

Nov. 6, 1962

A. V. HIGH ET AL

3,062,481

STRAND PACKAGE AND METHOD FOR FORMING SAME

Filed Nov. 3, 1958

5 Sheets-Sheet 1

Fig. 2

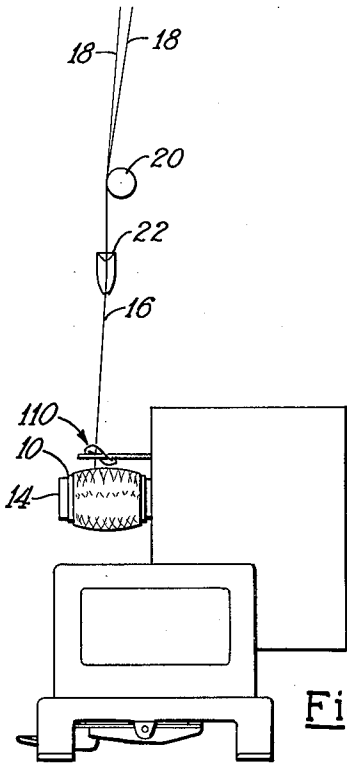
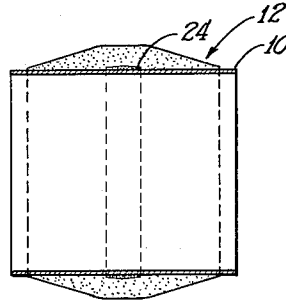


Fig. 1

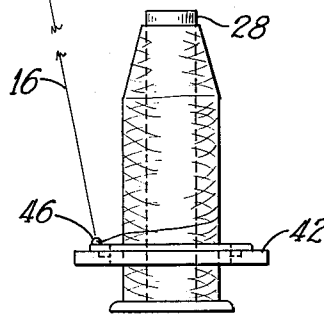
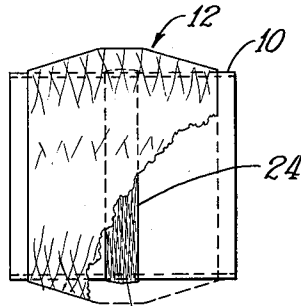


Fig. 3

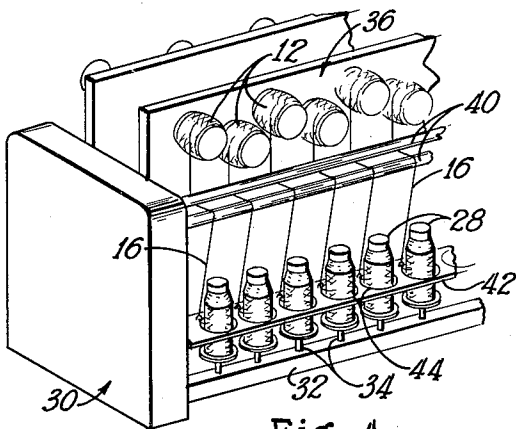


Fig. 4

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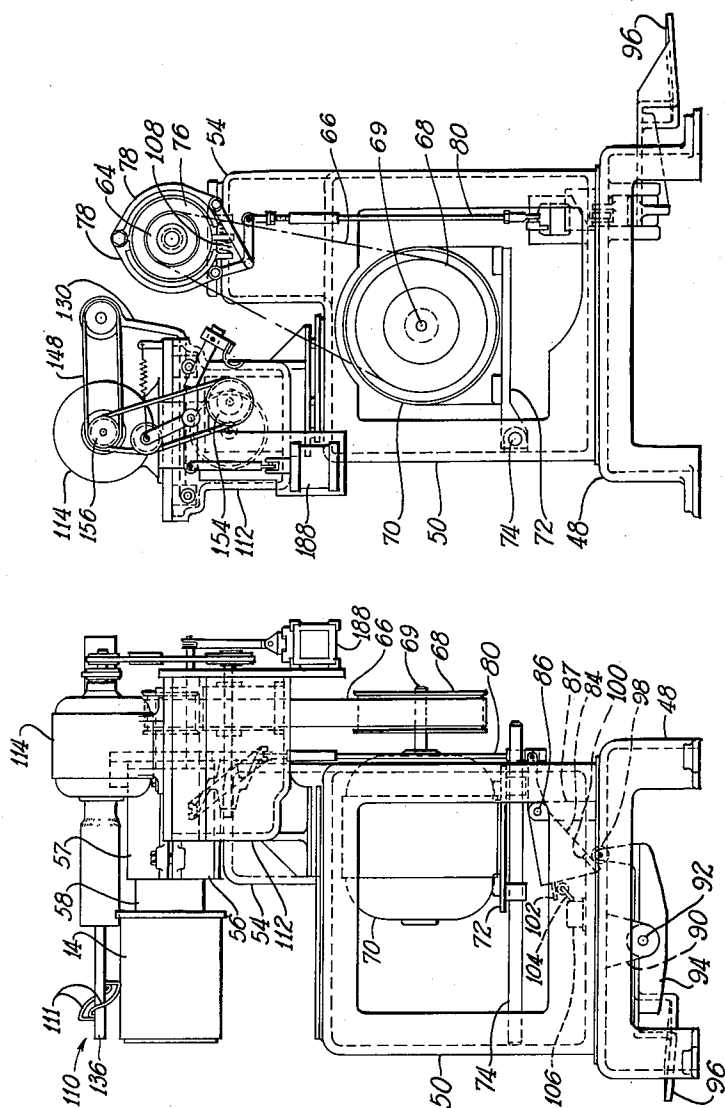


