July 10, 1962 J. H. HEALY 3,043,530

APPARATUS FOR PACKAGING STRAND MATERIAL

Filed May 6, 1958 2 Sheets-Sheet 1

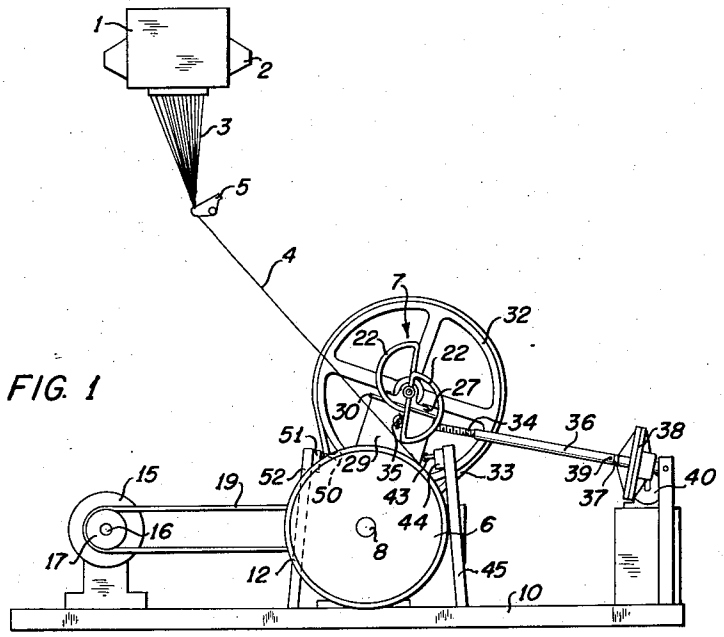


FIG. 1

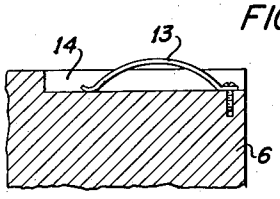


FIG. 3

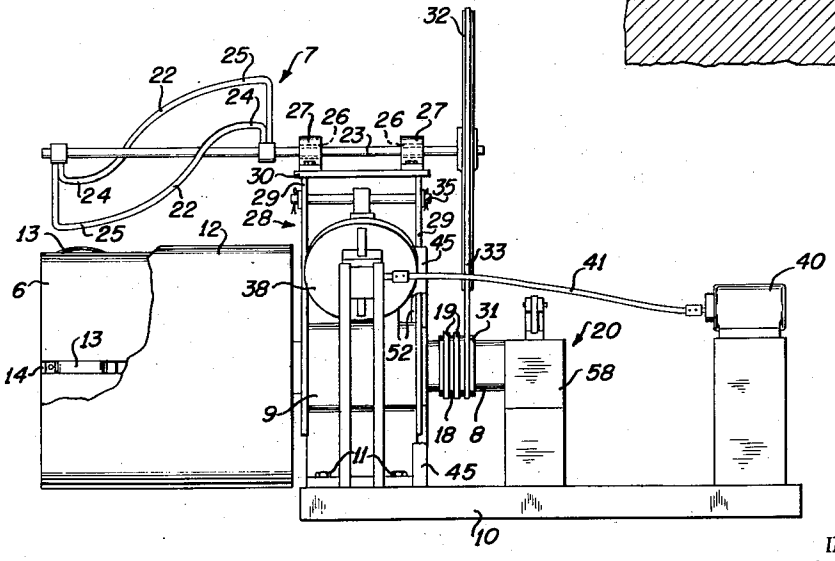


FIG. 2

INVENTOR.
JAMES H. HEALY

BY Adams & Starke

ATTORNEYS

July 10, 1962 J. H. HEALY 3,043,530

APPARATUS FOR PACKAGING STRAND MATERIAL

Filed May 6, 1958 2 Sheets-Sheet 2

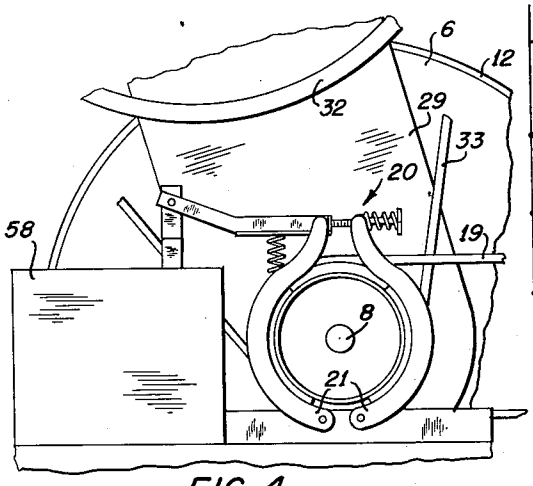


FIG. 4

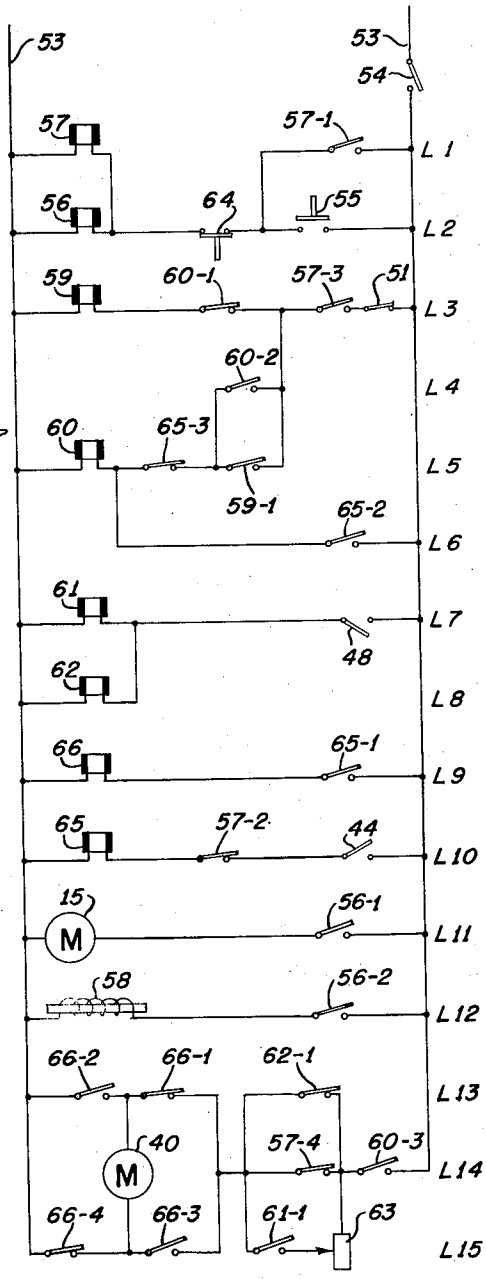


FIG. 7

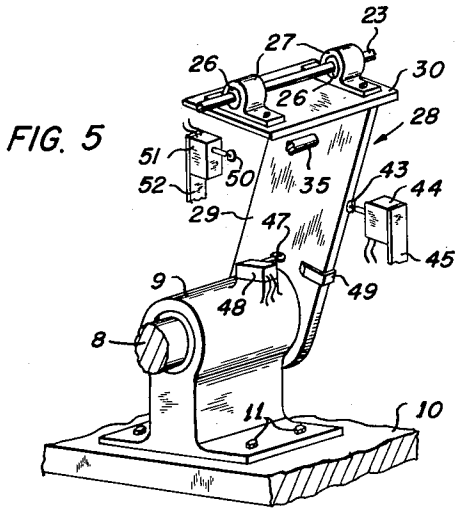


FIG. 5

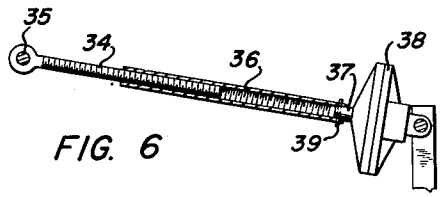


FIG. 6

INVENTOR.
JAMES H. HEALY

BY Adams & Starke

ATTORNEYS

United States Patent Office 3,043,530 Patented July 10, 1962

3,043,530

APPARATUS FOR PACKAGING STRAND MATERIAL

James H. Healy, Milwaukee, Wis., assignor to A. O. Smith Corporation, Milwaukee, Wis., a corporation of New York

Filed May 6, 1958, Ser. No. 733,409
14 Claims. (Cl. 242—43.1)

This invention relates to an apparatus for packaging strand material and more particularly to a traversing mechanism for winding strand material on a rotating support.

