

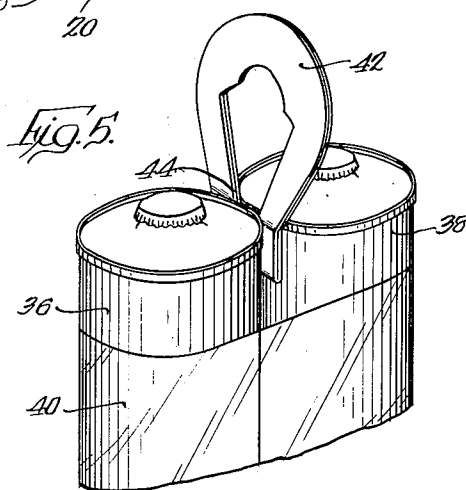
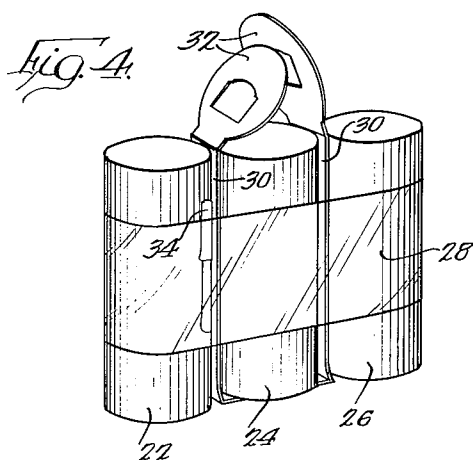
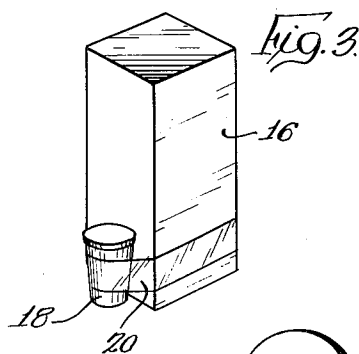
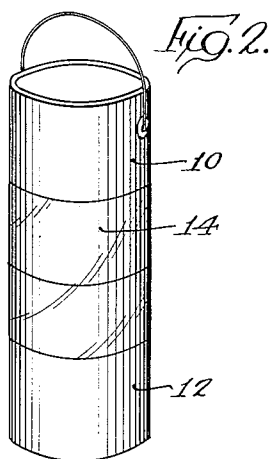
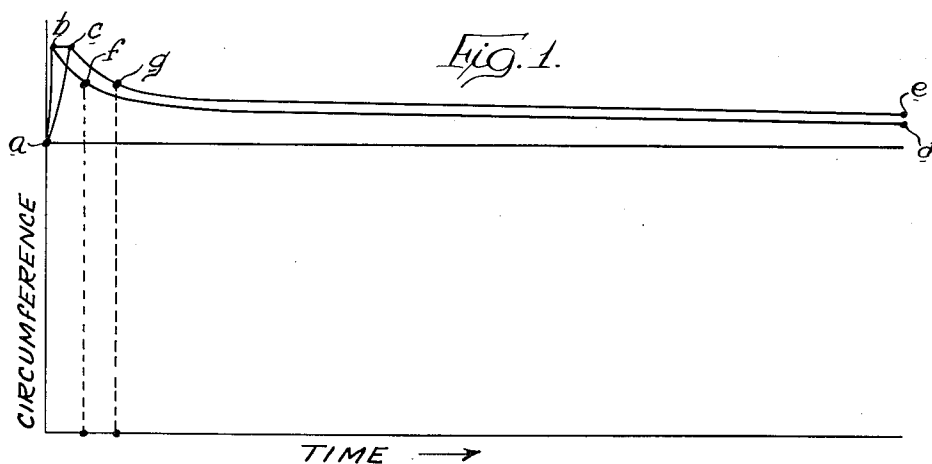
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W. J. HLAVACEK ETAL

3,023,554

ARTICLE BANDING METHOD

Filed Jan. 24, 1958



INVENTORS.
William J. Hlavacek
Walter B. Fleming
 BY
Brown, Jackson, Buetcher & Dimer
Attys.

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3,023,554

ARTICLE BANDING METHOD

William J. Hlavacek, Oak Park, and Warren B. Fleming,
Merrionette Park, Ill., assignors to Tee-Pak, Inc., Chi-
cago, Ill., a corporation of Illinois

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The present invention relates to packaging, and particularly to the banding of articles, either a single item or a number of items, by means of dry bands of regenerated cellulose for convenient merchandising of the articles.