Fig. 6

Fig. 5

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5 Sheets-Sheet 3

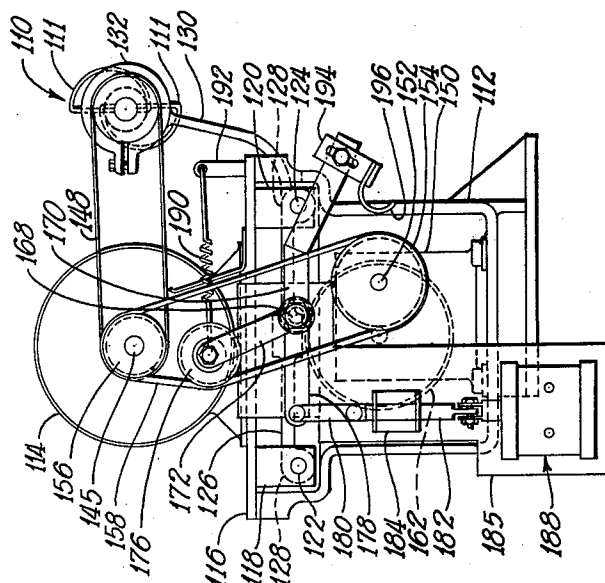


Fig. 8

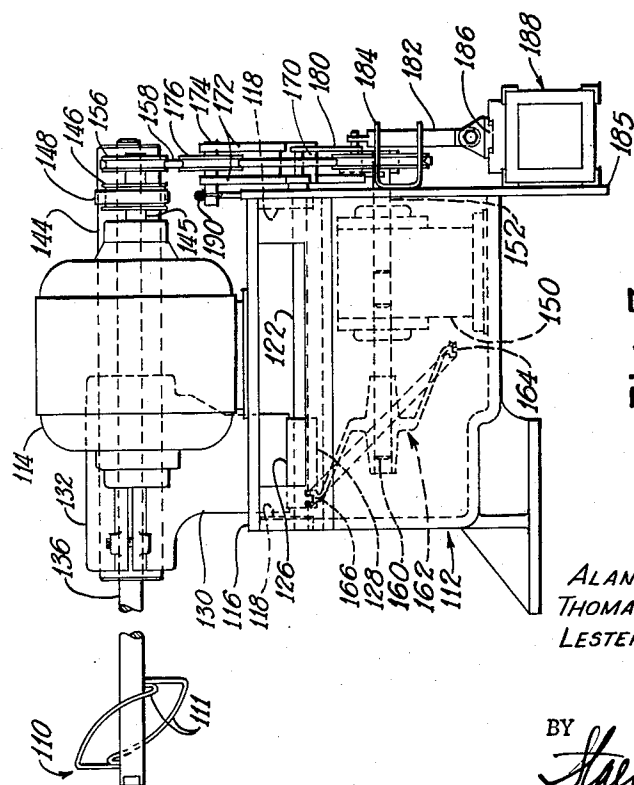


Fig. 7

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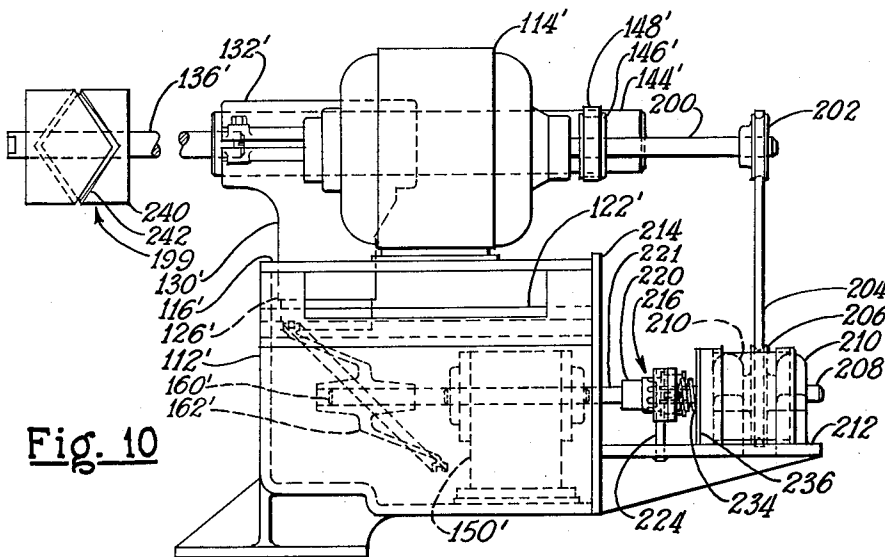
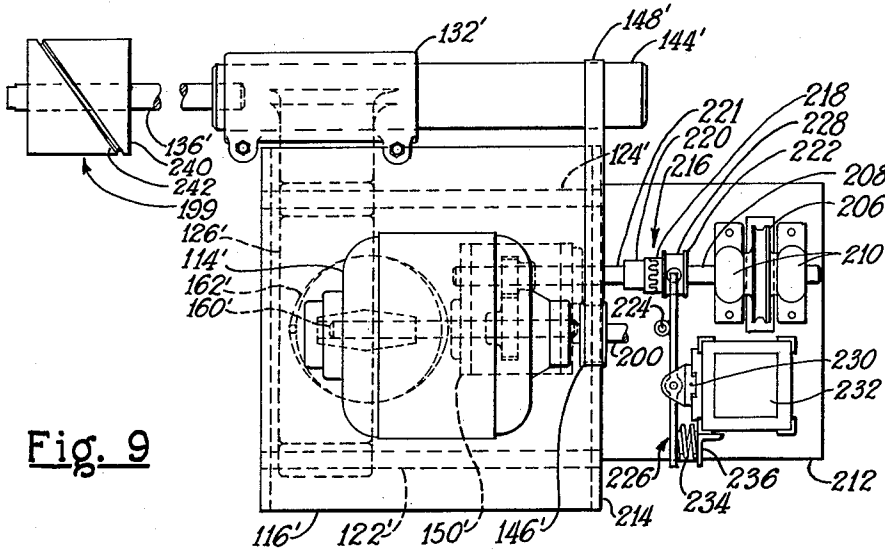
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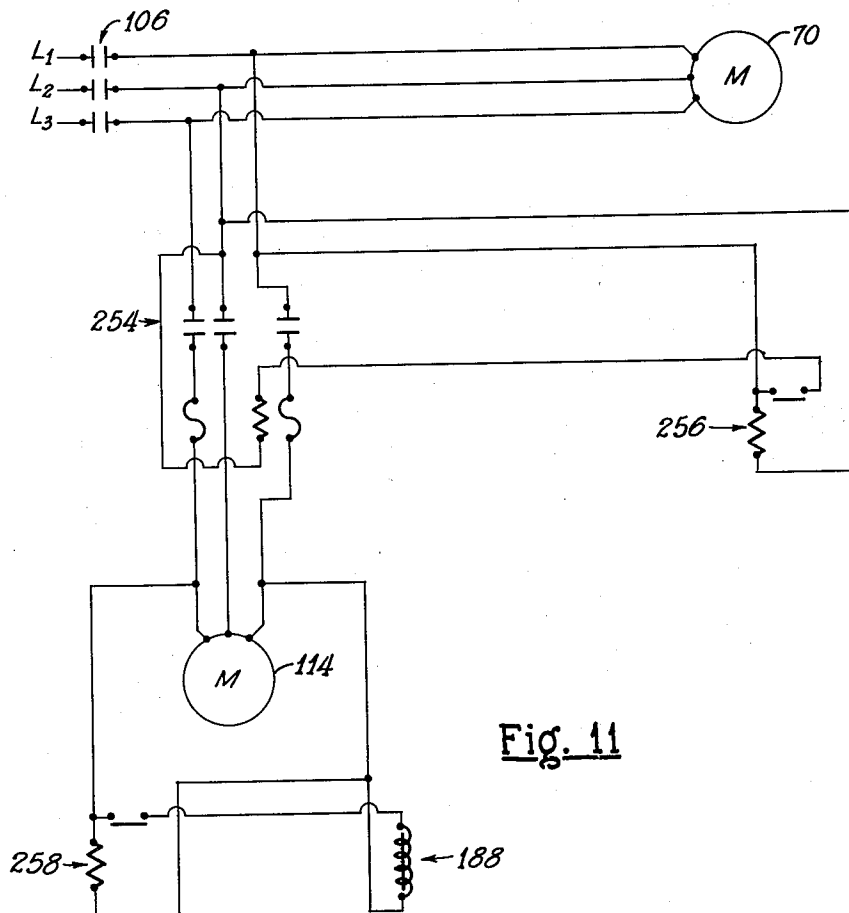


