

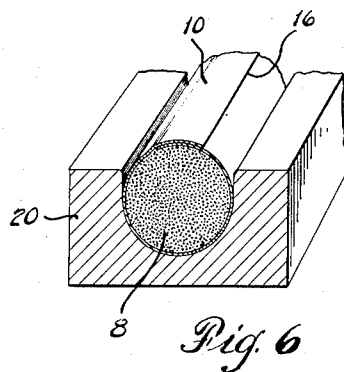
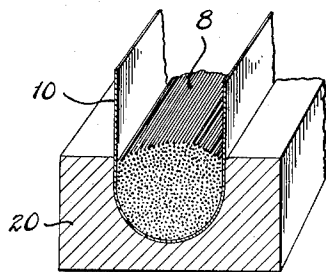
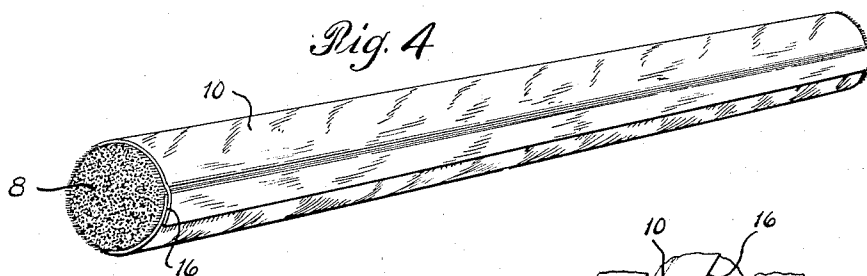
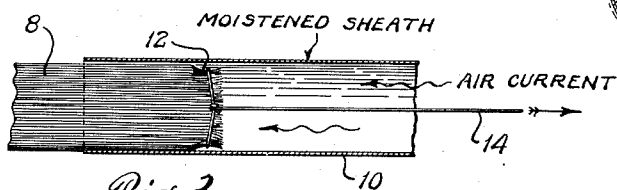
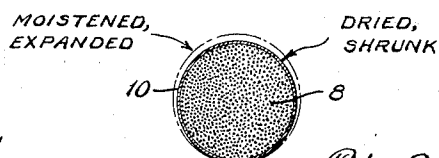
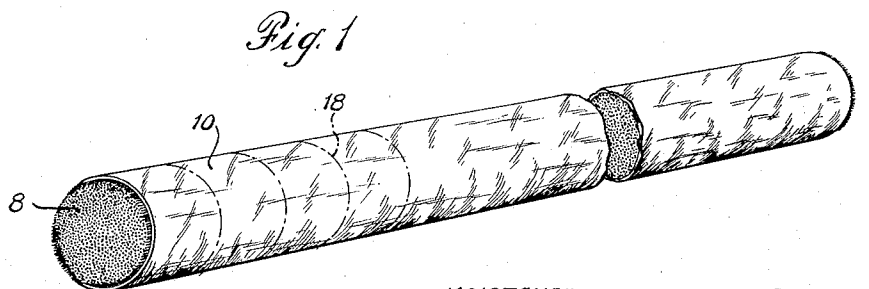
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2,581,561

FILAMENT PACKAGE AND METHOD OF PRODUCING SAME

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FILAMENT PACKAGE AND METHOD
OF PRODUCING SAME

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9 Claims. (Cl. 18—56)

1

This invention relates to improvements in packages for filaments and the like and in the method of producing the same.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities, processes, steps and combinations pointed out in the appended claims.

The invention consists in the novel steps, parts, constructions, arrangements, processes, combinations and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate an embodiment of the invention, and together with the description, serve to explain the principles of the invention.

Of the drawings:

Fig. 1 is a view in perspective of a package of filaments;

Fig. 2 is a view in cross section of the package of filaments shown in Fig. 1;

Fig. 3 is a view in side elevation of a package of filaments showing a step in a preferred packaging method;

Fig. 4 is a view in perspective of a package of filaments;

Fig. 5 is a view in perspective of a bundle of filaments in place on a retaining form, showing a step in a preferred method of packaging the same; and

Fig. 6 is a view in perspective showing another step in a preferred method of packaging filaments, as shown in Fig. 5.