Package identity is a factor of utmost importance in today's market. Manufacturers strive to attain a distinctive unit package or container for their goods and to establish in the minds of the purchasing public an identity between the package, the goods and the manufacturer. At the same time, the manufacturer desires to gain the benefit of volume sales as afforded by special promotions and multiple packaging, for example by a common pack of a plurality of identical package units, a common pack of different units of a related character and a common pack of one or more units and a premium. These two merchandising objects have generally been at odds with one another. On the one hand, if the items are to be effectively consolidated into one pack with reasonable safeguards against disassociation, breaking of the pack and pilfering of premiums, it has been necessary to adopt a packaging device that covered the unit package or otherwise obliterated its identity. If, on the other hand, package identity were to be preserved, the means available for multiple packaging have been tedious and expensive to apply and have afforded little if any safeguards in the respects noted.

For example, cardboard boxes, packing sleeves, and the like must necessarily encompass substantially the entirety of the item, thus destroying or substantially diminishing package identity and preventing optimum display of the items, premiums, etc. Adhesive bands and the like are expensive, difficult to apply and do not afford reasonable assurance against breaking and pilferage. Rubber and resilient plastic bands, due to their immediate return after stretching, are also difficult to apply on a production basis and fail, due to their resiliency, to safeguard to a reasonable extent the multiply package items.

It has also previously been proposed to shrink cellulose bands of the type normally employed as casings for skinless frankfurters and sausages onto multi-packs in a manner somewhat analogous to the use of this material in the meat industry; specifically, by first wetting the bands, slipping them over the items to be consolidated and subsequently drying the bands to cause them to shrink onto the consolidated pack. It was believed that this would result in a firmly banded multiple package and that the cellulose band would in no way detract from or diminish unit package identity. However, this proposal has proved impractical for a number of reasons. First, if the bands or sleeves were to be shrunk, it was deemed essential within the skill of the art to wet or soak the bands immediately prior to application to the articles. This immediately restricted use of the proposal to products and packages that would not be damaged by moisture. Second, the proposal presented severe production problems relative to soaking of the sleeves which were required to be soaked in glycerine and water for about twenty minutes, handling of the wet sleeves and accommodation on the production line of sufficient time and/or means for curing or drying of the sleeves. Third, the amount that any given sleeve or band would shrink after wetting could not be prognosticated with any reasonable degree of accuracy, with the consequence that there was little if any certainty that the sleeve would per-

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form its intended function. In some cases, the sleeves or bands would not shrink enough or exert sufficient tension when dry to hold the banded items together. In other cases, where fragile or crushable items were to be banded, the shrinkage was excessive with consequent damage to the goods. Accordingly, the proposal was not a solution to the problem of multiple packaging.

The object of the present invention is to provide an improved method whereby regenerated cellulose sleeves or bands can be employed with absolute surety in solution of the multiple packaging problem and other similar problems without loss or diminution of unit package identity.

More specifically, the invention has for its object the application of cellulose products, especially tubes or bands of dry regenerated cellulose, to packaging problems, which application completely eliminates the disadvantages of the prior proposals in the art.

The invention, in brief, constitutes the discovery, and is a practical application of the discovery, that regenerated cellulose bands or sleeves have the unexpected characteristic that they can be stretched while dry to a certain extent without breaking and that the dry bands have, when released, a slow or delayed return at least partially toward their initial diameter; in other words, that dry regenerated cellulose bands have a delayed action partial "memory." Specifically, the invention resides in the discovery or discoveries that dry regenerated cellulose bands can be stretched as much as 50% so that their stretched diameter or circumference is as much as 150% of their initial or manufactured diameter or circumference, that they will, when released, return or shrink slowly in a delayed manner by at least one-half the amount of stretch and that the amount of shrinkage, or more properly the amount of pressure that the band can exert on the item or items to be banded, and the rate at which shrinking occurs can be varied by varying the thickness of the material and the amount and duration of stretch.

Bearing these factors in mind, an object of the invention is the provision of an improved method of banding comprising the steps of stretching a dry regenerated cellulose band from an initial circumference that is less than the circumference of the article to be banded, or less than the consolidated circumference of the several items that are to be banded together, to a circumference that is greater than the latter circumference, releasing the band for positioning about the article, and accommodating relatively slow contraction of the band onto the article, all with a dry band.

A further object of the invention is the provision of an improved method of banding as above defined wherein the band is stretched no more than about 50% of its initial circumference and the amount of stretch is no more than about twice the difference between the initial circumference of the band and the circumference or consolidated circumference of the item or items to be banded, i.e., the banding circumference.

A still further object of the invention is the provision of an improved method of banding as above defined wherein the pressure to be exerted by the band on the article is varied in inverse relation to the amount of stretch and the duration of the stretching cycle prior to release of the band, and/or in direct relation to the thickness of the band.

