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F. E. KLIMPL
TEXTILE SHIPPING PACKAGE

3,109,540

Filed Feb. 13, 1961

3 Sheets-Sheet 1

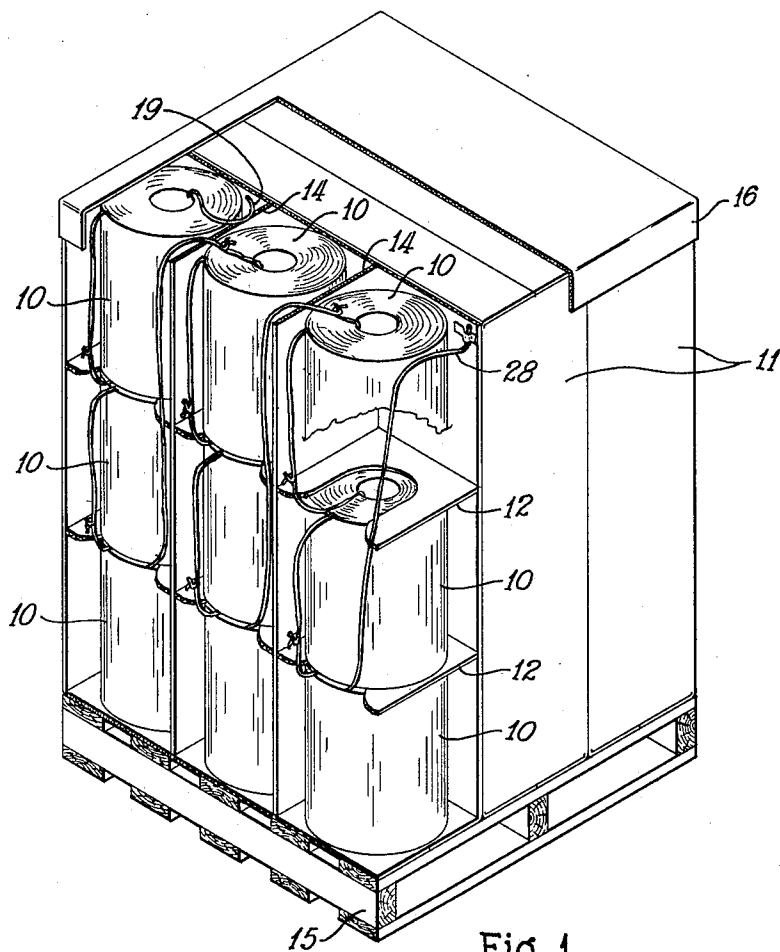


Fig. 1

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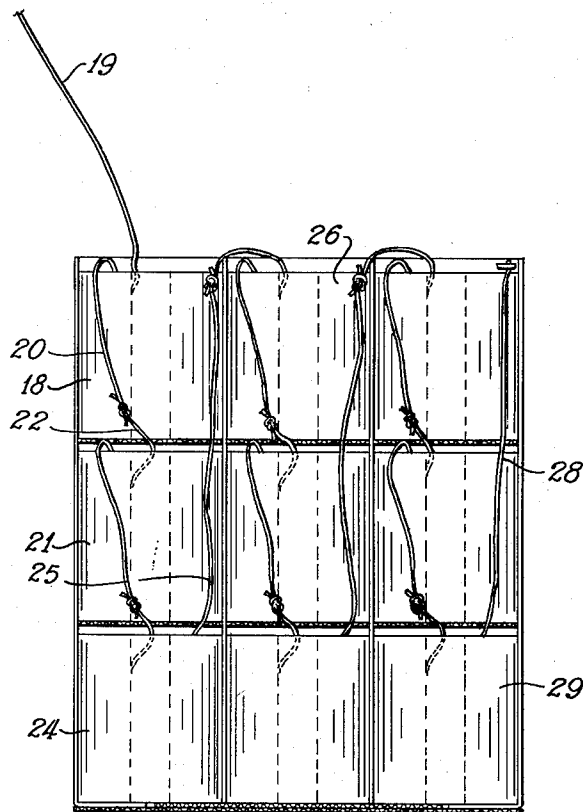


