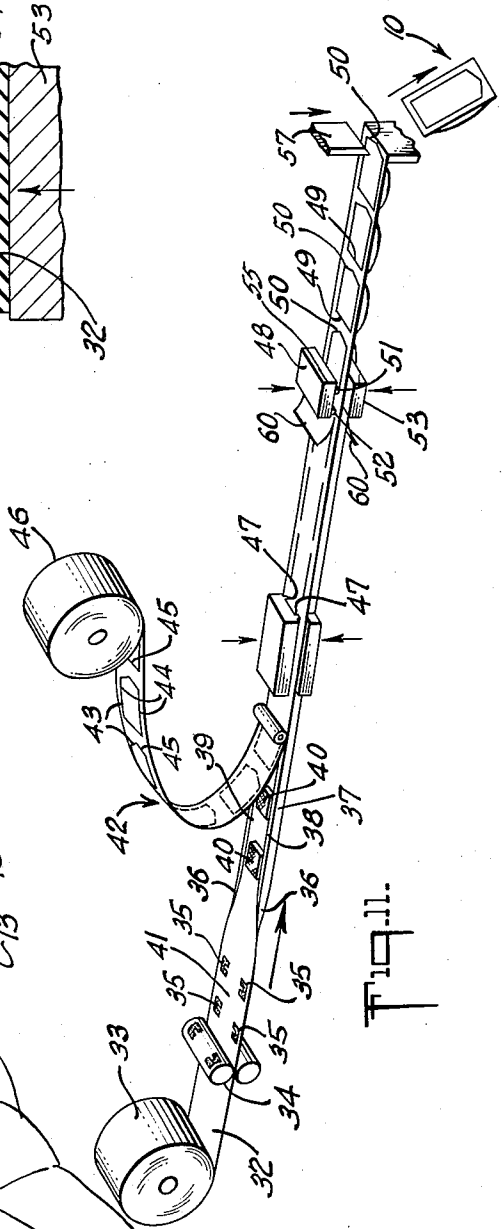


Fig. 11.

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PACKAGE AND METHOD OF MAKING SAME

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Fig. 13.

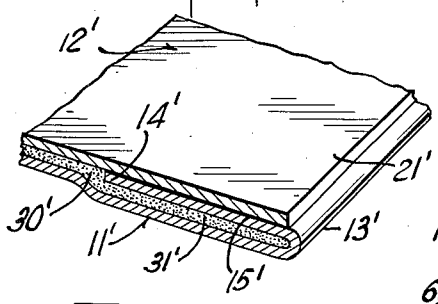


Fig. 14.

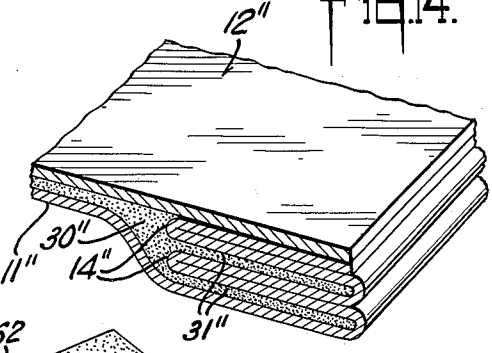


Fig. 15.