The invention also has the additional objects and advantages of improving the quality of the band and its resistance to failure due to nicking and puncturing by virtue of what is believed to be a molecular reorientation occurring during stretching of the band while dry; of facilitating banding of articles by virtue of the band's slow or delayed return so that the band can be stretched and released to drop down over the article without the

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necessity of moving the stretching fingers around the article; of accommodating exceptionally high production rates in a minimum space—up to sixty cycles per minute for a single stretching head; of accurately controlling the amount of pressure applied to the article; of accommodating banding of substantially any item or items; of enhancing unit package identity and multiple package merchandising by use of entirely transparent bands, translucent bands, bands that are in part transparent or translucent and in part printed or colored, and bands that are printed and/or colored (in up to five colors); of retaining package identity both before and after the band is removed; and of facilitating conversion of special promotion merchandise back to regular merchandise after a promotion.

These and other objects and advantages of the invention will become apparent in the following detailed description of preferred embodiments of the invention.

Now, in order to acquaint those skilled in the art with the manner of practicing the method of the invention, there is set forth in the following detailed description, as taken in connection with the accompanying drawing, a full line disclosure of the preferred manners of practicing the method and certain exemplary packages resulting from such practice.

In the drawing:

FIGURE 1 is a graph representing generally the response phenomena of dry regenerated cellulose bands to stretching and release;

FIGURE 2 is a perspective view of two cans, such as two one-gallon paint cans, banded together in stacked relation according to the invention;

FIGURE 3 is a perspective view of two fragile or crushable items, such as a box of crackers and a glass of cheese spread, banded together according to the invention;

FIGURE 4 is a perspective view of three items banded together in side by side relation with separating means between adjacent items and with handles provided on the separating means for carrying the three items as a common article when banded together according to the invention; and

FIGURE 5 is a perspective view of two cans of the type having a protruding bead at their ends banded together according to the present invention with the beads thereof in abutting engagement, together with a carrying handle for the multiple package comprising a cardboard member having a portion confined between the two cans and having a slot therein through which the beads of the cans extend firmly to retain the handle in association with the banded cans.

With reference to FIGURES 2, 3, 4 and 5 of the drawing, it is to be understood that the same are simply illustrative of the wide variety of packages that may be formed according to the present invention, and of the wide variety of articles that may be banded according to the invention, the articles ranging from light to heavy and from fragile to strong, and requiring a banding pressure from slight to great, all with preservation of unit package identity. While all of the packages illustrated are multiple packages, it will be apparent that individual items may also be banded in accordance with the invention.

In passing, it is observed that each article to be banded has what is herein termed a banding circumference, that is, the overall circumference of the item, or of the several items of a multiple package, at the point of banding as the item is prepared for packaging, or as the several items are assembled or consolidated in a multiple package. For example, the stacked cans of FIGURE 2 have a banding circumference equal to the circumference of one can, and the side by side arrangement of three cans of equal diameter illustrated in FIGURE 4 has a banding or consolidated circumference equal to the circumference of one can plus four times the diameter of one can plus four times the thickness of the separating strip.

Also, since the invention is directed to both single and

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multiple article packaging or banding, the term "article" and "article banding" as employed herein include both a single item and a group of items consolidated for banding in a multipack.

In practicing the present invention, the bands employed are formed of regenerated cellulose or cellulosic fibers impregnated with and held together by regenerated cellulose. The bands are suitably cut to the desired width from seamless tubular stock produced in the manner customary for the manufacture of regenerated cellulose sausage casings and fibrous sausage casings, respectively.

The regenerated cellulose tubing which is used for sausage casing is a well known commodity and is formed, briefly, by extruding viscose through an annular orifice, subjecting it to coagulating and regenerating baths, washing the tube in water and then treating it with a hygroscopic agent, followed by drying. The method is described in U.S. Patent No. 1,612,508, issued December 28, 1926 to Henderson and Dietrich and is referred to in numerous patents, for example, U.S. No. 1,937,225, issued November 28, 1933 to Alfred Hewitt.

Fibrous casing is likewise a well known commodity and may be formed in accordance with the technique described in U.S. Patent No. 2,045,349, issued June 23, 1936, to Goodman. Briefly, according to this technique a cellulosic fibrous sheet is formed into a tube in any suitable way, as for instance, by slipping the fibrous sheet over a hollow mandrel, and then immersing the mandrel and contents into a viscose solution, followed by regeneration, washing, impregnation with hygroscopic agents and drying.