Fig. 2

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3 Sheets-Sheet 3

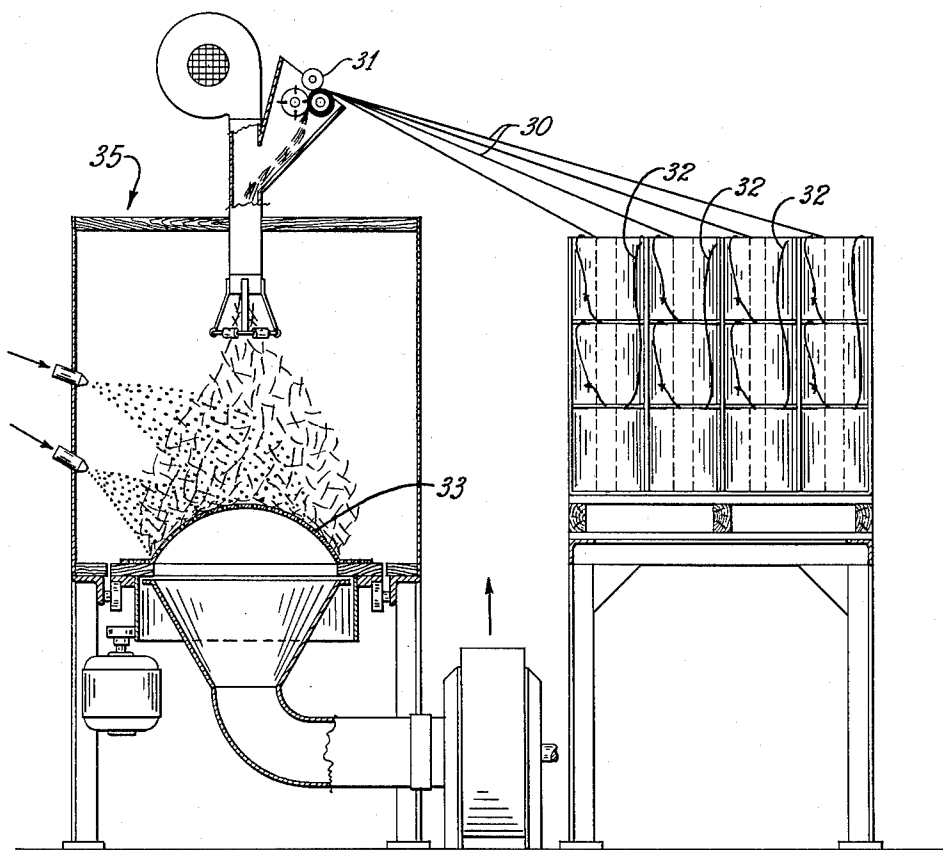


Fig. 3

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TEXTILE SHIPPING PACKAGE

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5 Claims. (Cl. 206—65)

This invention relates to a package for shipping and storing textile strands, yarns or rovings. More particularly this invention provides a package for shipping and in process storage of spools or balls of multifilament glass textile rovings.

In recent years composite materials of many types have come to the forefront. Among the most widely used of these composite materials are organic and inorganic resins reinforced with glass textile fibers.

Textile fibers of glass are produced by melting glass in a feeder that has many small orifices in the bottom. The molten glass from the feeder flows through these orifices and is attenuated into continuous filaments by a revolving mandrel located below the feeder. The continuous filaments are gathered in groups or strands of, for example 204 filaments, before reaching the mandrel and the multifilament strand is thereupon collected about the attenuating mandrel. This multi-filament strand is the basic element from which glass yarns and rovings are formed by collecting, twisting, plying, etc., to construct any of a number of textile forms adapted to meet the demands of particular end uses.

Often, in order to form a more readily handleable textile material for use in reinforcing resins, several multifilament strands are grouped together in parallel side-by-side relationship to form a roving having in the order of forty or more strands. Such roving material may be wound in the form of a large package or ball weighing, for example, 35 pounds or more, which may then be placed in a carton for shipment.

Sometimes the strand of continuous filaments being attenuated from the feeder is looped back and forth upon itself and twisted to form a bulky pseudo spun roving as of the type described in U.S. Patents 2,719,350 and 2,719,352. By regulating the ratio of the speed of the attenuating rolls to the speed of the collecting or twisting mechanism, the bulk of the roving or the number of strands that appear to compose the roving can be controlled.

These parallel and spun rovings are used in a variety of operations for producing reinforced plastics. Such operations include chopping the rovings into short lengths to form a chopped fiber mat which is laid in the mold with the resin. The roving is also sometimes drawn from the ball into which it is wound and is fed directly to a resin-fiber spray gun that chops it into short lengths and simultaneously deposits the short lengths of strands, a resinous matrix, and the necessary amount of catalyst onto a mold. Another operation comprises drawing these rovings from the package balls, chopping them, and then depositing the chopped strands on a foraminous mold that conforms generally to the shape of the article desired. The preformed mass of chopped filaments is then placed in a mold and the necessary amount of resinous matrix is added and cured to form the reinforced resinous article. Roving material is also used in unchopped form by drawing it from the ball, continuously impregnating it by dip passage into a pool of resin, and then drawing the impregnated roving through a die to remove the excess resin, and curing the composite to form a reinforced plastic rod.

