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3,313,405

PACKAGE

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Fig. 1.

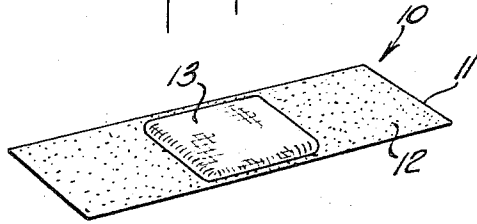


Fig. 2.

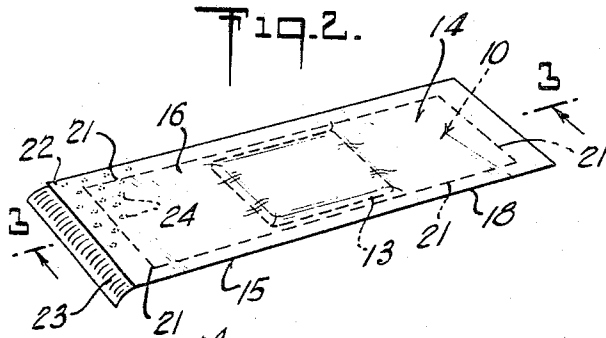


Fig. 6.

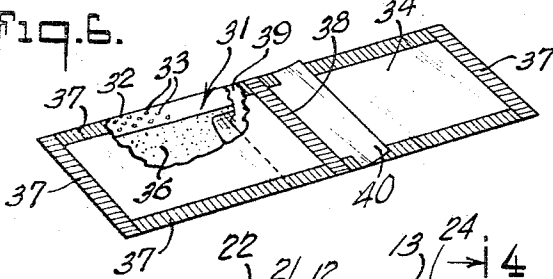


Fig. 3.

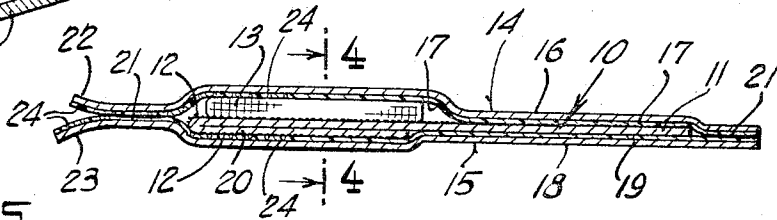


Fig. 5.

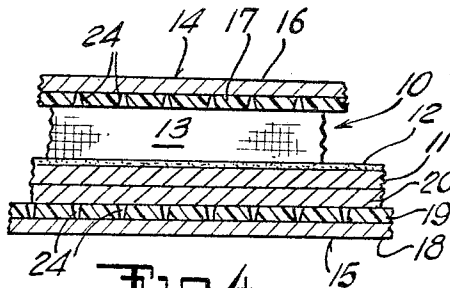
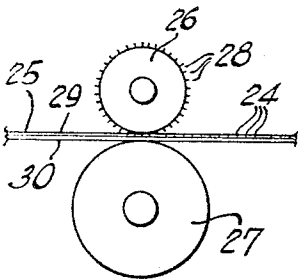


Fig. 4.

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3,313,405
PACKAGE

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The present invention relates to sealed packages, the contents of which can be gas sterilized after sealing and packaging materials suitable for preparing the same.

It is becoming increasingly the practice in packaging sterile articles to package the same, where possible in bacteria proof containers and then sterilize the contents by gas sterilization such, for example, as steam or ethylene oxide sterilization. As sterilization is done after the package has been sealed, it is necessary that at least part of the packaging materials used be pervious to the sterilizing gases while impervious to air-borne bacteria. The packaging materials for such packages have generally been papers having a pore size sufficient to permit the entry of the sterilizing gases but sufficiently small to prevent the entry of air-borne bacteria.