In a fiber forming process, such as the forming of glass fibers, the fibers are drawn from molten material contained in a bushing, gathered together in strand form and then wound on a high speed rotating drum or support. The strand is usually wound on the drum in a helical pattern so that the strand will cross over itself at large angles and minimize the tendency of entanglement.

If the strand is traversed or reciprocated along the high speed drum with a constant stroke or length of travel to form the helical pattern of winding, an excessive build-up in thickness of the wound strand will occur at the end points of the stroke of travel of the traverse. This build-up or enlargement in thickness of the wound strand at the ends of the wound package, will result in abrasion of the strand as it is unwound from the package for subsequent use. The abrasion can cause fracture of fibers in the strand and thereby substantially reduce the physical properties of the strand.

The present invention is directed to an improved apparatus for winding strand material on a rotating drum in which the wound package has a substantial uniform thickness and enlargements in thickness at the ends of the package are eliminated. According to the invention, the length or stroke of traverse of the strand is progressively increased during the winding operation, so that the build-up of the strand at the ends of each stroke of the traversing mechanism is moved progressively outwardly toward the ends of the drum with the result that the wound package has a substantially uniform thickness.

More specifically, the strand being wound on the rotating drum is contacted by a rotating, conical spiral-shaped traversing mechanism which moves or reciprocates the strand back and forth along the drum with a given length of stroke to provide the helical winding pattern. During the winding operation, the rotating traversing mechanism is moved toward the strand along an arc of a circle having its center coinciding with the axis of the drum. As the traversing mechanism is moved along this arc, the length of the stroke of reciprocation of the strand is progressively increased so that the build-up in thickness of the wound strand at the ends of each stroke is moved progressively outwardly along the drum. This movement will in effect prevent any substantial build-up in thickness throughout the length of the wound package.

Other objects and advantages will appear in the course of the following description.

The drawings illustrate the best mode presently contemplated of carrying out the invention.

In the drawings:

FIGURE 1 is a diagrammatic front elevation of the apparatus of the invention;

FIG. 2 is an end view of the apparatus of FIGURE 1;

FIG. 3 is an enlarged, fragmentary section of the drum showing the clip attachment of the sleeve to the drum core;

FIG. 4 is a rear elevation of the apparatus of FIGURE 1 and showing the drum brake mechanism;

FIG. 5 is a fragmentary perspective view of the pivotable frame and showing the location of the limit switches;

FIG. 6 is a side elevation, with parts broken away in section, of the screw drive for the frame; and

FIG. 7 is a wiring diagram of the electrical circuit.

The drawings illustrate an apparatus for packaging strand material comprising a metallic bushing 1 which is adapted to contain a molten mass of material, such as glass or the like. The glass in the form of beads or marbles is introduced into the bushing 1 through openings in the upper end of the bushing and an electrical current is applied to the bushing through terminals 2 to heat the glass and melt the same. The molten glass is drawn from a plurality of orifices in the lower surface of the bushing in the form of individual fibers 3 which are collected together as a strand 4 by means of guide member 5. Suitable lubricating and sizing materials may be supplied to the guide member 5 and thus coated on the individual fibers.

The fiber strand is adapted to be wound on a rotating support, such as drum 6 and the strand is contacted by a traversing mechanism, indicated generally by 7, which traverses or reciprocates the strand along the surface of the drum and winds the strand in a generally helical pattern on the drum surface.

The drum is supported for rotatio on a shaft 8 which is journaled within a suitable bearing housed in bearing housing 9. The bearing housing 9 is secured to a base 10 or foundation by bolts 11.