Often when producing the roving one of the strands or filaments is colored with suitable dye, or a colored organic or glass yarn is added to the roving to serve as a marker or

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tracer element which enables the operator of a preforming machine or resin-fiber spray gun to quickly and accurately gauge by eye the quantity of glass fibers being deposited on the mold. Also, during the manufacturing of the roving a catalyst or accelerator can be coated onto the strands to eliminate need for pre-mixing of an accelerator therein. In this way the resin is not mixed with the catalyst or accelerator until it comes in contact with the cut glass strand and accordingly it will not polymerize or set up in the storage vessel and will have a greatly prolonged pot life.

By using strands composed of hollow glass filaments when manufacturing the roving, it is possible to markedly decrease the specific gravity of the reinforced resinous composite so that it will float. The openings in the center of such filaments can be made so small that the surface tension of the resin will prevent its flowing into the openings. Because of the difference between the indexes of refraction of glass and air, any rays of light passing through such a composite will be reflected and refracted many times and thus cause the composite to be opaque. Opacity in a fibrous reinforced composite can also be obtained by mixing air into a small amount of the resin to form small bubbles therein and then laminating the resin-air mixture to the surface of the composite before the matrix has cured so that it becomes an integral part of the composite. Such an opaque film applied as a layer of the composite also decreases its specific gravity.

Heretofore, such rovings were generally placed in individual cartons by the manufacturer and shipped to the fabricator who would remove them from their carton and place them in a supply bank or creel. Difficulties arise, however, in that creeling operations require considerable time and it is necessary for the fabricator to either rethread the loom or chopper after each ball has been exhausted or expend a considerable amount of time tying or splicing the individual balls together after placing them on the creel. Further, after the individual balls had been removed from their shipping cartons and placed on the creel, they become contaminated with dirt from the surrounding area, or the outer layers or winds become loose and entangled, thereby rendering efficient unwinding of the balls extremely difficult. Also, since each ball of roving is shipped in a separate carton it is necessary for the fabricator to supply means for disposing of numerous cartons.

Furthermore, the relatively small size of the individual roving packages necessitates frequent re-creeling or transfer to the forming area. Attempts to eliminate these problems by supplying larger balls of roving have been for the most part commercially unsuccessful since the large balls are not easily handled by the fabricating personnel.

In brief, the present invention provides an improved method of packaging rovings, strands, yarns, etc., wherein several individual textile packages or balls are placed in a larger carton type package and the rovings, strands, yarns, etc., on the individual balls within the package are stacked and aligned and tied together mechanically or spliced chemically to permit continuous, uninterrupted, free withdrawal of either one or more ends of the roving from the balls until the material in the carton is completely consumed.

An object of this invention is to provide a more efficient and economical package than has existed heretofore for storing and shipping large quantities of textile materials.

A further object of this invention is to provide a novel arrangement for assembling textile balls within a shipping package which will facilitate the easy uninterrupted withdrawal of the material therefrom.

An advantage of this invention is the elimination of the

necessity to dispose of the numerous empty individual cartons.

Another advantage of this invention is the ease with which a large quantity of roving can be handled and shipped.

Further objects and advantages of this invention will become apparent when reference is made to the following description and drawings in which:

FIGURE 1 is a partially cut-away isometric view of the package of this invention; and

FIGURE 2 is a cut-away view of the package of this invention illustrating more clearly the arrangement by which the wound balls are joined together in the package of FIGURE 1 to permit continuous withdrawal of a single strand therefrom; and

FIGURE 3 illustrates a modified arrangement of the package of FIGURE 2 which permits simultaneous withdrawal of two or more strands of roving where desired in specific processing operations.

It will be apparent as this description of the invention proceeds that it may be successfully employed in the packaging of filaments, strands, yarns and rovings, cords and ropes made of any of a number of organic, inorganic, natural and synthetic materials including cotton, wool, asbestos, nylon, rayon, acrylic and polyester fibers, etc. However, this invention has been developed for and will be described with reference to providing an improved packaging and shipping arrangement for balls of rovings of materials such as glass filaments where such material is subsequently to be incorporated as reinforcing material in a resinous matrix.