Fig. 11

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3,062,481 STRAND PACKAGE AND METHOD FOR FORMING SAME

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Filed Nov. 3, 1958, Ser. No. 771,675
3 Claims. (Cl. 242—165)

This invention relates to a strand package and to a method for forming same and more especially to a package and method for producing same wherein a portion of the strand is oriented in the package in a manner to provide a visual means or signal indicating the approach of the end of the strand during transfer or rewinding of the strand in subsequent processing operations.

In the textile industry, it has been customary practice for many years to wind strands of fibers or continuous filaments, yarns or threads upon collectors, spools or spindles during the various twisting, plying and other processing operations. In textile operations, strands, yarns or threads may be wound or rewound on sleeves or spindles rotating at high speeds of several thousand revolutions per minute.

In forming certain fibers or filaments such, for example, as continuous filaments of glass, it is a conventional practice to gather the continuous filaments into a strand and to wind the strand on a collector sleeve, cylinder or core. Such strand of glass filaments is collected at winding speeds of upwards of twenty thousand linear feet per minute.

In the formation of the glass fibers or filaments, the filaments are usually coated with a lubricant or binding material as they are formed to reduce interabrasion and to hold the filaments in strand formation. As the strand is being formed and wound at a relatively high rate of speed, the lubricant or binder is usually in a wet or tacky condition when the strand is wound on the collector. By reason of this condition, a traverse mechanism is employed to guide the strand onto the collector in a manner whereby the strand is deposited in large helices so that the strands will cross each other at relatively great angles, thus eliminating or substantially reducing the tendency for the convolutions of strand to become tangled or adhered together by the binder or lubricant. Traverse means of the character disclosed in United States Patent 2,391,870, granted to George Beach on January 1, 1946, is adapted to deposit the strand on a collector in this manner. The traverse is rotated and concomitantly reciprocated lengthwise of the collector so that the convolutions of strand or linear material are not only continuously overlapped in large helices but the strand is deposited over a greater area of the collector in forming the package than is embraced within the distribution span of the rotating traverse without reciprocation.

Packages of strand or linear material have heretofore been formed by winding successive superposed layers of strand or linear material throughout an area of the collector occupied by the strand in the completed package so that there is substantially no visible difference in the width of successive layers of strand or linear material as the package is built up or as the strand is unwound.

It is necessary in textile operations to transfer or rewind strand or linear material from one spool or collector onto another, as for example, in applying twist to the strand, twisting strands together, plying yarns and other similar operations. In such transferring, twisting or rewinding operations, usually a substantial number of strand or yarns are simultaneously transferred from several packages onto other collectors or spools. For example, a twisting machine may be utilized for applying twist to two-hundred or more strands simultaneously and

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the strand or linear material payed out from a like number of spools or packages of the material supported upon a rack or creel. One operator or attendant may take care of several hundred twister spindles, a major duty of the operator being to replace a package when the strand or linear material on the package is exhausted.

As such collecting spools or spindles are rotated at very high speeds, it is essential that the operator be apprised of the approaching end of the strand in the package before it is fully exhausted because the trailing end of the strand or linear material is whipped or slashed against a guide or traverse, which action breaks or fractures short pieces or fragments from the trailing strand. The presence of minute fragments of glass filaments or fuzz is particularly harmful as they collect in the bearings of the winding machine or twister causing excessive wear.

In wound packages of linear material of conventional character, the layers adjacent the collector or spindle surface are of the same width as the layers throughout the remainder of the package. During transfer or twisting of the strand by rewinding, the package from which the material is payed out becomes of decreasing diameter but the strand layers are of full width in the package and there is no means of informing the attendant or operator that a package is about exhausted until the last layer of strand on the spool is payed out. Unless the operator is at the spool position as the last layer is being withdrawn, which may occur in one or two seconds due to the high speed transfer of the linear material, the time is insufficient in which to stop the twister or transfer spindle in order to prevent slashing and whipping of the trailing end against the traverse or other equipment. These difficulties are encountered in all types of operations involving transfer of linear material from a wound package onto a spindle or collector.