The hygroscopic agents employed may suitably be taken from the class consisting of glycerin, the glycols and the like, and may suitably be applied to the tubular stock, prior to cutting the stock into bands, by running the stock through a liquid bath of the hygroscopic or plasticizing agent, followed by drying. According to the present invention, the stock and the bands cut therefrom preferably have a plasticizer content of about 20-25% and a moisture content of at least 6%, preferably 10% or more. The indicated plasticizer and moisture contents of the stock are adopted to avoid brittleness, excessive drying and shattering of the bands. Such contents also facilitate cutting of bands from the tubular stock since they mitigate against shattering of the stock and nicking of the band edges. In cutting bands from the stock, the cutting blades should be maintained in properly sharpened condition as a further precaution against nicking. As will presently appear, practice of the method of the invention will increase the resistance of the band to shear due to nicking, but care should be exercised to avoid nicking of the band edges prior to stretching, as such nicking would result in a high incidence of band breakage during the stretching step.

Referring now to FIGURE 1, the general stretch-shrink phenomena of dry regenerated cellulose bands, constituted as described, and the effect of duration of stretch on the amount of shrink are graphically represented therein. In the graph, the abscissa is graduated in time in seconds and the ordinate in circumferential distance. The point *a* therein represents the initial or manufactured circumference of a dry cellulose band, the line *a-b* illustrates a relatively rapid or fast stretch of the band, the curve *b-d* represents the shrink occurring after such fast stretch, the line *a-c* illustrates a relatively slow stretch, the lines *a-b-c* illustrate a fast stretch coupled with a holding period at the termination of stretch which equals in duration the slow stretch *a-c*, and the curve *c-e* represents the shrink occurring after either the slow stretch *a-c* or the held or delayed stretch *a-b-c*.

This graphic representation directly illustrates, first, that the shrink or return occurring after stretch of a dry regenerated cellulose band is slow or delayed, second, that there is an initial slow return followed by a period of still slower return, third, that the amount of return

is greater than 50% of the amount of stretch, fourth, that the amount and rate of return are inversely related to the duration of the stretching cycle, and fifth, that the duration of the stretching cycle may be varied either by varying the rate of stretch or providing a delay time between the completion of stretching and the time of release without appreciably varying the resultant return or shrink curve for a given duration of stretch. Through innumerable tests these basic characteristics have proven consistent for dry regenerated cellulose bands of varying diameters, thicknesses and widths, and for varying amounts of stretch.

While not revealed by the representation of FIGURE 1, other criteria in the stretch-shrink characteristics of dry regenerated cellulose bands are that the bands can be stretched to as high as 150% of their initial or manufactured circumference without breaking and without exceeding their elastic limit, and that the proportional amount of return or shrink of the bands is directly related to their thickness. For purposes of the specific application of these phenomena as provided by the present invention, the important characteristics may be enumerated as (1) stretching of the band up to 150% of its initial circumference, (2) delayed or slow return or shrinking of the band, (3) return or shrinking of the band by more than half the amount of stretch, and (4) control of the degree of band return or shrinking by variation of band thickness, the amount of stretch and/or the duration of stretch.

With these discoveries in mind, the improved banding method of the invention resides in stretching a dry regenerated cellulose band from an initial circumference that is less than the banding circumference of the article to be banded to a circumference that is greater than said banding circumference, followed by release of the band for contraction onto the article, whether the article be a single item or a group of items. Due to the slow or delayed return of the dry band after stretching, the band may conveniently be released either before or after it is positioned about the article, i.e., the fingers or like instrumentalities employed for stretching the band may receive the article within their confines before stretching pressure is released, with the fingers being subsequently retracted, or stretching pressure may first be released and the fingers retracted from the band with the band subsequently being positioned about the article manually, mechanically, or by virtue of gravity drop from the fingers over the article. Either practice is intended to be included within the herein phrased method step of releasing the band for positioning about the article. Due further to the slow return or contraction of the dry band, it is necessary to accommodate the delayed action of the band in contracting onto the article. In this respect, reference is again made to the portions of the return curves plotted in FIGURE 1 immediately following release of the band. The initial return of the band, while quite slow, occurs considerably more rapidly than the terminal return of the band, and usually takes place within about fifteen seconds after release. In banding according to the method of the invention, it is preferable to have the band set up quite firmly against the article within this fifteen second period to facilitate factory handling of the banded item or items shortly after banding, and the band will thereafter attain its final degree of tension to withstand the rough handling that the package will later receive in retail outlets. Thus, an appreciable period of time is afforded for positioning of the band about an item or a consolidated group of items to facilitate the banding operation, yet the amount of time required for permitting the band to initially set up is sufficiently short as to occasion no production problem even in modern high speed canning factories and the like.

