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[31] **44/11778**

[56]

## References Cited

### UNITED STATES PATENTS

3,061,087	10/1962	Scrivens et al.	206/63.2
3,123,210	3/1964	Hermanson et al.	206/63.2
3,229,813	1/1966	Crowe, Jr. et al.	206/63.2
3,247,957	4/1966	Kemble	206/63.2
3,410,395	11/1968	Sellers	206/63.2
3,435,948	4/1969	Kaganov et al.	206/63.2
3,485,239	12/1969	Vanderbeck	206/43

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[54] **PACKAGE FOR STERILIZED ARTICLES**  
**4 Claims, 4 Drawing Figs.**

[52] U.S. Cl. .... **206/63.2 R**  
[51] Int. Cl. .... **B65d 81/18**  
[50] Field of Search .... **206/63.2,**  
**43, 46 ST**

**ABSTRACT:** A package particularly adapted for use in sterilizing and storing medical implements, which comprises a plastics vessel having an opening for receiving or taking out the article, and a sealing sheet made of plastics-impregnated, gas-permeable moistureproof and germproof paper, and having a hot-melt-type adhesive agent coated on the back for sealing the opening.

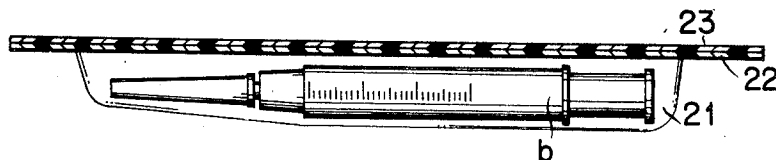


FIG. 1

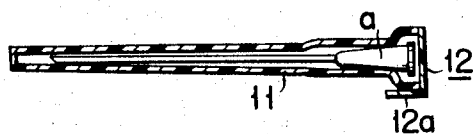


FIG. 2 FIG. 3

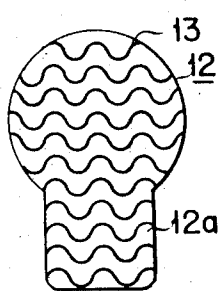
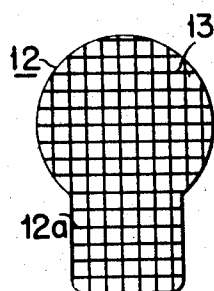
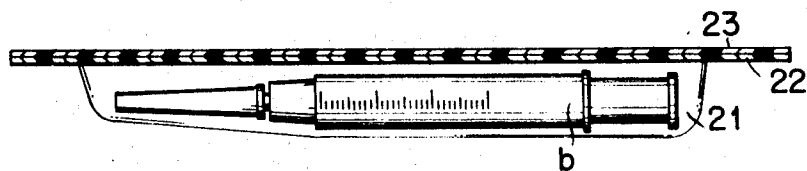


FIG. 4



## PACKAGE FOR STERILIZED ARTICLES

The present invention relates to a package particularly adapted for use in the sterilizing and storing medical implements such as an injection needle or syringe.

Heretofore, there has been known a handy package for a medical implement wherein said implement received in a plastics capsule assuming a suitable size to match its shape is sterilized before or after the capsuled implement is hermetically sealed with a sealing sheet similarly made of plastics material, so as to save the trouble of performing any extra sterilizing treatment at the time of use or to render it immediately available in an emergency. With the prior art package, however, a sealing sheet for heat sealing a vessel containing an implement is made of the same plastics material as the vessel, and liable to adhere to the vessel so strongly that when the vessel is to be unsealed, the sealing sheet is easily broken and fails to be satisfactorily opened. Further, it is difficult to carry out gas sterilization once the vessel has been sealed with the sealing sheet. Accordingly, the prior art package is accompanied with various inconveniences as described above.

The present invention has been accomplished in view of the aforementioned circumstances and is intended to provide a package for sterilized articles which permits easy gas sterilization after sealing with a sealing sheet, is capable of effectively preventing the intrusion of germs and moisture and further enables the sealing sheet to be easily removed in a perfect and medically satisfactory condition.