The invention embraces a wound package of strand or linear material and a method for forming same wherein the package embodies a special pattern of the strand or linear material adjacent the package sleeve, core or spindle providing a visual indication, signal or flag of a character to apprise the attendant or operator of the approaching end of the strand during operations of unwinding the linear material from the package.

An object of the invention is the provision of a package of strand or linear material wound upon a collector and embodying a region in which a limited number of superposed layers of strand or linear material form a band of lesser width than the standard width of the strand layers in the package providing a signal or indicator for the purpose of visually indicating the extent of removal of the linear material from the package.

Another object of the invention is the provision of a wound package of strand or linear material embodying a special pattern of deposition of superposed layers of the strand or linear material adjacent the supporting core of the package which is different from the pattern of deposition of the material in the remainder of the package providing a visual signal or flag indicating the condition of the package during removal of the strand from the core.

The invention embraces a method of orienting into a wound package a special deposition of the linear material in the package formed by modifying the normal deposition of material so as to build up a visually discernible pattern or region of the material so that during an unwinding operation of the material from a package, an operator is enabled sufficient time to interrupt the unwinding operation as the end of the linear material is payed out to prevent slashing of the trailing end.

Another object of the invention embraces a method of initially winding a restricted or minor area of a collector with a comparatively few layers of linear material

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by a winding operation employing a reciprocable traverse wherein reciprocation of the traverse is temporarily interrupted to effect the deposition of the few layers upon the restricted area of the collector and initiating the reciprocation of the traverse to deposit layers of standard width of the strand material over said layers in the restricted area in forming the package to normal size.

Still a further object of the invention is the provision of a rotatable traverse for guiding strand or linear material onto a rotating collector wherein the rotation of the traverse distributes the strand over a predetermined limited area of the collector, the arrangement embodying means for reciprocating the traverse concomitantly with its rotation to deposit superposed layers of strand material over the initially deposited layers on the restricted area to lay the subsequent convolutions of the strand material in crossing relation in superposed layers over a greater area in completing a wound package of the material.

Further objects and advantages are within the scope of this invention such as relate to the arrangement, operation and function of the related elements of the structure, to various details of construction and to combinations of parts, elements per se, and to economies of manufacture and numerous other features as will be apparent from a consideration of the specification and drawing of a form of the invention, which may be preferred, in which:

FIGURE 1 is a semidiagrammatic view illustrating the novel method of forming a package embodying the invention;

FIGURE 2 is a sectional view of a complete package embodying the invention;

FIGURE 3 is a diagrammatic view illustrating transfer of strand or linear material from the package onto a sleeve of a twister spindle or other collector;

FIGURE 4 is a schematic view illustrating a method of transferring strand from packages onto rotating collectors in imparting twist to the strands;

FIGURE 5 is a side elevational view of a strand winding apparatus embodying a form of means for winding strand or linear material into a package embodying the invention;

FIGURE 6 is a rear view of the arrangement shown in FIGURE 5;

FIGURE 7 is a side elevational view of one form of apparatus for controlling the traverse or guide means for a strand or linear material in forming a package embodying the invention;

FIGURE 8 is an end view of the arrangement illustrated in FIGURE 7;

FIGURE 9 is a top plan view illustrating another form of strand traverse and control means therefor;

FIGURE 10 is a side elevational view of the arrangement shown in FIGURE 9, and

FIGURE 11 is a schematic diagram of the electrical circuits and instrumentalities for controlling the strand traverse and package formation.

The package of the invention may comprise any form or type of strand, thread or linear material wound upon a core, sleeve, spindle or support and embodying the signal or flag in the form of superposed layers of the strand or material of comparatively narrow width which may be positioned anywhere in the package as a flag or signal for indicating the amount of strand or linear material removed from or remaining in the package. The method of forming the flag or signal in a package and the apparatus for carrying out the method are especially adaptable for use in any and all kinds of winding operations of strand or linear material where it is necessary or desirable that an attendant or operator be visually alerted of the approaching end of the strand in a package during unwinding operations.

The novel method and apparatus for forming the package embodying the flag or signal is usable with any strand or linear material which is formed, accumulated or proc-

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essed by winding or rewinding the strand or linear material upon a support or core as, for example, strands of filaments attenuated from filament or fiber-forming resins or glass twisted or untwisted strands, threads, yarns, plied yarns, rovings formed of organic or synthetic fibers or filaments, cotton, wool and other similar materials.

The invention has particular utility in producing a package of strand of glass filaments or fibers. During winding or rewinding operations of strand of glass filaments, the winding or transferring is effected at high linear speeds of upwards of twenty thousand linear feet per minute and the trailing end of the strand or linear body paying off of the package is whipped or slashed against the traverse or guide means and pieces or fragments of the strand or material repeatedly broken off until rotation of the winding spindle ceases.

The broken pieces or fragments of strand, especially if the filaments or fibers are formed of glass, become lodged in the bearings of the winding or strand twisting apparatus resulting in excessive wear and destruction of the bearings. The signal or flag embodied in a package provides, during an unwinding operation, a time interval of several seconds after the flag comes into view to bring the strand winding spindle to rest before the trailing end is completely free of the supply package.

Referring to the drawings, FIGURES 2 and 3 illustrate a formed or wound package of strand or linear material embodying one type of flag or signal which is especially suited to visually forewarn an operator or attendant, during an operation of withdrawing the strand or linear material from the package, that the strand or linear material is nearly expended from the package. The particular form of package illustrated in FIGURE 2 is usually produced by winding newly formed filaments or fibers attenuated from resinous fiber-forming materials or inorganic mineral materials such as glass wherein the softened resin, glass or other material is attenuated to filaments by winding a strand of the filaments upon a collector, core or sleeve which is being rotated at a high speed.