To facilitate removal of the wound package from the drum, an outer sleeve 12 is removably secured around the periphery of the drum 6 by a series of spring clips 13 which are secured within grooves 14 formed in the outer surface of the drum. The clips 13 extend outwardly beyond the surface of the drum and serve to resiliently engage the inner surface of sleeve 12 and bias the sleeve in place during the winding operation.

The drum 6 is rotated by means of a motor 15 which is secured to the base 10. The drive shaft 16 of motor 15 carries a pulley 17 which is connected to pulley 18 on shaft 8 by belts 19. With this arrangement, rotation of the drive shaft 16 serves to rotate shaft 8 and the drum 6 to thereby wind the strand on the surface of the drum sleeve 12.

The rotation of the drum 6 is controlled by a brake mechanism, indicated generally by 20. The brake mechanism is a standard type of solenoid actuated brake having pivotable jaws 21 adapted to engage the shaft 8 to control the rotation of the drum 6.

The traversing mechanism 7 includes a pair of spiral, conical-shaped complementary cam members 22 which are secured to a horizontal shaft 23. The cam members are adapted to rotate with the shaft 23 and are located between the guide member 5 and the drum 6 in position to engage the strand and move the strand back and forth along the surface of the drum to wind the strand in a generally helical pattern on the drum sleeve 12. Each of the cam members extends through slightly more than 180° of a convolution and the small diameter end 24 of each cam member 22 terminates inside of the larger diameter end 25 of the complementary cam member 22. With this construction, the strand moves along one of the cam members from the large diameter end 25 to the small diameter end 24 and is then engaged by the opposite cam member 22 which traverses the strand in the opposite direction along the drum sleeve 12.

The traversing of the strand along the drum sleeve 12 by the cam members 22 produces a wound package having a length substantially equal to the cam members.

The cam members 22, themselves, have a length slightly less than the length of the drum 6 so that the length of the wound package will be slightly less than the length of the drum.

To support the cam members 22 for rotation, the shaft 23 is journaled within bearings 26 housed in brackets 27 which are attached to the upper portion of a pivotable frame 28. The frame 28 includes a pair of spaced arms 29 journaled on the shaft 8, and connected by an upper plate 30 which supports the bearing brackets 27.

The cam members 22 are rotated by motor 15 acting through shaft 8. A pulley 31 is attached to shaft 8 and is connected to a pulley 32 on shaft 23 by means of a belt 33. With this arrangement, the rotation of the motor 15 not only serves to rotate the drum 6 but also rotates the traversing mechanism 7. The rotation of the drum serves to wind the fiber strand on the outer surface of drum sleeve 12 and the rotation of the traversing mechanism serves to successively engage the cam members with the strand to thereby reciprocate the strand along the surface of sleeve 12 and wind the strand in a helical pattern on the sleeve.

During the traverse or reciprocation of the strand along the drum 6, a build-up in thickness of the wound strand will occur at the end points of the stroke of travel of the traverse. This build-up results from the speed of traverse of the strand being decreased toward the ends of the stroke due to the fact that the strand must reverse its direction of travel. This build-up or enlargement in thickness of the wound strand at the ends of the stroke will continue and, if the winding pattern has a traverse of constant length, the completed wound package will have a substantial enlargement at the ends. This enlargement in the wound package will cause serious problems when the strand is unwound from the sleeve for subsequent use, for the strand, when unwound, will rub or abrade across the enlargements and thereby tend to fracture some of the fibers in the strand. This will seriously impair the physical properties of the strand.

To prevent the enlargement or build-up of the strand at the ends of the wound package, the length or stroke of traverse of the strand is progressively varied during the winding operation so that the build-up of the strand at the ends of each stroke is moved progressively along the drum with the result that the wound package has a substantially uniform thickness without any enlargements. This is accomplished by progressively pivoting the frame 28 about the shaft 8 to move the traversing mechanism along an arc of a circle having its center coinciding generally with the axis of the drum 6.

To pivot the frame 28, one end of a screw 34 is pivotally connected by a pin 35 between the arms 29 of frame 28 and a sleeve 36 is threadedly engaged with the other end of screw 34. The sleeve 36 is secured to the output shaft 37 of transmission 38 by a pin 39 and a motor 40 is connected by a flexible shaft 41 to the input shaft of transmission 38. With this arrangement, rotation of the output shaft 37 of the transmission 38 serves to extend or retract the screw 34 with respect to the sleeve 36 and thereby pivot the frame 28 about the shaft 8.