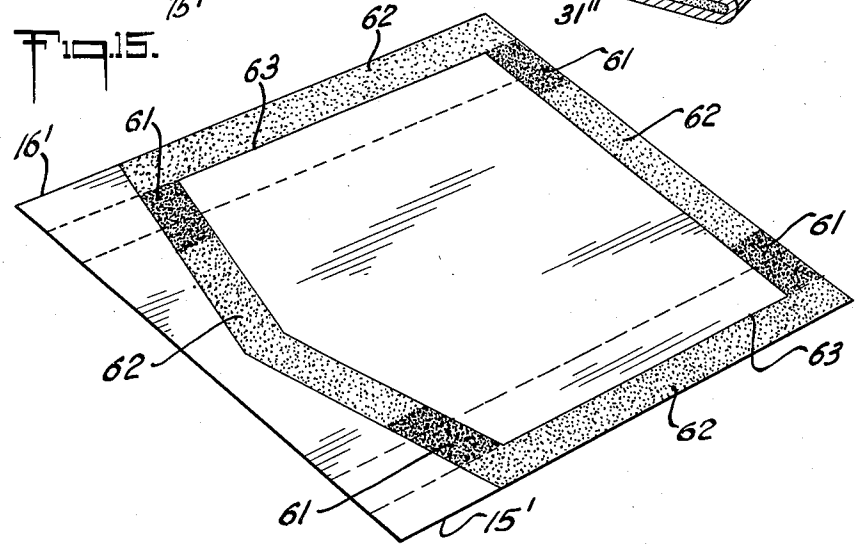
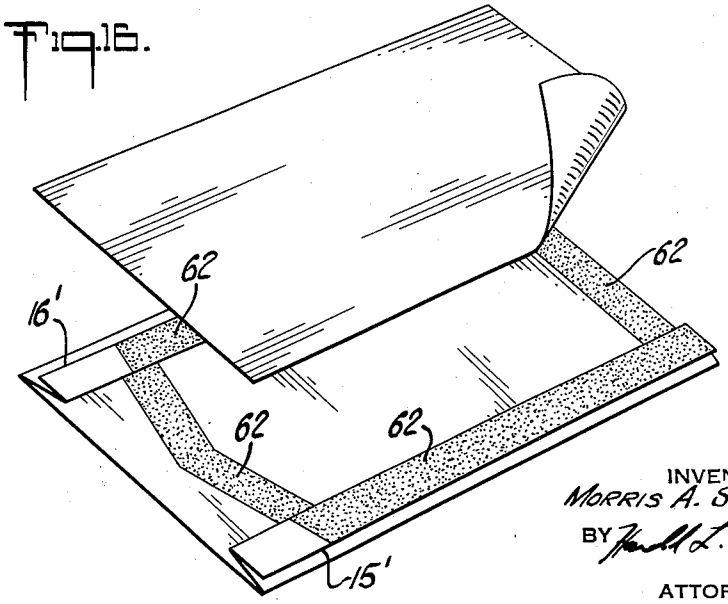


Fig. 16.



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United States Patent Office

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PACKAGE AND METHOD OF MAKING SAME

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Filed Aug. 31, 1960, Ser. No. 53,194
11 Claims. (Cl. 206—56)

The present invention is drawn to packages formed of flexible sheet material and more particularly to packages for relatively bulky objects which are suitable for packaging sterile articles and to the method of making the same.

Relatively thin dressings or other objects have heretofore been packaged by placing the same between two sheets of paper, permeable to air, but impervious to air-borne bacteria, and then bonding around the peripheral edge with thermoplastic or other adhesive to protect the enclosed contents. However, where it is desired to package relatively bulky articles, the paper will not conform around the article without wrinkling of the edges, thus preventing obtaining a good seal.

It is accordingly an object of the present invention to form a package from flexible sheet material, which package is suitable for relatively bulky objects and is completely sealed, the seal being impervious to air-borne bacteria. It is a further object to form a flexible package of flexible sheet material that contains folds which provide for expansion of the package for enclosing bulky articles, the package being completely sealed. Also, an object is to prepare a package for sterile articles from which the sterile article can be readily removed without danger of contamination by contact with unsterile package edges during removal. A still further object is a process for making expansible packages of flexible sheet material and sealing the same.

Other objects and advantages will become apparent from the following description taken in connection with the accompanying drawings wherein are set forth by way of illustration and example certain embodiments of this invention.

Referring to the drawings:

FIG. 1 is a perspective view of a package of the present invention;

FIG. 2 is an exploded view showing the relationship of the sheets from which the package of FIG. 1 is formed and details thereof;

FIG. 3 is a detail taken along line 3—3 of FIG. 1;

FIG. 4 is a detail taken along line 4—4 of FIG. 2;

FIG. 5 is a top plan view of the package of FIG. 1 with a portion broken away to show the packaged article;

FIG. 6 is a side view of the package of FIG. 1 with a portion broken away to show the packaged article;

FIG. 7 is a bottom view of the package of FIG. 1;

FIG. 8 is a front perspective view of the package of FIG. 1;

FIG. 9 is a view taken along line 9—9 of FIG. 5;

