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ARTICLE OF MANUFACTURE

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This invention relates to the packaging of pellicles in the wet state, especially to maintaining gel cellulosic structures in normal condition. More particularly, it appertains to aqueous storage solutions which prevent bacteria, mold, and the like from attacking shrinkable regenerated cellulose caps and bands.

Shrinkable, non-fibrous secondary closures such as thimble-shaped caps (U. S. A. Patent No. 823,355 to Oliver), and tube-shaped bands for bottles, have been known and used for a number of years. They provide an attractive decoration to the container, a deterrent against tampering with the contents thereof, and when suitably pigmented an effective background for printed matter (advertising, etc.).

To seal a bottle, such a regenerated cellulose structure in gel form is placed over the bottle top (the primary closure being in place) and allowed to dry. The well known shrinkage which accompanies the drying of (loss of water from) gel regenerated cellulose, results in the dry structure fitting into extremely firm engagement with the bottle neck and primary closure to form an attractive, tightly stretched seal. Although this type of secondary closure may be produced by various procedures, the great bulk of present day production is manufactured by cutting short sections from continuous lengths of cellulose tubing regenerated from viscose. The manufacture of such tubes is described in detail in U. S. A. Patent No. 2,141,776 (Vautier & Fays). The cutting of such tubes into bands is described in U. S. A. Patent No. 1,647,489 (Webster). In most cases the bands are suitably decorated by pigmentation and/or printing. Typical procedures are described in U. S. A. Patents No. 2,141,744 (Evans) and 1,997,767 (Fletcher).

After manufacture, the bands are usually packed in liquid-tight containers together with sufficient solution to maintain them in gel condition, for shipment to the users. Conventional packaging details are disclosed in U. S. A. Patent No. 2,164,505 (Edwards). The purchaser has only to open the shipping container and apply the bands to the bottles in the condition in which he has received them.

The gel regenerated cellulose structures and the glycerol softener are very susceptible to attack by mold and bacteria. To prevent this attack, the incorporation of a preservative in the shipping solution has been proposed. One such solution is described in detail in U. S. A. Patent No. 2,013,739 (Wright). No difficulty has been experienced in finding substances which preclude

the action of mold and bacteria, but up to the present time no really satisfactory solution of the problem has been discovered because certain other controlling factors are involved. For example, formaldehyde, which has a very satisfactory preserving action, reacts in some manner with the gel cellulose and in a short time is substantially removed from the solution. In addition, it causes skin irritation, or dermatitis, on the hands of the workers who apply the bands. Application of the bands to the bottles is a hand operation, and the workers have their hands wet with the shipping solution for hours at a time. Any material toxic to the skin is therefore very undesirable. Another aspect in which heretofore suggested preservatives are undesirable, is the effect on the printing on the bands. To be satisfactory, the preservative must not only be colorless, but in addition must not cause the ink to bleed or be bleached. The cost of the preservative is also important, and from an economic standpoint it is desirable that the preserving action be strong so that small quantities of the preservative can be used in order to keep down the cost.

The principal object of this invention was to provide a preservative solution for gel regenerated cellulose bands which was stable, efficient, non-irritating, and colorless. Further objects were to provide preservatives for gel pellicle softening solutions which would protect both the pellicle and the softener from attack by mold and bacteria, to provide a preservative for gel regenerated cellulose which is compatible with, and soluble in, without discoloring, water-glycerol solutions, and to provide a preservative for wet gel regenerated cellulose pellicles packed in a solution of water and glycerol, and which is not toxic to human skin. A general advance in the art, and other objects which will appear hereinafter, are also contemplated.

It has now been found that isopropanol satisfies the requirements previously mentioned. Preferably a shipping solution, which when put into contact with the wet cellulosic material will come to an equilibrium at 7% glycerol, 8% isopropanol and 85% water, is employed. Larger or smaller quantities of the preservative may be employed. The preferred range is 4% to 12%. The amount utilized will depend upon the result desired, and this amount can readily be determined empirically.

While chemically pure isopropanol is preferred, commercial grades of isopropyl alcohol can be employed satisfactorily.

Softeners other than glycerol may be employed. These are well known in the prior art, and in the interest of brevity need not be mentioned here.

Regenerated cellulose has been used for convenience in the description of the invention. Related materials, such as low substituted cellulose ethers (U. S. A. Patent No. 2,123,883) are similarly protected by the isopropanol.

In many cases the bands are used to close bottles having metal caps, and in order to prevent the formation of rust and consequent staining of the dried band, it has been customary to incorporate a rust inhibiting agent in the solution. Details of this rust prevention are disclosed in U. S. A. Patent No. 2,179,571 (Banigan). Such a material may be utilized in the shipping solutions of this invention. Preferably a small per cent of sodium phosphate is used in such instances.

The property of shrinking upon drying possessed by regenerated cellulose, has been taken advantage of in a number of uses other than the sealing of bottles, and the present invention is applicable to such fields.

Regenerated cellulose caps and bands packed in a shipping solution using isopropanol, can be stored from 4 to 12 months or longer without deterioration of the regenerated cellulose or glycerol. This alcohol gives no color to the solution and has, surprisingly, been found to be non-toxic to the skin, thereby differing from some of its homologues like butyl, amyl, octyl and lauryl alcohols. It is sufficiently strong as a preservative to be used in relatively low per cents set out above.

Isopropanol does not alter the physical or chemical structure of the cellulosic pellicles, does not impart color to the solution or to the pellicle, is satisfactorily soluble in water and aqueous solutions containing softeners such as glycerol, and is effective in relatively small amounts. It effectively precludes the formation of mold and the action of bacteria, and is non-toxic to human skin when used in the aforementioned concentration. It is inactive towards dye-stuffs used to color regenerated cellulose pellicles. It is substantially completely removed from the pellicle during drying.

It is now possible for the manufacturer to pack gel regenerated cellulose pellicles into a

container containing a shipping solution, and transport the same to a customer who may use them immediately, or permit them to stand for a considerable length of time without deterioration of the product.

As many apparently widely different embodiments of this invention may be made without departing from the spirit and scope thereof, it is to be understood that this invention is not limited to the specific embodiments thereof except as defined in the appended claims.

I claim:

1. A composition comprising essentially 85% water, 7% glycerol and 8% isopropanol.
2. A gel regenerated cellulose pellicle containing isopropanol.
3. A non-fibrous cellulosic gel band containing water, softener and isopropanol.
4. The process which comprises adding isopropanol to a storage solution containing non-fibrous cellulosic pellicles.
5. A softened, wet, gel regenerated cellulose pellicle, which is capable of shrinkage upon loss of water, containing sufficient isopropanol to preclude attack by mold and bacteria.
6. The method of preserving gel regenerated cellulose pellicles, which comprises packing the gel pellicles in an aqueous solution of isopropanol and glycerol.
7. The method of preserving a pellicle of gel regenerated cellulose, which comprises immersing it in an aqueous solution containing 8% isopropanol and 7% glycerol.
8. A gel regenerated cellulose pellicle impregnated with isopropanol and glycerol.
9. A gel regenerated cellulose pellicle impregnated with an aqueous composition containing isopropanol and glycerol.
10. A regenerated cellulosic pellicle impregnated with a composition comprising essentially water, softener and 4%-12% isopropanol.
11. A regenerated cellulosic pellicle impregnated with a composition comprising essentially 85% water, 7% glycerol and 8% isopropanol.
12. The process of repressing the attacks of lower organisms on non-fibrous cellulosic pellicles, which comprises storing the pellicles in an aqueous solution and incorporating isopropanol in said solution.

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