

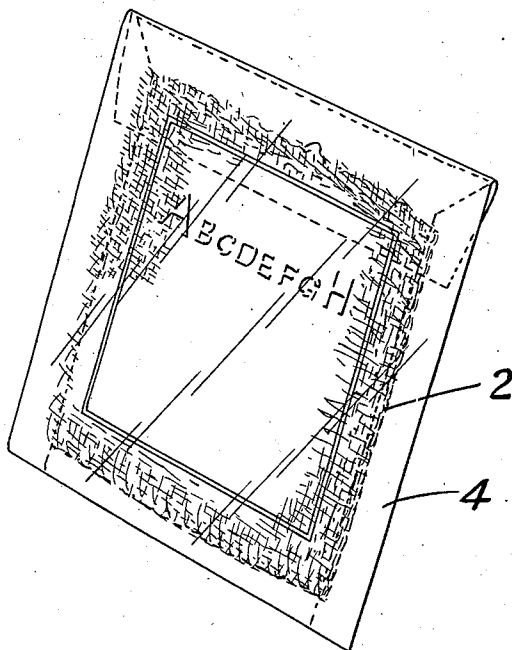
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STERILIZED PACKAGE

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STERILIZED PACKAGE

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This invention relates to a sterilized package, and particularly a glassine package containing gauze or similar material in sterilized form.

Attempts have been heretofore made to provide sterilized packages of gauze bandages or the like comprising glassine envelopes or wrappings, the advantage of the glassine being visibility and low permeation due to its greaseproof properties. Such attempts, however, have not been particularly satisfactory because the sterilizing temperatures used, at least 212° F., and more usually temperatures of 235 to 240° F., corresponding to a four pound steam pressure, maintained for a period of forty-five minutes to one hour, are such as to result in the disintegration of ordinary glassine to the extent that the glassine turns color, the result being a dirty brown which is, of course, highly objectionable in a supposedly sterile package. Furthermore, the paper becomes quite brittle and readily breaks in handling. The paper which thus disintegrates is ordinary glassine consisting, for example, of 100% bleached sulphite pulp with the addition of about ½% of rosin size based on dry stock, 0.02 pound of a blue phospho-tungstate lake per thousand pounds of dry stock and 1.25 to 1.5% of crystallized alum (based on dry stock), the latter amounting to 12 to 15 pounds per thousand pounds of the dry stock. Even though such paper has stood the formation conditions involving heating over the driers and then supercalendering, it will disintegrate and turn brown in the sterilizer. The conditions of formation involve the exposure to high temperatures only for a very short period, and furthermore, during the drying process there is such dilution with water that disintegration, probably due to the causes presently described, will not take place.

My experiments have indicated that the disintegration and discoloration is probably due to the formation of sulphuric acid in fairly concentrated form by hydrolysis of the free alum in the paper. Both in the presence of steam and in the presence of dry heat, hydrolysis may occur because the glassine contains a considerable amount of inherent moisture. At sterilization temperatures of the amounts indicated above, the sulphuric acid is probably liberated and is in such a concentrated condition as to cause dehydration of the cellulose resulting in disintegration and discoloration above mentioned.

In accordance with the present invention, these undesirable results are obviated by the utilization of special glassine for the formation of the package, the nature of which will be apparent from

the accompanying drawing, in which the figure represents a sterile package produced in accordance with the invention.

In the drawing, the package is shown as comprising a bandage indicated at 2 within an improved glassine envelope indicated at 4.

Instead of utilizing for the formation of the container glassine of the type heretofore used, I have provided a satisfactory sterile package by utilizing, for example, the same sulphite pulp as before, with the addition of ½% of rosin size (based on dry stock) and 2½ ounces of tetra azo direct dye per thousand pounds of dry stock and about 0.8% or 7 to 8 pounds per thousand pounds of crystallized alum. Variations in the composition may be made as indicated below, but under desirable conditions the amount of alum is relatively slight and the excess unused in precipitating the rosin size is of such amount that the concentration of the sulphuric acid apparently produced by hydrolysis does not affect the paper.