In FIGURE 2, the collector, support or sleeve 10 which forms the core of a strand package 12 is usually six inches or more in diameter and is supported and driven by a suitable collet, spindle or arbor 14 shown in FIGURE 1 which is rotated at a speed of several thousands revolutions per minute to advance the strand or other linear material at a speed of upwards of twenty thousand linear feet per minute.

As indicated diagrammatically in FIGURE 1, the strand or linear material 16 may be made up of individual filaments 18, attenuated from heat-softened glass or other filament forming material, which are gathered into strand formation by a means 20 in the form of a diabolo shaped guide which converges the continuous filaments or fibers into strand or linear bundle formation.

Where the filaments are newly formed, it may be desirable to apply a lubricant or binder to the strand and this may be accomplished by means of an applicator 22 for delivering the coating onto the strand 16 in a well known manner. In conventional methods of winding strand, textile or linear material into a multilayer package, a relatively movable traverse means or guide is employed for distributing the strand lengthwise of the supporting core, sleeve or bobbin and deposit superposed layers on the core 10 until the desired amount of linear material is wound in the package.

In the package of this invention, as shown in FIGURES 2 and 3, a flag or signal comprising several superposed strand layers 24 of comparatively narrow width are first wound or deposited upon the sleeve or core 10 providing a narrow band occupying a minor area of the sleeve. As will be seen in FIGURE 2, the superposed layers 24 of strand form a flag or signal band of sufficient size so that during removal or unwinding of the strand from the package in subsequent processing opera-

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tions, several seconds will elapse from the moment that the entire flag of superposed layers becomes visually apparent until the strand is entirely paid out.

This time interval enables the attendant or operator to bring the winding spindle or collector to rest at the time or before the trailing end of strand is entirely removed from the sleeve 10.

In the conventional methods of winding a strand of other linear material upon a sleeve or support, and particularly a strand formed of filaments of glass, the guide or traverse means is adapted, by its rotation concomitantly with the package winding operation, to reciprocate the strand so that successive convolutions cross one another to prevent an intertangling of the fibers or filaments of adjacent convolutions and avoid winding the strand in successive parallel convolutions. The traverse or guide means is reciprocated as well as rotated to distribute the strand lengthwise of the sleeve to form a package of conventional width.

In the method of the invention, the reciprocation of the traverse or strand guide means is interrupted to provide for the formation of the flag or signal 24 by rotation of the traverse to distribute the strand in a comparatively narrow band. FIGURES 3 and 4 illustrate schematically, the operation of removing strand or linear material from a wound package embodying the invention onto a sleeve or collector 28 carried by a twister spindle of a strand twisting machine or apparatus 30.

In this operation the strand signal or flag 24 is most advantageous. As shown in FIGURE 4, the twister mechanism includes a frame 32 which journally supports spindles or shafts 34 upon which the winding sleeves or collectors 28 are supported.

A portion only of the twister apparatus is diagrammatically shown in FIGURE 4 and in practice one machine may embody several hundred winding spindles 28. The spindles are all driven from a single power source, as for example an electric motor, but a clutch (not shown) individual to each spindle is provided for connecting and disconnecting the spindle with the power source so that each spindle may be stopped and started at will.

The twister apparatus includes a creel 36 having projections each of which is adapted to loosely support one of the packages 12. The individual strand 16 from each package is wound upon an individual spindle sleeve 28 and, by reason of rotation of the spindles, the strand withdrawn from each package 12 is twisted as it is collected or wound upon the spindle sleeve 28. The strands 16 are maintained in tension by engaging them with longitudinally extending bars 40 intermediate their traverse from the packages to the sleeves 28.

Mounted adjacent the twister spindles is a member 42 extending longitudinally of the frame, the member 42 being provided with openings 44 to accommodate the sleeves 28 and the strand or linear material being wound thereon. A guide eye 46 is mounted upon the member 42 adjacent each sleeve 28 through which the strand 16 is threaded as shown in FIGURE 3. The member 42 is arranged to be reciprocated vertically and forms a traverse for distributing the strands 16 lengthwise of the sleeves 28.

When the strand on the package 12 is withdrawn to an extent to render visible the flange 24, the operator, noting the flag on the package core 10, disconnects the clutch (not shown) for the twister spindle adjacent the spent package, to stop rotation of the twister spindle at or about the time that the trailing end of the strand is completely paid out from the package. The operator removes the empty sleeve 10, replacing it with a full package, such as that shown at 12, inserts a vacant collector sleeve upon the spindle, threads the strand from the new package onto the sleeve 28 and engages the clutch to rotate the spindle.

While FIGURES 3 and 4 illustrate one operation in

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processing textile or linear materials of transferring linear material from one package to a collector to form a new package wherein the flag signals the approaching end of a package, it is to be understood that the signal or flag means may be embodied in any form of package wherever it is desired to establish a visual signal.

FIGURES 5 and 6 illustrate a winding apparatus or machine adapted to wind or collect multifilament or fibrous strand or linear material upon a sleeve, or other means forming a core or support for the package, the apparatus including a strand traverse or guide means for distributing the strand or linear material lengthwise of the sleeve or strand collector. The strand traverse mechanism is shown in further detail in FIGURES 7 and 8 and embodies an arrangement for controlling the operation of the strand traverse or guide to deposit superposed layers of strand in a comparatively narrow band 24 on the sleeve 10 and for distributing the remainder of the strand or linear material lengthwise of the sleeve to build up a completed package.

The winding apparatus includes a base structure 48 supporting a frame 50, the frame being formed with an upwardly extending platform structure 54. Supported upon the platform 54 is a journal means 56 provided with a journal cap 57 in which an arbor or shaft 58 is rotatably mounted, one end of which supports the winding collet 14 which receives and rotates the package sleeve or core 10 shown in FIGURE 2 upon which the strand 16 or linear material is collected.

The shaft or arbor 58 is equipped with a pulley 64 connected by a driving belt 66 with a driving pulley 68 mounted upon a shaft 69 of an electrically energizable motor 70. The relative sizes of the pulleys 64 and 68 is such that the winding arbor 58 is rotated at speeds of upwards of 7000 r.p.m. or more whereby the strand is wound upon the sleeve at many thousand linear feet per minute.