It is an object of the invention to provide an attractive package which holds parallel filaments, or the like, very firmly together.

It is another object of this invention to provide a packaging method for parallel filaments or the like which is simple and inexpensive in application.

Another object of this invention is to provide a package of filaments or the like which may be cut transversely into a plurality of any predetermined lengths, each of said lengths forming a separate package whose filaments are of substantially the same length and held together very tightly and firmly.

Another object of this invention is to provide a firm package of filaments which may be easily handled without the filaments becoming loosened or separated from each other.

A further object of this invention is to provide

2

an attractive package wherein filaments are firmly enclosed in a tightly fitting, transparent covering through which the contents of the package may be clearly seen.

In general, this method of producing an improved type of package for filaments and the like comprises the insertion of a loose bundle of parallel filaments of comparatively small diameter into an expanded tube of shrinkable film such as previously moistened regenerated cellulose or the like which is then allowed to dry whereby the circumferential shrinking of said tube tightly compresses said filaments into a fixed parallel relationship with each other, forming a firm, cylindrical slightly elastic package.

The invention is particularly applicable to the packaging and handling of synthetic mono-filament or mono-strand plastics such as used in making brushes. An example is vinyl chloride-acetate resin plus modifiers which has been processed in a screw extruder and subsequently oriented to give fibre having a diameter range of 0.008" to 0.020". Larger or smaller diameter fibres could be similarly packaged. In present practice, bundles of such fibres or filaments frequently 100" long, are tied at intervals of about 6" and so shipped—the filaments loosen during shipping, requiring re-tying. Also, this arrangement is very awkward in the handling of bunches of fibres being cut into short lengths, such as 1" to 1.5", for brushes.

It will be understood that the foregoing general description and the following detailed description as well are exemplary and explanatory of the invention but are not restrictive thereof.

Referring to the drawings in detail, Fig. 1 shows a plurality of filaments of relatively small diameter encased in a seamless tube 10 of regenerated cellulose. This package may be cut into desired smaller packages by cutting it at right angles as at 18 to the axes of the filaments 8. No matter how short the cut, the tube or "skin" firmly grips the contained fibres and preserves their parallel relationship.

Regenerated cellulose has the property of being pliable when moistened and of shrinking considerably upon drying. Fig. 2 shows a cross section of the filament package as in Fig. 1 illustrating the above described property of the regenerated cellulose sheath 10.

Fig. 3 shows a step in a preferred method of covering parallel filaments 8 with a seamless tubing of regenerated cellulose 10. A string 14 or other suitable means is fastened at 12 to an end of a bundle of parallel filaments 8, which is in-

roduced into a moistened sheath 10, of seamless regenerated cellulose. An air current is introduced into the tube 10 flowing in the opposite direction to which force is applied to filaments 8, along string 14. Said air current distends tube 10 circumferentially, enabling the bundle of filaments 8 to be easily pulled through tube 10 until it is completely encased therein. Other suitable methods of introducing filaments 8 into expanded tube 10 may also be used, for example, the air current may be dispensed with and the bundle of filaments drawn into the tube 10 without air-distension thereof. Tube 10 then shrinks tightly around filaments 8 as it dries, holding them firmly in fixed parallel relationship to each other.

Fig. 4 shows a bundle of filaments 8 encased in a tubing 10 of shrunken, transparent plastic film, such as regenerated cellulose, which has a longitudinal seam 16. Figs. 5 and 6 show two steps in the method of packaging filaments by enclosing them in such a seamed tube. As shown in Fig. 5 a sheet of moistened, regenerated cellulose or similar film 10 of requisite size is placed in a form member 20, which may be formed of a block having a groove therein, said groove defined by an identical curved line in similar cross sections of said form 20. A loose bundle of parallel filaments 8 is placed in sheet 10, resting in the groove of member 20. The edges of moistened sheet 10 are overlapped around filaments 8 and sealed with a suitable adhesive or binder at 16, shown in Fig. 6. When moistened sheet 10 dries, it shrinks around filaments 8 drawing them tightly together in a firmly fixed, parallel relationship to each other, the package assuming a substantially cylindrical shape.