The test for a satisfactory paper of the type just described is for its total acidity determined by extracting the paper with water, refluxing to avoid loss, and titrating with a weak sodium hydroxide solution. The acidity thus determined may, for specification purposes, be assumed to be wholly due to sulphuric acid, which, in fact, is substantially the case. Experiments indicate that an amount of sulphuric acid not more than 0.1% of the air dry weight of the glassine tested and preferably not more than 0.075% of the air dry weight of the glassine being tested will indicate a satisfactory paper adapted to be sterilized without disintegration or discoloration. Heretofore, the glassine papers used have generally contained 0.15% to 0.3% or more sulphuric acid shown by the extraction test just described. It appears that a sulphuric acid content of over 0.1% will give rise to an unsatisfactory product from the standpoint of both disintegration and discoloration.

The glassine paper is formed in conventional fashion by sheeting, moistening and supercalendering in the usual way, subject to the limitation on the addition of alum to give rise to the acidity conditions indicated by the above mentioned test.

The blue dye used, preferably the blue tetra azo direct dye, is substantially more heat resistant than the lake heretofore used, possibly because of the fact that it actually dyes the fibers rather than merely coats them. The blue dye is desirable because it will make a slightly yellow gauze appear white when viewed through the envelope. The particular dye used is such as not to be

affected by small changes in hydrogen ion concentration, and consequently the color is not affected by the liberation of sulphuric acid during the sterilization process.

Preferably, the container, after formation from the glassine of the preferable type described above and after the insertion of the contents which are to be sterilized, and suitable sealing, is subjected to the conventional sterilization process involving exposure to a temperature of about 235 to 240° F. for a period of 45 minutes.

While the above procedure is desirable, it is possible to achieve the same results consistent with the addition of a larger amount of alum. For example, if alum is added in the amounts previously used, say to the amount of 1.25% to 1.5% of crystallized alum based on dry stock, the possibility of the formation of sulphuric acid by hydrolysis may be avoided by the addition, for example, after the addition of the rosin size and alum, of borax in the calculated amount required to provide a liberation of boric acid instead of sulphuric acid in the final product under conditions of hydrolysis. In order to avoid excess alkalinity, the borax may be admixed with boric acid. Under such conditions, the test for total acidity is the same, that is, upon extraction as indicated above, the free sulphuric acid obtainable (differentiated from the boric acid by the use of a suitable indicator in the titration in well known fashion) should be less than 0.1% and preferably no more than 0.075% of the air-dry glassine weight.

Another alternative procedure involves the neutralization of the free acidity by the treatment of the paper on the paper machine with suitable amounts of dilute solutions of lime,

sodium carbonate, sodium aluminate or the like to secure in the final product the same type of results as those indicated above, that is, an extractible sulphuric acid content of not more than 0.1%, and preferably less than 0.075% of the air-dry glassine weight. Where sulphuric acid is the only acid which may be extracted by the treatment indicated above, it is only necessary that the total acidity should be determined, since the major portion of this will undoubtedly be due to sulphuric acid. On the other hand, where another acid may be extracted as, for example, boric acid, distinction may be made in the titration to secure an indication of the sulphuric acid content, since the presence of large amounts of total acidity will not be harmful if the sulphuric acid content is below the limit specified.

What I claim and desire to protect by Letters Patent is:

1. A sterile package comprising a container and contents subjected to a sterilizing temperature, the container comprising glassine made of sulphite pulp containing small amounts of rosin size and alum, the extractible sulphuric acid content being not more than 0.10% of the air-dry glassine weight, and said glassine being resistant to disintegration and discoloration at sterilizing temperatures.

2. A container for material requiring sterilization at an elevated temperature, said container comprising glassine made of sulphite pulp containing small amounts of rosin size and alum, the extractible sulphuric acid content being not more than 0.10% of the air-dry glassine weight, and said glassine being resistant to disintegration and discoloration at sterilizing temperatures.

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