The motor 70 is mounted upon a platform or support 72 pivotally carried upon a shaft or rod 74 supported upon the frame. It will be noted from FIGURE 6 that the shaft 74 supporting the motor is at the left side of the motor whereby the weight of the motor is effective to tension the driving belt 66 for driving the winding arbor 58.

The energization of the motor 70 is controlled by foot-operated means, the latter actuating a braking means for rapidly stopping rotation of the winding collet 60 when the energizing circuit of the motor 70 is interrupted.

Mounted upon the shaft or arbor 58 is a brake drum 76 which is adapted to be engaged by a pair of brake shoes or braking members 78. The brake shoes are connected to a suitable actuating rod 80, the lower end of which is connected to a rocker arm or lever 84 fulcrummed intermediate its ends upon a pivot shaft 86 carried by a bracket 87 carried by the frame 50.

The base structure 48 of the winding mechanism is formed with a pair of depending portions 90 bored to accommodate a pivot shaft 92 upon which is fulcrummed an actuating lever 94 for operating the brake shoes 78. One end of the lever 94 is provided with a foot pad portion or treadle 96, the opposite end being provided with a roller 98 adapted for engagement with a ledge 100 formed on the rocker arm or lever 84.

It will be apparent that depression or downward movement of the treadle 96 swings the lever 94 about its pivot 92, moving the roller 98 upwardly to swing the lever 84 in a clockwise direction as viewed in FIGURE 5 exerting a downward pull upon the link 80 to bring the brake shoes 78 into frictional engagement with the drum 76 to stop rotation of the winding collet 14.

The lever 84 is provided with a projection 102 which is cooperatively associated with a pivotally supported arm 104 of a switch 106 which is intercalated in the circuit of the motor 70 to deenergize the motor upon depression

of the treadle 96 and to reestablish the motor circuit when foot pressure is relaxed from the treadle 96.

An expansive coil spring 108 is interposed between the distal ends of the brake shoe 78 and serves to normally hold the brake shoes out of engagement with the drum 76 and to maintain the levers 84 and 94 in the positions illustrated in FIGURES 5 and 6 with the motor controlling switch 106 in circuit-energizing position.

A strand traverse or guide means 110 is provided for the purpose of establishing the flag 24 and distributing the strand lengthwise of the spool or sleeve 10 in laying successive layers of strand thereon. In the winding of newly formed fibers such as those formed of glass, it is imperative that the strand of filaments or fibers be wound in large helices so that the convolutions of strands will cross each other and eliminate the tendency for the adjacent strand convolutions to become entangled and prevent adhesion of the convolutions under the influence of lubricant or coating material that may be applied to the filaments.

The traverse means 110, particularly shown in FIGURES 1, 7 and 8 is especially adapted, when rotated, for guiding the strand onto the package in a manner to lay the strand in crossing helices and, when reciprocated lengthwise of the sleeve or spool 10, to deposit successive superposed full width layers on the sleeve or spool 10. A traverse means of the character illustrated at 110 is fully described in the patent to Beach, No. 2,391,870.

Referring to FIGURES 5 through 8, the winding machine frame 50 supports a housing 112 upon which is mounted a cover member or plate 116 upon which is mounted a second motor 114 for driving the traverse means. Depending from the corner regions of the cover plate 116 are pairs of projections 118 and 120. The projections 118 support a rod or shaft 122 and the projections 120 support a rod or shaft 124.

The rods or shafts 122 and 124 form parallel supports or ways upon which is slidably mounted a carriage 126. The carriage 126 is provided with an upwardly extending portion 130 formed with a hollow cylindrical extension 132 accommodating a bearing means within which the drum-like member 144 is journaled for rotatable movement, the latter carrying the transverse shaft 136. The motor 114 for driving the traverse means is provided with a pulley 146 which is connected by means of a belt 148 with the drum-type pulley or sheave 144 whereby the shaft 136, traverse means 110, and the drum 144 are rotated when the motor 114 is energized.

The arrangement is inclusive of means for effecting reciprocatory movement of the carriage 126 to cause reciprocatory movement of the traverse means 110, the traverse shaft 136 and the pulley 144. Mounted within the housing 112 is an auxiliary housing 150 which encloses suitable speed reducing gearing (not shown).

The input shaft 152 for the gear reducing mechanism in housing 50 is provided with a pulley 154 driven from a pulley 156 mounted on the shaft 145 of the motor 114 by a flexible belt 158 as particularly shown in FIGURE 8. The output shaft 160 of the speed reducing gearing is equipped with a cam or cam wheel 162. The speed reducing gearing in the housing 150 results in a comparatively slow rotation of the cam 162. The cam 162 is formed with a continuous cam groove 164 in the periphery thereof.

The carriage 126 is provided with a cam follower or depending member 166 extending into the cam groove 164 and, by reason of rotation of the cam wheel 162, the carriage 126 is reciprocated along the rods 122 and 124. The carriage 126 and traverse means are reciprocated through a distance equal to the throw of the cam groove 164 for distributing the strand lengthwise of the sleeve 10.

The traverse mechanism illustrated in FIGURES 7 and 8 includes means for interrupting the rotation of the cam wheel 162 to interrupt the reciprocation of the shaft 136

and the traverse means 110 carried thereby for a period of time required to wind the strand upon the sleeve in superposed layers of narrow width to form the signal or flag 24 in the package. Pivottally supported upon a pin 168 is a lever 170 having a pair of upwardly extending portions 172. A stub shaft 174 carried at the upper ends of portions 172 journally supports an idler pulley 176. The idler pulley 176 is normally in engagement with the belt 158 in the manner shown in FIGURE 8. Secured to an extension 178 formed on the lever 170 is a link 180 pivottally connected with a second link 182 the latter being adapted to be guided in a vertical path by means of a bracket 184 fixed to a plate 185 secured to the housing 112. The link 182 is connected with an armature or movable core 186 of a solenoid actuating means 188 mounted on the plate 185.