As best shown in FIGURE 1, pivoting the frame in a counterclockwise direction toward the fiber strand will result in the length of stroke of traverse being increased, while movement of the frame 28 in a counterclockwise direction in FIGURE 1 will result in a decreased stroke of traverse of the strand on the drum 6.

The pivotal movement of frame 28 is controlled by a series of switches which are sequentially actuated. In operation of the apparatus, the frame 28 is initially pivoted clockwise, as shown in FIG. 5, to permit the strand to be attached to the drum sleeve 12 without interference from the traversing mechanism. At this time, the edge of one of the arms 29 is in engagement with the roller 43 of a limit switch 44. The limit switch 44 is secured to the upper end of a bracket 45 which is supported on base 10.

After the drum reaches operating speed and the strand is attached thereto, the frame 28 is then pivoted counterclockwise at a high rate of speed to bring the cam members 22 into engagement with the strand 4. This pivotal movement of frame 28 results in the roller 47 of limit switch 48 being engaged by bar 49 secured to arm 29, and the pivotal movement of the frame 28 is then slowed so that the frame will move very slowly in a counterclockwise direction toward the strand to progressively increase the length of stroke of reciprocation of the strand.

At the end of the winding operation, the opposite edge of arm 29 contacts a roller 50 of limit switch 51 to stop the movement of the frame 28. The limit switch 51 is supported by a bracket 52 secured to the base 10. The actuation of limit switch 51 serves to set up circuitry to return the frame to its original position.

The electrical circuit employed to control the apparatus is shown in FIG. 7. In this diagram, the main power lines are indicated by 53 and a series of branch lines are connected across the main power lines and are designated by an L series of numbers, such as L1, L2, etc., and the contacts actuated by a given relay are designated by the reference numeral of the relay and the hyphenated number.

At the start of operation, the frame 28 is at the farthest clockwise position, as shown in FIG. 5, with the edge of the arm 29 in engagement with the roller 43 of limit switch 44 in L10 to hold the switch open. The switch 48 in L7 is open at this time and the switch 51 in L3 is closed.

To begin operation, the main power switch 54 is closed and the start button 55 in L2 is depressed to energize relays 56 in L2 and 57 in L1. Energizing relay 56 closes contacts 56–1 in L11 to actuate motor 15 and also closes contacts 56–2 in L12 to actuate brake solenoid 58 to release the brake jaws 21 on the drum shaft 8. Both the traversing mechanism 7 and the drum 6 are then rotated by means of the motor 15.

Energizing relay 57 closes contacts 57–1 in L1 to lock in the relays 56 and 57 after the start button 55 is released. In addition, the energization of relay 57 opens normally closed contacts 57–2 in L10, closes contacts 57–3 in L3 and opens the normally closed contact 57–4 in L14.

As the switch 51 in L3 is closed at this time, the closing of contacts 57–3 in L3 energizes the timing relay 59, and the energizing of timing relay 59 closes contacts 59–1 in L5 to energize relay 60 in L5. Energizing relay 60 opens the normally closed contacts 60–1 in L3 to de-energize the timing relay 59. The timing relay contacts 59–1 are set for a given period of delay before closing to permit the drum to get up to speed before the frame 28 is moved by energization of relay 60. The frame 28, at this time, being in the farthest clockwise position is, in effect, out of the way of the drum and permits the convenient attachment of the strand to the drum. After the strand is attached and the drum is running at its operating speed, the frame is then pivoted counterclockwise.

The energizing of relay 60 also closes contacts 60–2 in L4 to lock in the relay 60 after the contacts 59–1 in L5 have been opened due to the de-energizing of timing relay 59. In addition, the energizing of relay 60 also closes contacts 60–3 in L14. Closing of contacts 60–3 serves to energize motor 40 through L13. The starting of motor 40 pivots the frame 28 toward the strand and closes switch 44 in L10. Frame 28 is pivoted at a high rate of speed until the limit switch 48 is engaged by bar 49 to close the switch 48.