Relative to the specific manner of practice of the method, it is to be appreciated from the foregoing that the band is to be stretched to no more than about 150%

of its initial circumference, and therefore, that its initial circumference should be no less than about two-thirds of the banding circumference of the article to be banded. In practice of the invention on a commercial scale, however, it is preferred that the amount of stretch be restricted to about 20-25% of the initial circumference of the band to maintain a safety factor relative to the elastic limit and breaking point of the cellulose and to avoid unnecessary prolongation of the stretching cycle. Also, since the return of the band is somewhat greater than half the amount of stretch, it may be stated that the amount of stretch should not be substantially greater than about twice the difference between the banding circumference of the article and the initial circumference of the band. Stated in another manner, the stretched circumference of the band should not be substantially greater than the difference between twice the banding circumference and the initial circumference.

In banding, the amount of additional shrink to which the band would be subjected if not restricted in its contraction by the article to be banded is the determining factor in the degree to which the band is tensioned and thus the amount of pressure exerted by the band on the item or items. This pressure may be varied by varying the amount and/or duration of stretch within the limits above defined. As a general rule, it may be stated that for a high banding pressure it is preferable that the band be subjected to a small fast stretch and for a low banding pressure that it be subjected to a relatively large and/or slow or delayed stretch.

For example, in FIGURE 1, the point *f* represents the banding circumference of an article to be banded at high pressure by a band of circumference *a*. The band has an initial circumference greater than two-thirds of the banding circumference *f*, and preferably greater than about 80% of the circumference *f* (i.e., such that a 25% stretch will render the same larger than the circumference *f*). To band the article at high pressure, the band is rapidly stretched a relatively small amount *a-b* and is immediately released to afford a short duration of stretch. The band may be placed around the article either before or after release from the stretching fingers, and after release will contract onto the article. In commercial practice, the fast stretch is suitably effected in no less than about one second, as too fast a stretch, such as to impart impact to the band, may result in breaking of the band. The duration of stretch must of course be somewhat proportional to the amount of stretch, but for small amounts of stretch can safely be as little as one second. Assuming a one second stretch in the example given, the band may set up against the article at any time during the following ten to fifteen seconds, but since high banding pressure is desired, the amount of stretch is preferably effected to such extent that the band will initially set up on the article shortly after release, thus to restrict contraction of the band at a point where it has a high residual shrink factor, whereupon the band will exert a high pressure on the banded article at the end of its stretch-shrink cycle. Also, this facilitates factory handling of the banded article for packaging within a very short time after the stretch-release cycle, whereby only a short discharge area is required to the output side of the banding apparatus. More specifically, a banding machine for use in practice of the present invention may suitably comprise a plurality of separable fingers and means for separating and retracting the fingers, the machine requiring an area no more than about twenty-four inches wide and eighteen inches deep. The machine may suitably be set, in the example given, to stretch one band per second and to drop each stretched band over an item or a group of items to be banded, which items or groups may in turn automatically be fed step by step under the stretching fingers. With such arrangement, a discharge table to the output side of the machine would have to be of a length equal only to six or seven of the resultant

packages for the articles to be adequately banded for manual handling. Thus, the articles having a banding circumference f may be banded at high speed and great pressure according to the invention in a minimum amount of space and time and in complete accordance with modern mass production methods.

On the other hand, if an item or a group of items having a banding circumference g equal to the circumference f are to be banded at low pressure, a band a of the same circumference as used in the preceding example may again be employed. In this instance, however, the band is subjected to a slow stretch $a-c$ or a delayed stretch $a-b-c$ of, say, about three seconds duration, with the consequence that the band initially sets up on the article more nearly adjacent the end of the initial return of the band at which point (g) the band has only a very slight amount of residual shrink and exerts, ultimately, only a slight or low pressure on the banded article.

By way of example, if the circumferences f and g are each eighteen inches, the circumference a of the band may suitably be sixteen inches. For high pressure banding at point f , the band could suitably be stretched to about nineteen to nineteen and one-half inches in about one second, whereupon it would be released for contraction onto the article and ultimately set up a force thereon equivalent to residual shrink to a circumference less than seventeen and one-half to seventeen and three-fourths inches. Due to the fast stretch, the return is actually considerably more than half the stretch, approximately about 75% as illustrated in FIGURE 1, so that the actual residual strength would be to a circumference of about sixteen and three-fourths to sixteen and seven-eighths inches. In the case of light pressure banding at g , the slow or delayed stretch of the band results in a proportionally smaller return so that the banding pressure would be equivalent to a residual shrink to a circumference only slightly less than seventeen and one-half to seventeen and three-fourths inches, specifically about seventeen and one-fourth to seventeen and one-half inches with the curve $c-e$ illustrated in FIGURE 1. Alternatively, the decreased banding pressure could be achieved by increased stretch to say about twenty to twenty and one-half inches, or by a combination of increased stretch and increased duration of stretch.