FIG. 10 is a view illustrating the opening of the package of FIG. 1;

FIG. 11 is a schematic view illustrating the method of forming the packages of FIG. 1 in a continuous operation;

FIG. 12 is a detail view of the cross-sealing step of FIG. 11;

FIG. 13 is a detail view similar to that of FIG. 3 but taken on a package having a single fold;

FIG. 14 is a detail view similar to that of FIG. 3 but illustrating the cross-seal of a package having multiple folds;

FIG. 15 is a perspective view of the bottom sheet of the package with a different pattern of adhesive coating thereon; and

FIG. 16 is an exploded view similar to FIG. 2 showing the manner in which the adhesive-coated sheet of FIG. 15 is used.

Referring to the drawings, the outer wrap of the package 10 of FIG. 1 is formed from a bottom sheet 11 and a top sheet 12. The longitudinal side edges of the bottom sheet 11 are folded inwardly and then outwardly again to form an outer fold 13 and an inner fold 14 on each side of the bottom sheet 11. The outward folding of the edge of bottom sheet 11 along fold 14 forms flanges 15 and 16 extending respectively along each side of bottom sheet 11 along the length thereof. Although the two ends of the package, front end 17 and back end 18, are flat, the center portion of the package 19, which surrounds the packaged contents 20, will be noted to bulge substantially so that the packaged article 20 can be readily contained. This bulging or expanding of the package in the area where it surrounds the packaged article 20 is enabled by the outer folds 13 which provide for expansion in the main body area of the bottom sheet 11.

The top sheet 12 is cemented along its side edges 21 and 22 to the flanges 15 and 16 of the bottom sheet by adhesive 23 and across its front end 24 and back end 25 to completely seal the package.

Where the package is designed for the packaging of sterile articles, it is particularly important that the seal lines 26 and 27 extending along the sides of the package as well as seal lines 28 and 29 extending respectviely across the front and back ends of the package be impervious to air-borne bacteria; otherwise, the contents of the package will become contaminated. This is particularly important where the package is of a flexible nature, as where the walls are formed of flexible sheet material, since as the package is flexed air would be drawn into and expelled out of the package through any channel that may exist. Unless special precautions are taken in sealing across the inner folds 14, small channels will be formed in the area 30 which is not completely sealed. As a result, air-borne bacteria can readily pass into the package with resulting contamination of package contents. For sterile packages, it is therefore imperative that this area and any channels existing therein be completely sealed to prevent possible contamination of any packaged article 20. In accordance with the present invention, this sealing is accomplished in the manner hereinafter more fully described by placing a thermoplastic calking adhesive 31 along the contacting surfaces formed by the outer folds 13 in the areas of the end seals 28 and 29, this adhesive being adapted to flow during the sealing operation to completely fill or calk the area 30 and plug any channel that otherwise might exist along the edge of inner folds 14. This is best illustrated in FIGS. 3 and 4.

In preparing the packages of the present invention, the bottom sheet 11 is preferably first coated, as illustrated in FIG. 2, near its four corners with an adhesive 31 that will flow under heat and pressure. The adhesive is preferably spaced from the edge of the bottom sheet so not to cover the flange portions 15 and 16. This is best illustrated in FIG. 4 where the adhesive will be observed to coat the inner contacting side of the folded edge of the bottom sheet 11 but not to extend over the flange area 15.

The side edges of the bottom sheet 11 are then folded to form the flanges 15 and 16 and the article to be packaged placed on the bottom sheet 11 between the flanges. The top second sheet 12 is then adhesively secured along its edges 21 and 22 to the respective underlying flanges 15 and 16 of the bottom sheet 11. The respective ends of the top sheet 12 and the bottom sheet 11 are then brought together and adhesively secured to give transverse front and back seals 28 and 29. Heat and pressure are also applied along the front and back seals to cause the thermoplastic calking adhesive 31 to flow into

the area 30 and fill any channels existing along folds 14. In the preferred practice, the top cover sheet 12 is coated with a thermoplastic adhesive which may be the same as the calking adhesive 31. The side seals 26 and 27 are still preferably first formed so as to seal the side edges of the top sheet 12 to the flanges 15 and 16 of the bottom sheet 11. Where the adhesive 23, used for sealing together the top sheet 12 and the bottom sheet 11, is a thermoplastic adhesive, sealing is done throughout by heat and pressure. However, the side seals 26 and 27 are still first formed, the ends of the sheets 11 and 12 then brought together and the end seals 28 and 29 then formed by heat and pressure which, besides sealing the ends simultaneously, causes flow of the calking adhesive 31 which, besides sealing together the contacting surface of sheet 11 resulting from folds 13, also fills the area 30 to assure filling of channels that would otherwise exist along the edges of folds 14.