As shown in FIGURE 1, several balls of roving 10 are placed in large cardboard cartons 11 for shipment. These large shipping cartons are the same width as the ball of roving and are divided into numerous compartments by horizontal and vertical cardboard or kraft paper dividers or separators 12 and 14. Each ball of roving is packed in a separate compartment to prevent rubbing or chafing of adjacent balls and consequent weakening or breaking of the filaments that compose the roving or entanglement of the rovings themselves. To promote easy shipment, enough of these large shipping cartons are grouped on a standard wooden shipping pallet 15 and a common cover 16 is placed over the top of the group of cartons to hold them in place during shipment. The individual balls of roving, if desired, may be wrapped or bagged in kraft paper, polyethylene, etc., to protect them against handling damage and correspondingly to prevent sloughing, shelling loosening, or slipping of the outer winds of roving during shipment. Rovings of parallel continuous filaments are especially prone to this type of damage. Various other ways of restraining the outer windings and protecting them from slipping and chafing have been proposed, including enclosing the individual balls in resinous films such as polyethylene film bags which may be heat shrunk to securely hold the outer windings in place. Here, as when the kraft paper is wrapped around them, the two ends of the roving are positioned so they extend from the bag to facilitate their being easily tied to other balls of rovings.

The individual balls of roving are commonly wound cylindrically with the leading end on the inside of the balls and they are placed upright within the carton so that it may be easily grasped and the balls unwound from the inside out. The planar separators 12 that prevent the chafing of adjacent balls of roving in a column are preferably made of cardboard or other soft material and U-shaped in design. The cut out in the center permits the balls of roving to be placed in the shipping carton after they have been connected together. The cut-away portion of the separators must be large enough that they do not interfere with the unwinding of the balls from the inside out or the transfer to or the removal of the roving from the lower balls. In order to assure that they do not

so interfere, it is preferred that they be cut away at least as far as the center of the balls.

Provision is made for the folding of the separators up and out of the way for easy removal of the roving in the lower balls by hinging them from one side of the carton. By cutting the separators on a bias before they are fastened to the side wall, it is possible to stress them by forcing them down while the balls of roving are being placed in the container so that they will pop up in parallel to the side wall after the ball above them has been exhausted. They are then out of the way and will not interfere with the removal of the roving from the lower balls. If each of the individual balls of roving is adequately protected by wrapping, it is possible to eliminate the vertical separators 14 and under low loading conditions even the horizontal ones 12.

The carton 11 is constructed so that one major face and the top may be removed leaving the bottom, one major side, minor sides, and horizontal and vertical dividers intact. With the major face and top removed the carton may be easily filled by connecting the balls of roving together and then placing them in the carton. Also, the balls can be placed in the carton and then connected together or, if during removal of the rovings from the carton, the roving should break, it can be easily reached for restarting.

By tying or splicing the trailing ends of the balls of roving to the leading end of the following ball of roving as shown in FIGURE 2 it is possible to withdraw all of the roving from all of the balls in the shipping carton by merely grasping the interior or starting end of the first ball and pulling. The first or starting ball 13 is positioned in the upper corner of the package so its inner end 19 can be easily reached after removing the top of the carton to facilitate the withdrawal of the roving from the ball. The outer end or tail 20 of the roving ball 18 extends over the top of the kraft paper wrapping and is tied or spliced to the leading or inner end 22 of the roving ball 21 located immediately below it. Thus, when the first ball of roving 18 has been completely exhausted, the transfer will be made automatically to the second ball of roving 21. The transfer to the third ball of roving 24 will be made in the same manner because the outer or trailing edge of the second ball will be connected to the leading or inner end of the third ball. The vertical divider 12 that prevents chafing of balls of roving in the column are preferably U-shaped so that after the upper ball of roving has been exhausted the transfer to and withdrawal of roving from the center of the next lower package can be accomplished freely and easily without tendency toward snagging against obstructions.

The trailing end 25 of the third or bottom ball of roving 24 is connected to the leading end of the top ball of roving 26 in another column to provide for a transfer to the adjacent column of balls after the first column has been completely exhausted. In a similar manner the remainder of the balls of roving in the package are connected together to permit a complete removal of all of the roving from the package without "fishing" for the end to another ball after one ball of roving has been exhausted. That is, the balls of roving in vertical columns are tied together end-to-end to permit a continued withdrawal of roving and transfer from ball-to-ball down the column with the trailing end of the bottom ball being connected to the leading end of the top ball of roving in another column.

The trailing end 28 of the last ball of roving 29 in the last column is generally secured to the inner face of the carton near the top to permit it to be readily located and connected to the first ball of roving in another carton and thereby efficiently make a transfer to the second carton.

The balls of roving are generally tied together with a suitable knot. If one is used that will come undone as it passes through the chopper the necessity for picking the knots from finished preform, etc., will be eliminated. By using a splicing material that is compatible with the resin

to be used and will therefore dissolve therein the need for removing knots from the preform etc., can be eliminated.