While regenerated cellulose film has been referred to as a suitable material for the shrinkable transparent plastic tube or casing, it will be understood that other materials having equivalent characteristics may be used. For example films of thermoplastic vinyl resin, such as a co-polymer of vinyl chloride and vinyl acetate (known in the trade as "Vinylite") may be used. Such a vinyl film is disclosed in U. S. Patent No. 2,027,962 to L. M. Currie. In such case the "Vinylite" tube may be stretched or physically expanded and then shrunk on the package of filaments by the application of sufficient heat to release strains thermally. Regenerated cellulose which has been nitrated and then de-nitrated can be expanded and shrunk as desired with water alone; other types of regenerated cellulose may be moistened with a solvent-non-solvent mixture, such as glycerine and water, for swelling. Upon drying the desired shrinking action will occur.

The finished package of filaments may be cut into desired lengths which form in themselves attractive transparently wrapped packages which may be easily handled without the enclosed filaments becoming loosened with consequent loss of time spent in retightening or recollecting loose filaments.

When a package of filaments is cut into desired lengths while the wrapper is only partially dried and hence partially shrunk the wrapper will shrink longitudinally as well as circumferentially with the result that when the shrinkage is complete the ends of the packaged filaments will project slightly beyond the edges of the wrapper as shown in Fig. 1, thus easily permitting inspection of the filaments as to diameter.

The invention in its broader aspects is not limited to the specific mechanisms, process and

steps shown and described but departures may be made therefrom, within the scope of the accompanying claims, without departing from the principles of the invention and without sacrificing its chief advantages.

What I claim is:

1. A method of packaging a large number of filaments or the like of equal lengths which comprises moistening a seamless tubing of regenerated cellulose sufficiently to substantially expand said tubing, introducing a bundle of parallelly disposed filaments into said tubing while expanded to substantially fill said tubing and then subjecting said enclosed filaments to a drying atmosphere whereby said cellulose material upon shrinking tightly encloses said filaments subjecting them to constricting tension, holding them firmly in fixed parallel relation to each other in a cylindrical package.

2. A method of packaging a large number of filaments or the like of substantially equal lengths which comprises surrounding said filaments with a thin flexible expanded seamless tube of shrinkable film material, said tube being of substantially the same length as said filaments and subjecting said tube to a shrinking action whereby said material constricts tightly around said filaments holding them firmly in fixed parallel relation to each other in a cylindrical package.

3. The method of claim 2 wherein said material is a regenerated cellulose expanded by moisture and shrunk by drying.

4. The method of claim 2 wherein said material is a thermoplastic expanded by stretching and shrunk by the application of sufficient heat to release strains in said material.

5. In the method of claim 2 the additional steps of cutting said package into shorter lengths before the shrinking action is completed so as to shrink the tube longitudinally with respect to the contained filaments.

6. In the method of claim 2 the step of inflating said tube with air currents while surrounding the filaments therewith.

7. A method of packaging a large number of relatively incompressible filaments of substantially equal lengths which comprises the steps of introducing said filaments as a loosely gathered bundle wherein the filaments are substantially parallel to each other, into a thin, flexible, expanded, seamless tube of shrinkable plastic material, said tube being of substantially the same length as said filaments and subjecting said tube to a shrinking action whereby said material constricts tightly around said filaments gathering and compacting said filaments together in a cylindrical package in fixed substantially parallel relation to each other.

8. A package comprising a large number of parallelly disposed filaments of substantially equal lengths closely packed in a cylindrical shape and a seamless tube of thin flexible plastic film surrounding said filaments and extending over substantially the entire length of the filaments, said tube being shrunken around the packed filaments and holding them with constricting tension.

9. A package comprising a large number of parallelly disposed substantially incompressible filaments of substantially equal lengths closely packed in a cylindrical shape and a seamless tube of thin flexible plastic film surrounding said filaments and extending over substantially the entire length of the filaments, said tube being shrunken

around the packed filaments and holding them with constricting tension.

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