Where the article to be sterilized consists of a strip or strips of pressure-sensitive adhesive coated tape, or contains pressure-sensitive adhesive coated tabs such, for example, as contained by an adhesive bandage, the otherwise exposed adhesive surfaces have been covered by removable protective facings. The adhesive bandage or the like with the protective removable facings covering the pressure-sensitive adhesive surfaces are then packaged in a paper envelope which is sufficiently porous to permit the contents thereof to be gas sterilized.

In the preferred manufacture of adhesive bandages, the facing material in immediate contact with the pressure-sensitive adhesive surface is a smooth organic film, the organic film being formed of a material which is readily releasible from the pressure-sensitive adhesive. Such organic film materials, for example, are described in Gross Patent No. 2,703,083. Packages of this type require a dual operation before the article contained therein is ready for use, namely the opening of the package and then the removal of the protective cover strips placed over the pressure-sensitive adhesive.

Several patents have been issued drawn to various package constructions, particularly for the packaging of adhesive bandages, wherein the protective facings for the pressure-sensitive adhesive also forms a part of the wrapping or package in which the adhesive bandage is contained, so that with a single opening operation the package can be opened and the protective facing removed from its intimate contact with the pressure-sensitive adhesive coating of the adhesive coated tabs. Illustrations of adhesive bandage packages of this type are to be found in U.S. Patents Nos. 2,969,144 and 2,969,145, issued Jan. 24, 1961.

With packages of the type where the wrapper also acts as the protective facing for the pressure-sensitive adhesive coated portion of the packaged article, the difficulty is encountered that the organic films making the best protective facings materials are not sufficiently permeable to gases to permit steam sterilization of the package contents where the package wrapper is also formed of such material. It is an object of the present invention to prepare packaging materials having the surface formed of organic film readily releasible from pressure-sensitive adhesives, the packaging material also being pervious to sterilizing gases while still being impervious to air-borne bacteria. It is a further object of the present invention to prepare such packaging materials which can readily

be sealed by heat and pressure and packages made therefrom.

Other objects and advantages of this invention 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 the invention.

It has now been discovered that if a film-paper laminate, in which the paper is a porous air-permeable paper and the film is a thermoplastic organic film formed of a material releasible from pressure-sensitive adhesive surfaces, has pressed against the thermoplastic film-containing-side a plurality of heated projections, heated to a sufficiently high temperature to cause flow of the thermoplastic film, areas are formed in the film-paper laminate which are air-pervious but which remain releasible with respect to pressure-sensitive adhesive surfaces. Also these air-pervious areas are impervious to the passage of air-borne bacteria therethrough.

Apparently, what occurs is that the thermoplastic material of the film in the immediate area of the heated projections is caused to flow into the porous fibrous paper backing of the laminate forming openings through which air can now pass through the laminate, but still covers the fibers of the laminate on the film side.

The result is that the laminate so formed is pervious to sterilizing gases while the film-containing-side still releases readily from pressure-sensitive adhesive surfaces. This is substantially different than a structure which would result from laminating a pre-perforated thermoplastic film onto a porous paper backing. In such a case, the pressure-sensitive adhesive surface would adhere to the backing paper in the areas of film perforation in the same manner in which it would to the paper where used alone. As the paper portion of the laminate is not ruptured in the areas where the heated projections have not caused flowing and penetration of the film the laminate, although air-pervious, is still pervious to air-borne bacteria.

As the porous releasible packaging materials formed in the manner described have a thermoplastic film facing, the same also lend themselves to ready sealing through heat and pressure in the forming of sterilizable packages.

The invention is further described with reference to the drawings wherein:

FIGURE 1 is an articles such as an adhesive bandage to be packaged;

FIGURE 2 is a package made in accordance with the present invention, containing the adhesive bandage of FIGURE 1;

FIGURE 3 is a cross-sectional view drawn along line 3—3 of FIGURE 2;

FIGURE 4 is a cross-sectional detail enlarged view drawn along line 4—4 of FIGURE 3;

FIGURE 5 is a schematic view illustrating the formation of the air-pervious packaging material; and

FIGURE 6 is a perspective view of a different form of packaging embodying the present invention.