As previously pointed out, the thickness of the band is also a controlling factor in the amount of tension exerted by the band. However, the regenerated cellulose casings employed in the meat industry have generally been supplied in only two thicknesses, namely, 2 mils and 4 mils, and there has thus far in practice of this invention been no reason for departure from these two sizes. The thicker material has proven successful for all applications to which the present invention has been put, and the thinner stock is well suited for low cost banding of articles having a large banding circumference. It is also to be observed that cellulose sausage casings are now manufactured in seamless tubular form in a wide variety of diameters, which at least for the present, have satisfied the demands of the invention. In view of this fact, it is ideal to employ seamless bands in practice of the invention, although the invention is not restricted to seamless bands.

Relative to use according to the invention of bands formed from fibrous casings, it is observed that the characteristics thereof are substantially the same as above described, with the exception that they are not generally capable of as much as 50% stretch. However, the fibrous bands can be stretched by about 20-25% and are, therefore, employed in the same manner previously defined as being preferable. Thus, both the straight cellulose and fibrous products are included in the arm regenerated cellulose casings or bands as employed herein.

Referring now to FIGURES 2 to 5, a variety of multiple packages are therein illustrated for purposes of ex-

emplification of the uses to which the invention may be put. In FIGURE 2, two one-gallon cans of paint 10 and 12 are shown as banded together in stacked relation by means of a dry cellulose band 14 for unit handling by means of a conventional handle on the upper can. The band is suitably of a width equal approximately to the height of one can and engages over approximately one-half the height of each can. In actual practice, the band 14 has positively retained the cans in consolidated relation despite the most severe abuse to which the cans could be subjected. Unit identity of the cans is in no way diminished and the band serves as a carrier for special promotion advertising matter.

In FIGURE 3, two fragile or crushable items 16 and 18, such as a box of crackers and a glass of cheese spread, are shown as banded together by a dry cellulose band 20. The band exerts sufficient pressure to hold the articles firmly in consolidated relation, yet, due to application at relatively large stretch and/or relatively long duration of stretch, does not exert such pressure as either to crush the box or break the glass. Unit identity of both the glass and box are preserved in their entirety, and the band, due to its excellent reception of print, is ideally suited to carry promotional advertising and information relative to price.

Three identical cans or containers 22, 24 and 26 are shown in FIGURE 4 as banded together in side by side relation by means of a band 28. The multiple package illustrated also includes separating means 30 between containers for protection of the same, especially when formed of glass or a like fragile material. Here again, the band intimately consolidates the items for conjoint handling and volume sale without diminution of unit identity and facilitates the provision of advertising literature. In addition, the band facilitates provision on the separator 30 of handles 32 extending above the items for convenient carrying of the multiple package. The handles are suitably articulated relative to the portions of the separators extending between the containers to accommodate folding thereof flat against the top of the multiple package so that several of the packages may conveniently be stacked for display.

For purposes essentially of illustration, the multiple package of FIGURE 4 is also shown as including a premium 34, such as a knife, which is firmly retained against pilferage with the remainder of the package by the band 28.

Another modification of handle means for a multiple package is illustrated in FIGURE 5 wherein two cans 36 and 38 of the beaded rim type, such as two one-quart beverage cans, are banded together with a dry cellulose band 40 and equipped with a handle 42. In this modification, the handle has a portion confined between the cans beneath the upper beads thereof and is slotted as at 44, for passage therethrough of the beads, whereby the beads positively retain the handle in consolidated relation with the cans. This handle is also preferably formed to be folded flat against the top of one can to facilitate stacking of a plurality of the multiple packages.

From these illustrations, it is to be appreciated that the present invention facilitates the provision of multiple packages of items of the same or different shapes, sizes and character and firmly retains the items in consolidated relation against separation and against pilferage whether the items be light or heavy, rigid, crushable or fragile.

In addition to use in multiple packaging, the invention has significant usage in the banding of single items. For example, the bands may be employed according to the invention for identification and/or protection of an item. The bands have been used on hams to cover the aitchbone and thus protects the final wrapping and those handling the ham from the sharp bone. Also, the bands may be used to protect jewelry, such as compacts and lipstick cases, from scratching. Thus, the invention is seen to have wide application.