The closing of switch 48 in L7 energizes timing relay 61 in L7 and relay 62 in L8. Energizing relay 62 opens normally closed contacts 62–1 in L13 and energizing timing relay 61 closes normally open contacts 61–1 in L15. The motor 40 is then energized through the closed contact 60–3, variable resistance 63 and contacts 61–1 to advance the frame 28 at a low speed determined by the

resistance setting. Contacts 57–4 in L14 are open at this time. The timing relay contacts 61–1 are set to intermittently close and thereby intermittently energize motor 40. This causes the frame to move in short increments rather than with a continuous slow movement. It is contemplated that a steady slow movement could also be employed, if desired.

The slow pivotal movement of the frame 28 progressively increases the stroke of traverse of the strand and thereby produces a wound package of substantially uniform thickness.

At the far end of travel of frame 28, the edge of arm 29 engages roller 50 of switch 51 to open switch 51 in L3 and de-energize relay 60. De-energizing relay 60 opens contacts 60–3 in L14 to stop the motor 40. The drum motor 15 continues to operate until the manual stop 64 in L2 is pushed to de-energize relay 56.

At this time, switch 44 in L10 is closed and the pushing of stop button 64 de-energizes relay 57 to close contacts 57–2 in L10 and energize relay 65. Energizing relay 65 closes contacts 65–1 in L9 to energize relay 66 and this sets up the reversal of motor 40 to return the frame 28 to its original position. Energizing relay 66 opens the normally closed contacts 66–1 in L13 and closes the normally open contacts 66–2. In addition, the normally open contacts 66–3 in L15 are closed and the normally closed contacts 66–4 in L15 are open.

Energizing relay 65 also closes contact 65–2 in L6 to energize relay 60. Energizing relay 60 closes contacts 60–3 in L14. Contacts 57–4 in L14 are also closed at this time so that the motor 40 is actuated through closed contacts 60–3, 57–4 and 66–3 and 66–2 to operate the motor in the reverse direction and return the frame 28 to its original position.

When the frame reaches its end point of travel, switch 44 is engaged to open and de-energize relay 65. This opens contacts 65–2 and de-energizes relay 60 to stop the traversing mechanism motor 40. De-energizing relay 65 also closes contact 65–3 in L5 which serves to prevent current from backing up through L5 to energize timing relay 59.

While the above description is directed to the stroke or length of traverse being progressively increased, it is contemplated that the stroke could initially be of a maximum length and then decreased. Similarly, while the description is directed to glass fibers, the invention is applicable to other mineral or synthetic fibers which are drawn from a molten mass.

The present invention provides a simple and inexpensive apparatus for winding a strand on a rotating support in which build-ups or enlargements in thickness in the wound package are avoided and the package has a substantially uniform thickness.

Various modes of carrying out the invention are contemplated as being within the scope of the following claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention.

I claim:

1. In a winding mechanism, a rotatable support adapted to receive and wind a strand thereon, traversing means for engaging the strand and reciprocating said strand axially along the support with a given stroke of travel to thereby wind the strand on the support in a generally helical pattern, means for rotating said traversing means about the axis thereof, and means for moving said traversing means laterally of the axis of said support to progressively change the length of stroke of reciprocation of the strand so that the build-up in thickness of the wound strand at the ends of the stroke of reciprocation is progressively moved axially along the support during the winding operation to thereby provide a wound package having a substantially uniform thickness.

2. In a winding mechanism, a rotatable drum adapted to receive and wind a strand thereon, guide means for guiding the strand toward said drum, traversing means for engaging the strand and reciprocating said strand axially along the drum with a given stroke of travel to thereby wind the strand on the drum in a generally helical pattern, said traversing means being located between said guide means and said drum and including a plurality of complementary cams of conical spiral shape supported for rotation on a shaft disposed substantially parallel to the axis of said drum, and means for moving said traversing means laterally of the axis of said drum to progressively change the length of stroke of reciprocation of the strand so that the build-up in thickness of the wound strand at the ends of the stroke of reciprocation is progressively moved axially along the drum during the winding operation to thereby provide a wound package having a substantially uniform thickness.