Although the top cover sheet 12 may, if desired, be completely coated on its inner surface with a thermoplastic adhesive, it is preferred, in order to save on adhesive and to prevent adherence to the packaged article if later subjected to high temperature sterilization, to coat only the portion of the cover sheet 11 along which the transverse and longitudinal seal lines 26, 27, 28 and 29 will be formed, as illustrated in FIG. 2.

In the particular embodiment illustrated in FIGS. 1–9, the flanges 15 and 16 are formed on the bottom sheet 11 by first folding the side edges in and then out to form an outer fold 13 and an inner fold 14. A similar package can be prepared, however, although less expansible in its center, by having only a single fold, as illustrated in FIG. 13. With such a construction, the outer surface of the lower sheet 11' would form the upper surface of the flange 15' to which the edge 21' of the top cover sheet 12' is bonded. A package of this type formed with a single fold 13' would be suitable for articles somewhat less bulky than those that could be placed in the package of FIG. 1.

Where the article to be packaged is quite bulky and substantially more depth is required in the center portion 19 of the package, this can be obtained by forming the package with the side edges of the lower sheet 11'' being folded back and forth on itself several times, as illustrated in FIG. 14. A structure of this type provides substantially more paper for the bottom sheet in the central portion 19 of the resulting package and provides a package which can contain articles of even greater bulk than those which can be contained in the package of FIG. 1. In the structures of both FIGS. 13 and 14, the thermoplastic calking cement 31' and 31'' is still used between the inner meeting faces of the folded portion of the bottom sheets 11' or 11'' to bond these surfaces together at the transverse end seams and to provide adhesive for flowing into the areas 30' and 30'' to fill channels which would otherwise exist along the inner edge 14', as illustrated in FIG. 13, or along the inner folds 14'', as illustrated in FIG. 14. It is apparent that as the thickness of the fold increases the larger will be the channel formed and the more important that the same be filled through the flow of the calking thermoplastic adhesive 31.

One of the many advantageous features of the package of the present invention is the manner of its opening. By folding the bottom sheet 11 in the manner indicated and then applying the cover sheet over the resulting flanges 15 and 16, as described, the package can in essence be considered as consisting of a bottom tray covered with a flexible cover that can readily be peeled therefrom. An advantage to this construction is that the top cover 12 can be peeled back leaving the sterile article contained in the tray portion formed by the folded edges of the bottom sheet 11, as illustrated in FIG. 10. As a result, there is no contamination of the packaged article by contact with any unsterile edge as the package is being opened. After the cover sheet 12 is peeled back, the sterile packaged article 20 can then readily be removed by sterile forceps from its tray-like container without any danger of contamination. This is an important feature when it is considered that maintaining an article sterile in the package is of little value if the article, such as for example, a sterile sponge, is contaminated on its removal from the package through contact with an unsterile outer edge.

A further advantage of the package of the present invention is that it can be made automatically in a continous process in strip form, wherein a plurality of individual packages are all connected together. If separate packages are desired, these may then be severed to give separate packages, such as that shown in FIG. 1. In describing the preferred process for continuous manufacture of packages of the present invention, reference is made to FIG. 11 which schematically illustrates operation for carrying out such a process.