According to the present invention, there is provided a package for sterilized articles which comprises a plastics vessel having an opening through which a sterilized article is received or taken out, and a sealing sheet made of plastics-impregnated, moistureproof and germproof paper and coated on the back with a hot-melt-type adhesive agent for sealing the opening.

The present invention can be more fully understood from the following detailed description when taken in connection with reference to the accompanying drawing, in which:

FIG. 1 is a longitudinal view of a sealed needle package according to an embodiment of the present invention;

FIG. 2 is a bottom view of a sealing sheet showing a lattice pattern of an adhesive agent;

FIG. 3 is a bottom view of a sealing sheet showing an alternate pattern of an adhesive agent; and

FIG. 4 is a side elevational view of a sealed package of a syringe.

There will now be described an illustrated embodiment of the present invention. Numeral 11 represents a hypodermic needle capsule open at the top and prepared from polyethylene integrally formed into such a shape as is capable of fixing a hypodermic needle *a* to the inner circumferential wall surface. To the lip of the opening of the capsule 11 is lightly attached a sealing sheet 12 as shown in FIG. 1. Further, the sealing sheet 12 has a peeling tab 12a extending outward as illustrated in FIG. 2 or 3, which acts as a finger grip in removing the sealing sheet 12.

The sealing sheet 12 is prepared from Kraft paper, high quality paper or Japanese paper impregnated with synthetic resin in suitable concentration. However, most preferable is the type particularly consisting of long fibers and having good breathability. It is further preferred that the sealing sheet be  $100 \pm 10 \mu$  in thickness from the necessity of keeping the interior of the capsule free from the intrusion of germs as well as in view of sterilizing or sealing treatment of the capsule. Preferable types of synthetic resin to be impregnated in the aforementioned paper are polyacrylic ester resin, polyvinyl alcohol resin. Before impregnated in the aforesaid paper, these synthetic resins are diluted with an organic solvent such as ethyl acetate. The degree of concentration in which these synthetic resins are to be impregnated is determined in consideration of the required breathability and moistureproofness of the resultant paper, i.e. lack of the synthetic resins impregnated in the paper will result in poor moistureproofness of

the resultant paper, and overimpregnation of the synthetic resins will naturally result in poor gas permeability. For example, Kraft paper 98 microns in thickness impregnated with about 7 to 15 weight percent of polyacrylic ester resin based on the Kraft paper is suitably employed. In terms of breathability, it is desired that said degree of concentration be such that 100 ml. of air takes an average time of from 10 to 30 seconds in passing through an area of 645.16 mm.<sup>2</sup> at a pressure of 87.9 g./cm.<sup>2</sup> for obtaining sufficient moistureproofness of the paper and carrying out an efficient sterilization treatment of the package.

The underside of the sealing sheet 12 is coated with a hot-melt-type adhesive agent 13 in a latticed form as illustrated in FIG. 2 or by wavelike lines in FIG. 3. The hot-melt adhesive agent generally comprises a base resin such as polyethylene or a copolymer of polyethylene and vinyl acetate, a viscosity-imparting agent such as rosin, its derivatives, or phenolic resin, and additionally waxes and antioxidants. The hot-melt-type adhesive agent having the aforesaid composition which is free from a solvent is not in the danger of a solvent being evaporated as occurring in other solvent-bearing adhesive agents, and in consequence sterilized articles are not contaminated by such solvent and no reduction in volume of the adhesive agent coated occurs, thus preventing an uneven coating of the adhesive agent. Where sterilization is carried out by radiation, the hot-melt-type adhesive agent according to the present invention, has further advantage that said radiation promotes the cross-linking of the synthetic resins used to increase the bonding strength. The lattice-form application, as shown in FIG. 2, or wavelike pattern as shown in FIG. 3 of the aforesaid adhesive agent ensures good breathability of the sealing sheet 12 and the complete seal of a bonded surface and also enables the sealing sheet to be cleanly removed.