In describing the practice of the present invention, and the formation of a package utilizing the packaging materials made in accordance thereof, an adhesive bandage package such as that described in U.S. Patent No. 2,969,144 will be used. The article to be packaged is an adhesive bandage such as illustrated in FIGURE 1. The adhesive bandage 10 comprises a flexible backing 11 coated with a pressure-sensitive adhesive 12. An absorbent pad 13 is placed in the center of the adhesive coated strip. Although the particular article used in the present illustration is an adhesive bandage, the same could be an adhesive coated strip with no absorbent pad, such strips, for example, being used as temporary sutures and the like.

The adhesive bandage 10 is contained between two

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packaging or wrapping sheets 14 and 15 prepared in accordance with the present invention. These sheets each comprise a laminate formed of porous paper having laminated to one surface thereof a thin film of organic material releasible from the pressure-sensitive adhesive. Polyethylene film is an example and one of the preferred organic film materials used. The porous paper laminate 16 of the top wrapping sheet 14 is on the outer part of the wrapper, while the polyethylene film laminate 17 of wrapper sheet 15 extends over the absorbent pad 13 and is in intimate contact with the pressure-sensitive adhesive coating, 12, of the tabs which extend on each side of the absorbent pad.

The absorbent paper laminate 18 of the bottom wrapper sheet 15 is also on the outside of the package with the polyethylene film laminate 19 of the laminate being on the inside of the package against the back of the adhesive bandage except for the portion 20 of one of the adhesive coated tabs which is folded back, the film laminate 19 being in intimate contact with the adhesive 12 of this folded back portion 20 of the tab.

The two wrapping sheets 14 and 15 are sealed together through heat and pressure around the edge of the package along seal line 21. The seal 21 along the end of the package nearest to the end of the bandage 10 that contains the folded back portion 20 is spaced back from the ends of the two wrapping members 14 and 15 a sufficient distance to provide tabs 22 and 23 for grasping in opening the package. The package is opened by pulling apart the tabs 22 and 23 and the adhesive bandage contained thereon applied in the manner described in the previously mentioned Patent 2,969,144.

The polyethylene film facings 17 and 19 of the respective wrapping sheets 14 and 15 each contain a plurality of small openings therethrough in which fibers of the paper laminate immediately under the openings are coated, at least in part, by polyethylene caused to flow from the areas of the openings through the film facings, the openings 24 having been formed by fusion of the film in these areas in the manner hereinafter more fully described.

These openings, 24 through the film facings 17 and 19, are best illustrated in FIGURE 4. These openings 24 permit sterilizing gases to pass through the polyethylene film laminate 17 and 19 after the package has been sealed. As the paper laminate 16 and 18 of the wrapping sheets 14 and 15 has not been ruptured, the porous paper laminate will prevent the entrance of air-borne bacterial while permitting the passage of sterilizing gases therethrough.

The wrapping sheets 14 and 15 are prepared by passing a polyethylene film-porous paper laminate 25 between two rolls 26 and 27, such as illustrated in FIGURE 5. The bottom or anvil roll 27 is made of steel or other material presenting a hard impervious surface. The top roll 26 contains small, preferably blunt protuberances or pins 28, and is heated in any conventional manner so as to heat the projecting pins 28 to a temperature sufficiently high to soften the polyethylene film and cause the same to flow as the heated projections 28 are pressed against the film surface of the laminate sheeting. The film-paper laminate is passed between rolls 26 and 27 with the film surface 29 facing the top roll 26 and the paper surface 30 supported on the impervious surface of the bottom roll 27. The pins 28 are sufficiently long to penetrate the film portion 29 of the film-paper laminate 25 without the surface of the roll 26, between the pins 28, contacting the film surface 29. In the preferred practice, the polyethylene-porous paper laminate 25 is preferably heated to slightly below the softening temperature of the polyethylene film 29 prior to passing the same between the rolls 26 and 27, thus making it unnecessary to heat the projections 28 to as high a temperature as would otherwise be required.