When the coil of the solenoid 188 is energized, the armature 186 is drawn downwardly and thereby yieldingly engages the idler pulley 176 with the belt 158 to tension the belt and establish a drive from the motor 114 through the gear reducing mechanism contained in housing 150 to rotate the cam wheel 162 which reciprocates the carriage 126 and the traverse mechanism 110.

A contractile spring 190 is connected between the stub shaft 174 and a stationary anchor or member 192 carried by the cover plate 116 so that upon deenergization of the solenoid 188, the contractile force of spring 190 pivots the lever 170 in a clockwise direction as viewed in FIGURE 8 to disengage the idler pulley 176 from the belt 158. This action permits the belt 158 to become slack or loose so that the drive through the pulley 154 and gear reduction mechanism in housing 150 to the traverse supporting carriage is interrupted. Secured to the lever 170 is a bracket 194 provided with a brake shoe 196 which is swung into frictional engagement with the periphery of the driven pulley 154 to assure a stationary condition of the pulley 154 when the belt 158 is in a slackened condition.

Thus when the solenoid 188 is deenergized, the traverse means 110 continues to rotate through the medium of the driving belt 148 but is not reciprocated because of the interruption of rotation of cam wheel 162. During this period the traverse 110 guides the strand or linear material onto a limited area or minor region of the package sleeve 10 to deposit or lay the strand on the sleeve 10 in successive superposed layers of narrow width to form the flag or signal 24. When the solenoid 188 is reenergized, the lever 170 is pivoted in a counterclockwise direction to engage the idler pulley 176 with the belt 158, tensioning the belt and thus reestablishing a drive through the gear reducing mechanism and cam 162 to reciprocate the carriage 126 and traverse means 110. The belt tensioning pulley 176 serves as a clutch means for controlling the operation of the traverse supporting carriage.

The traverse means illustrated in FIGURES 7 and 8 includes a pair of substantially spirally shaped complementary cam members or bars 111 carried by the traverse shaft 136. The cams or bars 111 may be formed of metal wire or any suitable material capable of resisting the wearing action of the strand or linear material, the detailed structural arrangement of the traverse means of this type being illustrated in the patent to Beach, 2,391,870.

FIGURES 9 and 10 illustrate another form of apparatus or means for controlling a traverse mechanism to facilitate building up the flag or signal means 24 shown in FIGURES 2 and 3. In this arrangement the housing 112' supports a cover plate 116' which forms a support for the motor 114'. Disposed within the housing 112' and carried thereby are rods 122' and 124' arranged in parallelism and adapted to support the reciprocable carriage 126' which is slidable thereon.

The carriage 126' extends beyond the housing 112' and is formed with the bearing supporting boss portion 132' in which is journaled the drum member or pulley 144'

which supports the traverse shaft 136' carrying a traverse means 199 of a different form than that illustrated at 110. The shaft 200 of the motor 114' is equipped with a pulley 146' which is connected by means of a belt 148' with the driven drum member 144' for driving the traverse shaft 136' and the traverse means 199. Through this arrangement the traverse means 199 is continuously rotated when the motor 114' is energized.

The motor shaft 200 is also equipped with a pulley 202 connected by means of a driving belt 204 with a pulley 206 fixedly mounted upon a shaft 208, the latter being journaled in suitable bearings carried by bearing supports or blocks 210. The bearing supports 210 are mounted upon a platform 212 which is integral with or secured to an end plate 214 fastened to the housing 112' as shown in FIGURE 10. The shaft 208 is adapted to be connected or disconnected with the input shaft 221 of the speed reducing gearing contained within the housing 150' by a suitable clutch means 216.

The embodiment illustrated in FIGURE 9 includes a dog or toothed clutch member 218 which is splined or otherwise slidably mounted upon the shaft 208 so as to be rotated thereby. The clutch member 218 is adapted for cooperation with a reciprocally shaped dog clutch member 220 fixedly mounted upon the shaft 221. The clutch member 218 is equipped with a peripherally grooved portion 222. Pivotally supported upon a pin or shaft 224 supported by the platform 212 is a lever or lever member 226 adapted for pivotal movement about the axis of the pin 224 as a fulcrum.

One end of the lever 226 is provided with a roller or follower 228 which is received in a peripheral groove formed in portion 222 of the clutch member 218 so that movement of the lever 226 engages and disengages the clutch members 218 and 220 depending upon the direction of movement of the lever. Connected to the other arm of the lever 226 is an armature or movable core 230 of an electrically energizable actuator or solenoid 232 supported upon the platform 212.

Disposed between the lever 226 and a bracket 236 carried by the frame of the solenoid 232 is an expansive spring 234 which, when the solenoid 232 is deenergized, is adapted to move the clutch member 218 out of engagement with clutch member 220 so as to interrupt the rotation of the cam 162' and the reciprocation of the carriage 126' and traverse means 199. Energization of the solenoid 232 causes pivotal movement of the lever 226 in a counter-clockwise direction as viewed in FIGURE 9 to engage the clutch members 218 and 220 and reestablish a drive for reciprocating the cam 262' and the traverse means.

When the solenoid 232 is deenergized, the expansive force of the spring 234 swings the lever 226 to disengage the clutch members 218 and 220 and stop the rotation of cam member 162, but the traverse means 199 continues to rotate but is not reciprocated as long as the clutch members 218 and 220 are disengaged. During this period wherein no reciprocation of the traverse occurs, continued rotation of the traverse effects a building up of superposed layers of strand in the limited area or narrow band in the package to form the flag or signal 24.

In the embodiment of the invention illustrated in FIGURES 9 and 10, the traverse means 199 is in the form of a cylinder or drum shaped member 240, the periphery of which is provided with a diagonally arranged continuous groove 242 to accommodate and guide the strand as it is wound upon the sleeve 10 or other collector.

Thus when the solenoid 232 is deenergized and reciprocatory movement of the transverse means 199 ceases, the continued rotation of the traverse means causes the strand material guided by the groove 242 to be wound or deposited upon the sleeve 10 in large helices in superposed layers extending through a limited area forming a comparatively narrow band of strand in the package providing the flag or signal means 24.