Referring to FIG. 11, a strip of paper 32 impermeable to air-borne bacteria is drawn from a roll 33 and passed under a coating roll 34 where it is coated in spaced areas 35 with a thermoplastic adhesive (the calking adhesive 31 of FIGS. 3, 4, 12, 13 and 14). The spaced areas 35 containing the thermoplastic calking adhesive 31 coincide with the transverse seals of the finished package. These spaced areas are large enough to cover the back end transverse seal of one package and the front end transverse seal of an adjacent package so that at each transverse sealing operation the back transverse seal and the forward transverse seal of two adjacent packages are formed simultaneously. After the spaced areas 35 have been coated with adhesive, the side edges of the paper strip 32 are turned upward, as illustrated at 36 of FIG. 11, and then outward to provide a U-shaped channel having a center U-shaped body with sides 37 and flanges 38 and 39. After the paper strip has thus been formed, surgical sponges or other articles 40 to be packaged are then dropped in spaced relation as the folded strip 32 passes a package depositing station, not shown. The articles may, if desired, be placed on the U-formed moving strip by hand. The articles 40 are dropped in timed relation to the travel of the strip 32 so as to be placed in the area 41 between the adhesive-coated areas 35.

A second, top strip 42 of paper similar to that of the bottom strip of paper 32 is then placed over the U-formed bottom strip 32 so as to rest on the flanges 38 and 39 and cover the articles 40. The top paper strip 42 has thermoplastic adhesive 43 coated thereon in a predetermined pattern providing side adhesive-coated lines 44 and transverse adhesive-coated lines 45 on its under surface. Top strip 42 is fed from a roll 46 in timed relation to the movement of the lower strip 32 and superimposed on the lower strip 32 so that the side coated areas 44 lie directly over the flanges 38 and 39 of the bottom strip 32 and the transverse adhesive-coated areas or transverse adhesive lines 45 come directly over the coated spaced areas 35 on the bottom sheet 32. The two sheets with the article 40 to be packaged are moved together in timed relationship and passed under heated longitudinally extending sealing bars 47 which are synchronized with the movement of the two paper webs to close on the flange portion directly over the longitudinally extending adhesive-coated portion 44 of the top paper strip 42 to seal the same, through the application of heat and pressure, to the underlying side flanges 38 and 39. This sealing step may be done intermittently, with the movement of the paper strips 32 and 42 stopping during the sealing operation, or the mechanism can be so designed that the sealing bars 47 are adapted to travel with the webs during the sealing operation and, after the seal is completed, then move back to again grasp the flanges 38 and 39 opposite the packaged article and along the adhesive-

coated edges of the top sheet to seal the sides of the next package.

After passing the sealing means for preparing the side flange seals, the two webs 32 and 42 and contained article 40 are moved between spring-urged plates 60 which urge the bottom and top paper strips 32 and 42 together in the areas between the articles 40 from where the paper strips pass to transverse sealing means 48 which, through heat and pressure, simultaneously forms two transverse seals, one seal 49 across the lower end of the forward package and the other seal 50 across the front end of the following package. This is preferably done by providing the transverse sealing means with two raised sealing surfaces 51 and 52, the front sealing surface being in the form of a straight line extending directly across the moving strips 32 and 42 for making the back seal 49 and the other having a V-shaped configuration for making a V-shaped seal 50 at the front end of the package.

In the preferred operation, the lower plate or jaw 53 of the transverse sealing mechanism 48 is covered with a resilient surface 54, such for example as a heat-resistant rubber, so that when the jaws 53 and 55 come together to form the seals 49 and 50 the lower sheet 32 is forced up around the inner fold 56, as illustrated in FIG. 12, to help further in sealing any channel that might otherwise exist. By using a lower resilient surface to press in the paper around fold 56, as illustrated in FIG. 12, not only is there a force exerted to help further to flow the adhesive in areas 35 into any channel that might otherwise exist, but less calking adhesive, which is the adhesive coated in areas 35, is required since the paper itself is caused to bend partially around the fold to decrease the area needed to be calked by adhesive.

After the ends have been sealed by the transverse seals 49 and 50, the package is completed. Where the packages are relatively small, it may be desirable to keep them in strip form, numerous packages being joined together in a single strip. However, where the packages are somewhat larger or even when small, where individual packages are desired, the strip of packages is severed between transverse seals 49 and 50 by a severing knife 57 or other means to provide individual packages 10.