The porous paper laminate 30 of the thermoplastic organic film-paper laminate 25 may consist of any paper material which is sufficiently porous to permit the ready

passage of air but which will not permit the passage or ingress of bacteria through the openings 24, formed through the film in the manner above described.

The preferred papers have a porosity as shown by the Gurley-Hill S-P-S Tester of about 65 seconds to about 180 seconds. This method of porosity testing is the TAPPI standard t.460-m49 and is the time for passage of one hundred (100) milliliters of air through one (1) square inch of paper. The porosity rating of any papers in the above unit can be obtained from most manufacturers.

The practice of the present invention is further described by the following example which is given for purpose of illustration only, the invention not being limited thereto.

Example

An adhesive bandage is placed between two sheets of wrapping material. The adhesive bandage has a polyvinyl chloride film backing on which is spread a conventional rubber based pressure-sensitive adhesive. The backing has a thickness of about 2.8 mils and the adhesive is spread to a dry coating weight of about two (2) ounces per square yard. An absorbent gauze pad is placed on the adhesive coated strip between the ends. The wrapping material is formed of a polyethylene film-paper laminate. The film of the film-paper laminate has a thickness of about 0.006 inch and is formed of low density high-pressure polyethylene resin of extrusion coating grain. The paper portion of the laminate is formed of a paper substrate having a wet strength of 1.4 pounds per inch width and a dry strength of 9 pounds per square inch. The paper has a porosity as shown by the Gurley-Hill S-P-S Tester of 80 seconds. The paper-film laminate forming the wrapping material, prior to use, is passed between two rolls similar to that illustrated in FIGURE 5, the bottom roll has a smooth impervious surface and the top roll contains a series of 0.088 inch diameter projections spaced about 0.040 inch apart and centered in 90 degree diamond pattern. The roll containing the projections is heated to a temperature of 360° F., the heated projections are pressed against the polyethylene film surface of the wrapping paper as the film-paper laminate is passed between the rolls. In placing the adhesive bandage within the two sheets of wrapper material so formed, the polyethylene film portion of the wrapper faces inwardly towards the adhesive bandage.

The adhesive bandage is sealed within the wrapper material, after the wrapping material is pressed into intimate contact with the adhesive surface of the bandage, by applying heat and pressure to the wrapper material along a seal line extending around the periphery of the bandage. The heat sealing is done at a temperature of about 425° F., and a pressure of about 30.5 pounds per square inch. The sealed package is then steam sterilized by autoclaving. In the process a vacuum is first drawn on the package to an absolute pressure of 0.1. The package is then subjected to steam at a pressure of 2 atmospheres and a temperature of 240° F. for 30 minutes. The package is then brought back to atmospheric pressure. The package does not rupture during the sterilizing cycle. The contents of the package, however, are sterilized by the autoclaving indicating penetration of the steam during the sterilizing process.

In FIGURE 6 an adhesive bandage package of the type described in U.S. Patent No. 3,007,571 is illustrated in which the wrapper is formed of an air-pervious film-paper laminate in accordance with the present invention. Referring to FIGURE 6, the adhesive bandage 31 is contained between three air-pervious film-paper wrapping sheets formed in a manner similar to the wrapping sheets 14 and 15 of the package illustrated in FIGURES 2 through 4. The package of FIGURE 6 differs primarily in that it is formed with a back panel or wrapper sheet 32 with its perforate film laminate 33 facing the back of the adhesive bandage 31 and two facing sheets 34 and

35 formed of air-pervious film-paper laminate each with its film laminate extending over and in intimate contact with the pressure-sensitive adhesive coating 36 of one of the tabs of the adhesive bandage. The wrapper is sealed to the ingress of bacteria by a seal line 37 extending around the periphery of the bandage 31 and a seal line 38 extending across the center of the package sealing together the overlapping portions 39 and 40 of the respective film-paper laminate facing sheets 34 and 35 together. Where the thermoplastic film of the film-paper laminate used is too thin to form a satisfactory heat and pressure seal along the seal line 38 extending across the wrapper, an auxiliary adhesive or cement may be used.