FIGURE 3 illustrates the use of this type of package to supply several rovings 30 to a preforming machine 35 or other fabricating machinery. The severing mechanism 31 pulls the rovings from the package and cuts them into short lengths. The short lengths of the cut rovings are fed through a tube into an opening in the top of the forming chamber of the preform machine. They are dispersed within the forming chamber and collected on a revolving foraminous mold 33 located on the bottom of the forming chamber.

Several rovings can be simultaneously pulled from this package and still utilize its automatic ball-to-ball transfer characteristics. To convert this package to one from which several ends of roving can be simultaneously withdrawn, it is necessary merely to sever the trailing ends from the bottom balls of roving near the place they are connected to the leading end of a top ball of roving and then feed the free leading ends 30 from the top balls of roving to the severing mechanism.

As shown, the trailing ends 32 from the bottom balls of roving in each column are not connected to the top balls of roving in adjacent columns, but are left hanging loose in the carton. By severing them near the top ball of roving, it is possible to place them so that they may be readily reached and connected to the leading end of balls of roving in other cartons. Thus, by connecting the balls of roving together in vertical columns it is possible to separate the columns into individual feeding units and simultaneously pull more than one end of roving from each carton. This ease of convertibility from a package adapted for the withdrawal of just one end of roving to a package adapted for the simultaneous withdrawal of more than one end makes it possible for the manufacturer to maintain an inventory of only one type of package and still satisfy the requirements of customers who desire a supply source which will provide just one end of roving and other customers who prefer a creel type package to simultaneously supply several ends of roving.

It is apparent that, within the scope of the invention, modifications and different arrangements may be made other than is herein disclosed, and the present disclosure is illustrative merely, the invention comprehending all variations thereof.

I claim:

1. A shipping package comprising a walled container filled with wound packages of strand-like material, said wound packages being arranged in vertical columns within said walled container, horizontal planar members separating adjacent packages in each of said columns, said horizontal planar members being of U-shaped configuration and each being hinged to one wall of said container, each of said wound packages having a leading and a trailing end, the trailing end of each of said wound packages being connected to the leading end of the wound package immediately thereunder and the trailing end of all but one of the bottommost packages in said shipping package being individually connected to the leading end of a wound package at the top of another column whereby automatic transfer from each package to another throughout the complete shipping package during withdrawal of the strand-like material from said shipping package, and the trailing end of the remaining bottom package being secured to a wall of said container in a readily accessible location at the top of said container.

2. The shipping package of claim 1 wherein each of the

leading ends of said wound packages is an inside end of the ball for unwinding of each package from the inside out.

3. A shipping package for strand-like forms of fibrous material comprising a walled container filled with wound packages of such material, each of said packages being generally cylindrically shaped and having an inside leading end and an outside trailing end, said packages being stacked upright in vertical columns within said walled container, U-shaped package separating members hinged to a sidewall of said container and projecting between adjacent packages within the columns, said separators being held in horizontal stressed condition by said packages and being free to spring up after removal of the package thereabove to provide unobstructed unwinding of the package therebelow, the trailing end of each package being connected to the leading end of the package immediately below and the trailing end of all but one of the packages in the bottom layer in said container being individually connected to the leading end of the top package in an adjacent column.

4. A shipping package comprising a walled container filled with wound textile packages of strand-like material arranged generally in vertical columns, each of said packages being separated from the other packages in said container and being of the type adapted to being unwound without removal from said shipping package, U-shaped protective dividers within said container extending between said packages and isolating them from one another, said U-shaped dividers being hinged to one of the four vertical walls so that it can pivot upward so as not to interfere with the extraction of the strands from the package therebelow the trailing end of each of said textile packages being connected to the leading end of the package immediately below it, and the trailing end of all but one of the bottom packages being individually connected to the leading end of a top package in another column.

5. A shipping package comprising a walled container filled with wound packages of strand-like material, said wound packages being arranged generally in vertical columns within said walled container, horizontal planar members extending between adjacent packages in each of said columns to separate them, each of said horizontal planar members being hinged to one wall of said container and having an opening therein extending to the free edge of said separator opposite the hinge, each of said wound packages having a leading end and a trailing end, the trailing end of each wound package being connected to the leading end of the wound package immediately thereunder and the trailing end of all but one of the bottommost packages in said walled container being individually connected to the leading end of a wound package at the top of another column to effect automatic transfer from each package to another throughout the complete walled container during withdrawal of the strand-like material therefrom.

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