In severing the strip into separate packages, care should be taken to leave sufficient paper between the front end of the package and the front transverse seal 51 to permit grasping, as illustrated in FIG. 10, for peeling off the cover sheet 42. By forming the front seal in a V configuration, the cover can be more readily peeled since the initial pull for separation occurs along a specific point of the seal rather than occurring simultaneously along the whole seal line. This enables the package to be opened more readily than would be the case if a straight transverse seal were used, although a straight seal may be used if desired.

Although it is presently preferred to make the packages of the present invention by placing an adhesive on the cover sheet 12 (top paper strip 42 of FIG. 11) and then freshly applying the calking adhesive to the bottom sheet 11 (bottom paper strip 32 of FIG. 11) just prior to forming the package, all of the adhesive may be applied to the bottom sheet, as illustrated in FIGS. 15 and 16, the portion 61 which comes under the folds in forming flanges 15' and 16' preferably being somewhat heavier than the adhesive coating 62 which is on top of the flange areas 15' and 16' and across the front and back of the package. This is to assure sufficient adhesive in the area under the fold to obtain ready flow and proper calking along the fold to fill channels while permitting ready separation of the cover 12 from the flanges as the cover 12 is peeled back on opening the package. Where the bottom sheet 11 contains all of the adhesive, the adhesive should preferably not extend on the side past the flange fold lines 63 so as to avoid contact with the packaged articles. The thermoplastic adhesive is preferably applied fresh shortly prior to forming the package to assure proper flow during the sealing operation.

In practicing the invention, any thermoplastic adhesive may be used which can be caused to flow under heat and pressure as the calking adhesive 31. For securing the top cover sheet to the flanges and across the front and back ends of the package, any suitable adhesive may be used and it is not necessary to use a thermoplastic adhesive. However, for packages which are to be steam sterilized, the adhesive used should be one that will maintain its hold under the steam sterilization conditions. In the preferred practice, however, a thermoplastic adhesive is used which may, if desired, be the same as the calking adhesive 31. Although a thermoplastic adhesive which has been found to be highly suitable as the calking adhesive in the present packages is a liquid suspension of lightly plasticized polyvinyl acetate, any adhesive flowable under pressure or heat and pressure is believed to be suitable.

The invention is susceptible to many modifications within its spirit and accordingly is to be limited only by the scope of the appended clams.

Having thus described my invention, I claim:

1. A sterile package comprising a bottom sheet having an inner surface and folded side edges providing longitudinally extending side flanges, a packaged article resting on said bottom sheet between said folded side edges, a top sheet extending lengthwise of said bottom sheet bonded along its side edges to said flanges of said bottom sheet and bonded across its ends to said flanges of said bottom sheet and the portion extending therebetween to provide a peripheral bond extending along the sides and across the ends of said sterile package and adhesive on said bottom sheet on its inner surface covering contacting surfaces of said folded side edges under the portion of said peripheral bond extending across the ends of said container, said adhesive securing said contacting surfaces together and filling any channels existing along said folded side edges between said bottom sheet and said cover sheet.

2. A sterile package comprising a bottom sheet having an inner surface and having multi-folded side edges extending the length of said sheet to provide longitudinally extending flanges, a packaged article resting on said bottom sheet between said folded side edges, a top sheet extending lengthwise of said bottom sheet bonded along its sides to said flanges of said bottom sheet and bonded across its ends to said flanges of said bottom sheet and the portion extending therebetween to provide a peripheral bond extending along the sides and across the ends of said sterile package and adhesive on said bottom sheet on its inner surface covering contacting surfaces of said folded side edges under the portion of said peripheral bond extending across the ends of said container, said adhesive securing said contacting surface together and filling any channels existing along said folded side edges between said bottom sheet and said cover sheet.

3. A sterile package comprising a bottom sheet having an inner surface and having edges folded in toward the center of the package and then out toward the sides of the package to provide longitudinally extending flanges, a packaged article resting on said bottom sheet between said folded side edges, a top sheet extending lengthwise of said bottom sheet bonded along its sides to said flanges of said bottom sheet and bonded across its ends to said flanges of said bottom sheet and the portion extending therebetween to provide a peripheral bond extending along the sides and across the ends of said sterile package and adhesive on said bottom sheet on its inner surface covering contacting surfaces of said folded side edges under the portion of said peripheral bond extending across the ends of said container, said adhesive securing said contacting surfaces together and filling any channels existing along said folded side edges between said bottom sheet and said cover sheet.