Particular embodiments of the invention have been used in illustrating the same. The invention, however, is not limited to these particular embodiments. In view of the foregoing disclosure, variations or modifications thereof will be apparent, and it is intended to include within the invention all such variations and modifications except as do not come within the scope of the appended claims.

What is claimed is:

1. In a sterile package a laminate forming at least a part of the outer wrapping of said package said laminate comprising an air-pervious bacteria impervious paper sheet having adhered to one side thereof a thermoplastic film, said film being impervious to air but having a plurality of small air-pervious areas in which said film is fused to said paper sheet, said areas of said laminate in which said film is fused to said paper being pervious to the passage of air but impervious to the passage of air-borne bacteria therethrough.

2. A sterile package of claim 1 in which the film side of said laminate faces within said package.

3. A sterile package of claim 2 in which said package is sealed shut by fusing, through heat and pressure, a portion of the thermoplastic film containing surface to an opposing surface forming a part of the wrapper of said package.

4. A package of claim 2 in which the article contained therein has a pressure-sensitive adhesive coating on at least a part thereof, said air-pervious laminate also acting as a protective facing for said pressure-sensitive adhesive and having a part thereof in intimate contact with the otherwise exposed surface of said pressure-sensitive adhesive coating.

5. In a sterile package a flexible sheet having a pressure-sensitive adhesive coating on one surface thereof, a removable protective facing covering said pressure-sensitive adhesive coating comprising a laminate which also forms a part of the wrapping of said package said laminate comprising an air-pervious bacteria impervious paper sheet having adhered to one side thereof a thermoplastic film said film being impervious to air but having a plurality of small air-pervious areas in which said film is fused to said paper sheet, said areas of said laminate in which said film is fused to said paper being pervious

to the passage of air but impervious to the passage of air-borne bacteria therethrough, the film containing side of said laminate being in contact with said pressure-sensitive adhesive coating.

6. A sterile package having as a wrapper a laminate comprising an air-pervious bacteria impervious paper sheet having adhered to one side thereof a thermoplastic film, said film being impervious to air but having a plurality of small air-pervious areas in which said film is fused to said paper sheet, said areas of said laminate in which said film is fused to said paper being pervious to the passage of air but impervious to the passage of air-borne bacteria therethrough, a pressure-sensitive adhesive coated flexible sheet contained within said package, said adhesive coated sheet being contained between two opposed film surfaces of said laminate and the otherwise exposed adhesive surface of said sheet being in intimate contact with the film surface of said laminate covering the same, the adhesive coated sheet being sealed in said package through fusion together of the film surfaces between which the sheet is contained in a seal line extending around said pressure-sensitive adhesive coated sheet.

7. A package of claim 6 in which said pressure-sensitive adhesive coated sheet contains an absorbent pad, said pad having an area smaller than that of said sheet and said film being in intimate contact with the adhesive coating on the portion of said sheet extending beyond said absorbent pad.

8. A package of claim 6 in which said sheet has a portion thereof folded back on itself to form a fold with the adhesive coated side of said sheet being on the outside of said fold, the sheet being free of adhesive on its opposite side and in which the wrapper extends beyond the portion of said seal line closest to said fold to form two tabs for opening said package.

9. A package of claim 3 in which said sheet is in the form of an elongated strip and said fold extends across said strip from one side thereof to the other.

10. A package of claim 8 in which said strip contains an absorbent pad secured to the adhesive coated side of said strip said pad being positioned between the ends of said strip.

11. A package of claim 9 in which said fold is in a portion of said strip not covered by said absorbent pad.

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