It should be noted that in both forms of the traverse

control arrangement illustrated in FIGURES 7 through 10, the energization of the solenoid actuating means establishes a drive for reciprocating the traverse actuating cam and, upon deenergization of the solenoid actuator, the drive to the traverse reciprocating cam wheel is interrupted.

It is to be understood that this action may be reversed viz. the spring means may be utilized to bias the belt 158 into a tensioned driving position or engage the clutch members 218 and 220 to establish a drive to the traverse reciprocating cam and the energization of the solenoid to withdraw the tensioning or idle pulley 176 to render the belt 158 in slack condition or to disengage the clutch members 218 and 220.

The form of the invention shown in FIGURES 7 and 8 and the form shown in FIGURES 9 and 10 provide a method for interrupting the traverse means to establish the flag or signal build up of strand within the package.

FIGURE 11 is a schematic diagram of the circuit and components for controlling the operation of the winding motor 70 the traverse actuating motor 114 and the instrumentalities for controlling reciprocation of the traverse means to establish the signal or flag build up and to effect the winding of the strand into a complete package. A three phase power supply is indicated at L1, L2 and L3.

The switch 106 schematically illustrated in FIGURE 11 is closed upon release of the foot pedal 96 to supply current to the winding motor 70 and to the motor starter switch mechanism 254 for energizing or deenergizing the traverse actuating motor 114. Intercalated in the motor starter circuit is a traverse delay relay 256. A time delay relay 258 is intercalated in circuit with the solenoid actuator 188 for engaging and disengaging a drive to the traverse reciprocating cam 162.

The operation of the instrumentalities in the circuit illustrated in FIGURE 11 is as follows: The switch 106 is controlled by operation of the treadle 96 shown in FIGURES 5 and 6. The attendant or operator first positions a sleeve 10 on the winding collet 14 while the treadle 96 is depressed. Foot pressure on the treadle is removed which releases the brake shoes 78 and actuates the switch 106 to energize the winding motor 70 and energize the traverse delay relay 256.

The operator directs a first portion of the strand onto the collet supporting the sleeve 10 upon which the package is to be formed. As the winding collet is brought up to speed the traverse delay relay 256 actuates the traverse motor starter 254 which energizes the traverse motor 114. The time delay relay 258 deenergizes the actuating relay 188 preventing actuation of the traverse reciprocating cam 162.

The time delay relay 258 provides the time factor or delay period of reciprocation of the traverse while the rotation of the traverse builds up the narrow band 24 of superposed layers of strand or linear material on the package sleeve or core 10. The hold time of the relay 258 is adjustable so as to regulate or control the amount of strand or linear material wound as a flag or signal in the package and prevents reciprocation of the traverse means until the expiration of the time for which the relay 258 is adjusted.

It is found in practice that at the high linear winding speeds, a visually effective signal or flag 24 of strand may be formed in from fifteen to thirty seconds. When the time factor of the time delay relay 258 expires, it energizes the solenoid actuator 188 to initiate or establish the drive to the reciprocating cam 162 by moving the idle pulley 176 into a position engaging the belt 158 to tension the belt and effect a drive to the pulley 154, the traverse reciprocating cam 162 for the traverse means 110.

The normal reciprocation and rotation of the traverse means continue thereafter until the wound package is completed whereupon the attendant stops the operation of

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both motors 70 and 114 by depression of the treadle 96 to interrupt current flow through the switch 106. The collet 14, carrying the package, is quickly brought to rest by engagement of the brake shoes 78 with the brake drum 76 and enables the attendant to remove the completed package and insert an unfilled sleeve or collector 10 on the collet in preparation for forming a new package in the manner above described.

The circuit and instrumentation illustrated in FIGURE 11 is equally applicable in controlling the arrangement shown in FIGURES 9 and 10 as the solenoid 232 illustrated in FIGURE 9 functions in the same manner as the solenoid 188 shown in FIGURE 7.

It is to be understood that the flag or signal band 24 of strand may be disposed in any area lengthwise of the sleeve 10 but it has been found advantageous in producing a well balanced package to deposit the narrow band 24 of superposed strand layers at the central area or region of the sleeve.

It is to be understood that the method of forming a strand flag or signal in a package of material may be utilized in any type or form of package wherein linear material is wound upon a collector wherever it is desirable in a wound package to provide a visual means signaling a defined region in the package or signaling the approaching end of the strand in the package.

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

1. A method of packaging strand of continuous filaments of mineral material including rotating a cylindrical collector, winding the strand on the collector, oscillating the strand through a predetermined amplitude while maintaining static the median plane of oscillation with respect to the collector to wind a band of strand on the collector of a width substantially equal to the amplitude of oscillation of the strand with the individual convolutions of strand of the band in crossing relation to provide a visual signal in the package, and thereafter traversing the oscillating strand lengthwise of the collector to deposit superposed layers of the strand lengthwise on the collector of greater width than the band of strand with the individual convolutions of strand in crossing relation throughout the package.

2. A method of packaging strand of fibers of mineral

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material including rotating a cylindrical collector, winding the strand on the collector, oscillating and guiding the strand onto the collector to deposit a first winding on the collector comprising a plurality of convolutions of the strand on a minor area of the collector forming a narrow band of strand of a width substantially equal to the amplitude of oscillation of the strand and wherein the individual convolutions of the strand are deposited in crossing relation establishing a visual signal in the package, and thereafter traversing the strand relative to the collector to deposit layers of strand on the collector covering the narrow band of strand and of substantially greater width than the band with the individual convolutions of strand in crossing relation throughout the layers.

3. A wound package of strand of filaments of mineral material including a hollow elongated core, a band of strand surrounding the core comprising a plurality of convolutions of strand on a minor area of the core with the individual convolutions of strand in crossing relation, the width of the band of strand being substantially equal to the amplitude of angularity of the convolutions in their crossing relation, and a group of superposed layers of the strand on said core, the individual convolutions of strand in the superposed layers being in crossing relation, the strand of the band and the superposed layers being continuous and the superposed layers on the core being of substantially greater width than the band.

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