In use, the band does not detract from or diminish

unit package identity since it only encompasses a portion of each item and is generally employed in partially or substantially wholly transparent or translucent form. This of course is not the only advantage. Due to the fact that the dry cellulose bands can readily be printed in one to five colors, they enhance the package, both as a display items and as a promotion due to their ability to carry directly any desired promotional material. Original art work and printing plates may also be made in economical, condensed form, since stretching of the band increases the type size to that desired. Moreover, since even a printed band covers only a portion of the multiple pack, unit package identity is preserved.

In addition to the foregoing, the invention affords the advantage that after the stretch-shrink cycle, the band is considerably more resistant to shear consequent upon nicking and puncturing than before. The increased resistance, while not fully ascertainable, is apparently due to reorientation of the molecules in the band during stretching. This, of course, appreciably enhances the value of the band for the purpose herein described.

Despite their tenacity in engaging an article, the bands are readily severed or cut so that they occasion no annoyance on the part of the person opening the package. The band is opened more readily than devices conventionally used for multiple packaging and afford the specific advantage that they leave no residue on the banded article. These factors also facilitate conversion of special promotion merchandise to regular merchandise after a promotion.

In commercial practice of the invention to date, manually fed band stretching machines have facilitated banding of the articles at the rate of about twenty bands per minute. At this rate, output reaches nearly ten thousand packages per eight hour shift, a more than satisfactory speed for most applications. With automatic feed, speeds can, as hereinbefore noted, be increased to as much as sixty cycles per minute. This clearly illustrates the commercial practicality of the present invention. In addition, the consistent nature of the stretch-shrink characteristics of dry regenerated cellulose bands permits application of the dry bands to substantially any packaging problem with complete surety.

As previously stated the moisture content of the stock and the bands cut therefrom should be at least about 6% and preferably about 10% or more. The upper limit of the moisture content is about 20-25%; beyond this, there is an undesirable change in the stretch characteristics of the band.

While the foregoing are believed to be the preferred manners of practicing the method of the invention, it is to be appreciated that various changes, rearrangements and modifications may be made therein without departing from the scope of the invention, as defined by the appended claims.

What is claimed is:

1. A process for banding articles with dry regenerated cellulose bands comprising the steps of stretching a dry pliable regenerated cellulose band having a plasticizer content of about 20 to 25% and a moisture content of about 6 to 25% from an initial circumference that is less than the banding circumference of the article but not less than about two-thirds of said banding circumference, to a circumference greater than said banding circumference but not substantially greater than the difference between twice said banding circumference and said initial circumference, and not greater than about one and one-half times said initial circumference, positioning the band while stretched around the article, and releasing the band for relatively slow contraction onto the article.

2. A process for banding articles with dry regenerated cellulose bands comprising the steps of stretching a dry plasticized regenerated cellulose band having a moisture content of about 6 to 25% from an initial circumference

that is less than the banding circumference of the article but not less than about two-thirds of said banding circumference, to a circumference greater than said banding circumference but not substantially greater than the difference between twice said banding circumference and said initial circumference, and not greater than about one and one-half times said initial circumference, and releasing the stretched dry band for positioning around the article, and for relatively slow contraction of the dry band onto the article.

3. A process for banding articles with dry regenerated cellulose bands comprising the steps of stretching a dry plasticized regenerated cellulose band having a moisture content of about 6 to 25% from an initial circumference that is less than the banding circumference of the article but not less than about two-thirds of said banding circumference, to a circumference greater than said banding circumference but not substantially greater than the difference between twice said banding circumference and said initial circumference, and not greater than about one and one-half times said initial circumference, releasing the dry band for positioning around the article, and for relatively slow contraction of the dry band onto the article, and controlling the amount of pressure exerted on the article by the dry band by adjustment of the amount and duration of its stretch.

4. A process for banding articles with dry regenerated cellulose bands comprising the steps of stretching a dry pliable regenerated cellulose band having a plasticizer content of about 20 to 25% and a moisture content of about 6 to 25%, from an initial circumference that is less than the banding circumference of the article but not less than about two-thirds of said banding circumference, to a circumference greater than said banding circumference but not substantially greater than the difference between twice said banding circumference and said initial circumference and not greater than about one and one-half times said initial circumference, releasing the dry band for positioning around the article, and for relatively slow contraction of the dry band onto the article, and controlling the amount of tension exerted on the article by the dry band as a function of the thickness of the band.

5. A process for banding articles with dry regenerated cellulose bands comprising the steps of stretching a dry pliable regenerated cellulose band having a plasticizer content of about 20 to 25% and a moisture content of about 6 to 25% from an initial circumference that is less than the banding circumference of the article but not less than about two-thirds of said banding circumference, to a circumference that is greater than the said banding circumference but not substantially greater than the difference between twice said banding circumference and said initial circumference and not greater than about one and one-half times said initial circumference, and releasing the dry band for positioning around the article, and for relatively slow contraction of the dry band onto the article.