In the package of the aforementioned arrangement, the surface of the sealing sheet 12 which is coated with an adhesive agent 13 is brought face to face with the open portion of the capsule 11, after the needle *a* is inserted into said capsule to be securely supported therein, and thereafter said open portion is sealed by thermally melting the adhesive agent 13. The heating temperature generally ranges from about 150° to about 200° C., though it is somewhat dependent on the magnitude of pressure applied on the sealing sheet 12, as well as on the length of the heating time. The interior of the package thus sealed is sterilized, as in the prior art package, with a sterilizing gas, for example, a gas mixture consisting of 20 percent by volume of ethylene oxide and 80 percent by volume of carbon dioxide or by means of radiation. When the needle *a* is taken out for use, all the sealing sheet 12 can be cleanly peeled off with great ease by pulling the peeling tab 12a.

For example, when paper 100 microns in thickness impregnated with 10 percent solution of polyacrylic ester resin and coated in the same pattern as shown in FIG. 3 with above-mentioned hot-melt-type adhesive agent was employed as a sealing sheet and heat sealed to the capsule 11, the sealing sheet could not be peeled off without leaving the adhesive agent on the capsule 11, breaking no part of it and dispersing out a single piece of its filament.

FIG. 4 illustrates another embodiment of the invention, wherein a hypodermic syringe is housed in a vessel 21 vacuum moulded in conformity with the shape of the syringe *b* and having a lengthy opening. On the margin 22 of the opening is heat sealed the sealing sheet 23 impregnated of a suitable amount of polyvinyl alcohol resin, and coated of a hot-melt-type adhesive agent in the same manner shown in FIG. 2 or 3. In this embodiment, gas-permeable area of the sealing sheet 23 is relatively large in comparison with the volume of the vessel 21, so that sterilizing gas treatment can be conducted effectively.

As mentioned above, the package according to the present invention comprises a sealing sheet formed by impregnating its base material with synthetic resin in suitable concentration, so that it not only enables gas sterilization and seals against the intrusion of germs and moisture to be unfailingly carried out

but also allows the sealing sheet to be cleanly removed with ease. Further, when the received medical implement is unsealed there is no danger of the paper fiber of the sealing sheet being scattered perchance to be attached to the syringe. This is extremely favorable from the hygienic standpoint.

The package of the present invention displays many other advantageous practical effects, for example, that at the time of radiation sterilization which said package also permits, the radiation promotes a cross-linking reaction among the synthetic resins involved in the adhesive agent with the resultant increase in the bonding strength.

What is claimed is:

1. A package for a sterilized article which comprises:
  - a plastic vessel having an opening through which the article is introduced or removed and a marginal flange around the periphery of the opening; and
  - a sealing paper sheet impregnated with a resin selected from the group consisting of polyacrylic ester resin and polyvinyl alcohol resin, so as to be moistureproof and germproof, and to have the breatheability for permitting the passage of sterilizing gas, and sparsely coated on the back with a hot-melt type adhesive agent which includes no solvent and is free from substantial reduction in volume as coated.
2. A package for a sterilized article according to claim 1, wherein said paper sheet has a breatheability such that 100 ml. of air takes from 10 to 30 seconds in passing through an area of 645.16 mm.<sup>2</sup> at a pressure of 87.9 g./cm.<sup>2</sup>.

3. A package for a sterilized article according to claim 1, wherein the hot-melt type adhesive agent comprises:

a base resin selected from the group consisting of polyethylene and a copolymer of polyethylene and vinyl acetate; and

a viscosity-imparting agent selected from the group consisting of rosin, derivatives of rosin, and phenolic resin.

4. A package for a sterilized article which comprises:

a plastic vessel having an opening through which the article is received or taken out and a marginal flange around the periphery of the opening; and

a sealing paper sheet of 100±10 microns in thickness impregnated with a resin selected from the group consisting of polyacrylic ester resin and polyvinyl alcohol resin, so as to be moistureproof and germproof, and to have a breatheability so that 100 ml. of air takes from 10 to 30 seconds in passing through an area of 645.16 mm.<sup>2</sup> at a pressure of 87.9 g./cm.<sup>2</sup>, and sparsely coated on the back with a hot-melt type adhesive agent;

said hot-melt type adhesive agent including

a. a base resin selected from the group consisting of polyethylene and a copolymer of polyethylene and vinyl acetate, and

b. a viscosity-imparting agent selected from the group consisting of rosin, derivatives of rosin and phenolic resin.

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