4. A sterile package comprising a bottom sheet having an inner surface and having folded side edges extending the length of said sheet to provide longitudinally extending side flanges, a packaged article resting on said bottom sheet between said folded side edges, an adhesive-coated top sheet extending lengthwise of said bottom sheet bonded along its sides to said flanges of said bottom sheet and bonded across its ends to said flanges of said bottom sheet and the portion extending therebetween to provide a peripheral bond extending along the sides and across the ends of said sterile package and adhesive on said bottom sheet on its inner surface covering contacting surfaces of said folded side edges under the portion of said peripheral bond extending across the ends of said container, said adhesive securing said contacting surfaces together and filling any channels existing along said folded side edges between said bottom sheet and said cover sheet.

5. A sterile package comprising a bottom sheet having an inner surface and folded side edges providing longitudinally extending side flanges, a packaged article resting on said bottom sheet between said folded side edges, a top sheet extending lengthwise of said bottom sheet bonded along its side edges to said flanges of said bottom sheet and bonded across its front end and its back end to said flanges of said bottom sheet and the portion extending therebetween to provide a peripheral bond extending along the sides of said sterile package and the front end and back end thereof, the bond across the front edge of said package being spaced from the end of said bottom sheet and said top sheet to provide tabs for grasping the ends of said top and bottom sheets for peeling back said top sheet to open said package and adhesive on said bottom sheet on its inner surface covering contacting surfaces of said folded side edges under the portion of said peripheral bond extending across the ends of said container, said adhesive securing said contacting surfaces together and filling any channels existing along said folded side edges between said bottom sheet and said cover sheet.

6. A package of claim 5 in which the bond across the front end of said package extends in a line diagonal to the sides thereof.

7. A package of claim 6 in which the bond across the front end of said package is V-shaped.

8. The method of forming a sterile bacteria impervious seal between a cover sheet and a covered sheet containing a fold wherein the seal between said cover sheet and the covered sheet containing said fold extends across said fold, comprising coating said sheet containing said fold, prior to forming said fold, with an adhesive flowable under pressure, said adhesive being coated on the surface adapted to face said cover sheet and in the area to be occupied by said fold under said seal between said cover sheet and said covered sheet extending across said fold, forming said fold in said covered sheet, placing said cover sheet over said sheet containing said fold and adhesively bonding said cover sheet to said covered sheet and pressing said cover sheet and covered sheet containing said fold together in the area coated with said adhesive flowable under pressure to cause said adhesive on said covered sheet to flow and fill any channel existing between the edge of said fold, the covered sheet and the cover sheet to seal the same to the entrance of air-born bacteria.

9. The method of claim 8 in which the adhesive flowable under pressure is freshly applied prior to forming the fold in the covered sheet.

10. The method of claim 9 in which the adhesive is a thermoplastic adhesive and in which the cover sheet and covered sheet containing the fold are pressed together while heating the adhesive.

11. The method of forming a sterile bacteria impervious seal between a cover sheet and a covered sheet containing a fold wherein the seal between said cover sheet and the covered sheet containing said fold extends across said fold, comprising coating said sheet containing said fold prior to forming said fold with a thermoplastic adhesive on the surface adapted to face said cover sheet and in the area to be occupied by said fold under said seal between said cover sheet and said covered sheet. forming said fold in said covered sheet, placing said cover sheet with thermoplastic adhesive coated thereon in the area adapted to form said seal over said sheet containing said fold, pressing said cover sheet and covered sheet containing said fold together in the area in which said seal is to be formed while heating said adhesive in the area to be sealed to bond said cover sheet to said covered sheet and to cause said adhesive on said covered sheet within said fold to flow and fill any channel existing between the edge of said fold, the covered sheet and the cover sheet to seal the same to the entrance of air-borne bacteria.

References Cited in the file of this patent

UNITED STATES PATENTS

2,147,384	Salfisberg	Feb. 14, 1939
2,557,794	Nicolle	June 19, 1951
2,826,020	Hoag	Mar. 11, 1958
2,828,590	Swartz et al.	Apr. 1, 1958