6. A process for banding articles with dry regenerated cellulose bands comprising the steps of stretching a dry pliable regenerated cellulose band having a plasticizer content of about 20 to 25% and a moisture content of about 6 to 25% from an initial circumference that is less than the banding circumference of the article to a circumference that is greater than said banding circumference but not substantially greater than one and one-half times the initial circumference, and releasing the dry band for positioning around the article, and for delayed contraction of the dry band onto the article.

7. A process for banding articles with dry regenerated cellulose bands comprising the steps of stretching a dry plasticized regenerated cellulose band having a moisture content of about 6 to 10% and having an initial circumference that is less than the banding circumference of the article but not less than about two-thirds of said banding circumference to a circumference that is greater than said banding circumference, but not substantially greater

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than the difference between twice said banding circumference and said initial circumference and not greater than about one and one-half times said initial circumference, and releasing the dry band for positioning around the article, and for delayed contraction of the dry band onto the article.

8. A process for banding articles with dry regenerated cellulose bands comprising the steps of stretching a dry pliable regenerated cellulose band having a plasticizer content of about 20 to 25% and a moisture content of about 6 to 10%, and having an initial circumference that is less than the banding circumference of the article but not less than about two-thirds of said banding circumference, to a circumference that is greater than said banding circumference, but not substantially greater than the difference between twice said banding circumference and said initial circumference and not greater than about one and one-half times said initial circumference, releasing the dry band for positioning about the article, and for delayed contraction of the dry band into firm engagement with the article, and controlling the amount of pressure exerted on the article by the dry band by adjustment of the amount of stretch and the duration of the stretching cycle prior to release of the dry band.

9. A process for banding articles comprising the steps of stretching a dry pliable band formed at least in part of regenerated cellulose, and having a plasticizer content of about 20 to 25% and a moisture content of about 6 to 25%, from an initial circumference that is less than the banding circumference of the article but not less than about 80% of the banding circumference of the article to a circumference that is greater than said banding circumference, but to an extent no greater than about twice the difference between said initial circumference and said banding circumference and no greater than about 25% of said initial circumference, and releasing the dry band for positioning about the article, and for delayed contraction of the dry band into firm engagement with the article.

10. A process for banding articles comprising the steps of stretching a dry pliable band formed of cellulosic fibers impregnated with and held together by regenerated cellulose, and having a plasticizer content of about 20 to 25% and a moisture content of about 6 to 25%, from an initial circumference that is less than the banding circumference of the article but not less than about 80% of the banding circumference of the article to a circumference that is greater than said banding circumference, but to an extent no greater than about twice the difference between said initial circumference and said banding circumference and no greater than about 25% of said initial circumference, and releasing the dry band for positioning about the article, and for delayed contraction of the dry band into firm engagement with the article.

11. A process for banding articles comprising the steps of stretching a dry pliable band formed at least in part of regenerated cellulose and having a plasticizer content of about 20-25% and a moisture content of about 6% to 10% from an initial circumference that is less than the

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banding circumference of the article but not less than about 80% of the banding circumference of the article to a circumference that is greater than said banding circumference, but to an extent no greater than about twice the difference between said initial circumference and said banding circumference and no greater than about 25% of said initial circumference, and releasing the dry band for positioning about the article, and for delayed contraction of the dry band into firm engagement with the article.

12. In a method of banding an article by stretching a dry, pliable band formed at least in part of regenerated cellulose from an initial circumference less than the banding circumference of the article to a circumference greater than said banding circumference, and placing the stretched band around the article for contraction thereon, the step of releasing said stretched band before the latter is positioned around said article.

13. In a method of banding an article by stretching a dry, pliable band formed at least in part of regenerated cellulose from an initial circumference less than the banding circumference of the article to a circumference greater than said banding circumference, and placing the stretched band around the article for contraction thereon, the improvement which comprises controlling the amount of pressure exerted on said article by said band by adjustment of the amount and duration of the stretch of said band.

14. In a method of banding an article by stretching a dry, plasticized band formed at least in part of regenerated cellulose and having a moisture content of about 6 to 25%, from an initial circumference that is less than the banding circumference of the article but not less than about two-thirds of said banding circumference, to a circumference greater than said banding circumference but not substantially greater than the difference between twice said banding circumference and said initial circumference and not greater than about one and one-half times said initial circumference, and placing the stretched band around the article for contraction thereon, the improvement which comprises controlling the amount of pressure exerted on said article by said band as a function of the thickness of said band.

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