3. In a winding mechanism, a rotatable drum adapted to receive and wind a strand thereon, traversing means for engaging the strand and reciprocating said strand axially along the drum with a given stroke of travel to thereby wind the stand on the drum in a generally helical pattern, said transversing means including a plurality of complementary cams of conical spiral shape with the major diameter of one cam being opposed to the minor diameter of adjacent cams and said cams being supported for rotation on a shaft disposed substantially parallel to the axis of said drum, and means for moving said traversing means along an arc of a circle having the center thereof substantially coinciding with the axis of said drum to progressively change the length of stroke of travel of the strand with respect to the cams so that the build-up in thickness of the wound strand at the ends of the stroke of reciprocation is progressively moved axially along the drum during the winding operation to thereby provide a wound package having a substantially uniform thickness.

4. In a winding mechanism, a rotatable support, means for rotating said rotatable support, a cylindrical member mounted on said rotatable support and adapted to receive and wind a strand thereon as said rotatable support is rotated, a frame pivotally mounted about the axis of said rotatable support and extending radially outward beyond the periphery of said cylindrical member, a shaft rotatably supported on the outer end portion of said frame and being generally parallel and co-extensive with the axis of said rotatable support, means for rotating said shaft, a traversing mechanism mounted for rotation on said shaft and disposed to engage the strand and reciprocate said strand axially along the cylindrical member with a given stroke of reciprocation to thereby wind the strand on the cylindrical member in a generally helical pattern, and means for pivoting said frame about the axis of said rotatable support to vary the length of stroke of reciprocation of the strand so that the build-up in thickness of the wound strand at the ends of the stroke of reciprocation is progressively moved axially along the cylindrical member during the winding operation to thereby provide a wound package having a substantially uniform thickness.

5. In a winding mechanism, a rotatable member, means for rotating said rotatable member, a cylindrical member mounted on said rotatable member and adapted to receive and wind a strand thereon as said rotatable member is rotated, guide means for collecting and guiding the strand toward said cylindrical member, a frame pivotally mounted about the axis of said rotatable member and extending radially outward beyond the periphery of said cylindrical member, a shaft journalled in the outer end portion of said frame and being generally co-extensive with said rotatable member, means for rotating said shaft, a traversing mechanism mounted for rotation on said shaft and disposed to engage the strand and reciprocate said strand axially along the cylindrical member with a given stroke of reciprocation to thereby wind the strand on the cylindrical member in a generally helical pattern,

said traversing means being located between said guide means and said rotatable member and including a plurality of complementary cams of conical spiral shape with the major diameter of one cam being opposed to the minor diameter of adjacent cams, and means for pivoting said frame about the axis of said rotatable member to vary the length of stroke of reciprocation of the strand with respect to the cams so that the build-up in thickness of the wound strand at the ends of the stroke of reciprocation is progressively moved axially along the drum during the winding operation to thereby provide a wound package having a substantially uniform thickness.

6. In a winding mechanism, a rotatable drum adapted to receive and wind a fibrous strand thereon, guide means for guiding the strand toward said drum, a traversing mechanism mounted for rotation about an axis located substantially parallel to the axis of said drum and disposed to engage said strand and reciprocate said strand axially along the drum with a given stroke of reciprocation to thereby wind the strand on the drum in a generally helical pattern, driven means for rotating said drum and said traversing mechanism, means for withdrawing said traversing mechanism out of the plane extending from the guide means to said drum at the start of the winding operation to facilitate attachment of said strand to said drum, means for moving said traversing mechanism in a direction toward said plane along an arc of a circle having the center thereof coinciding with the axis of said drum at a substantially high rate of speed after said drive means is operating at a predetermined speed to bring said traversing mechanism into engagement with the strand, and means responsive to a given amount of movement of said traversing mechanism in said direction for reducing the speed of said traversing mechanism and moving said traversing mechanism in said direction along said arc at a substantially reduced speed to thereby progressively vary the length of stroke of reciprocation of the strand so that the build-up in thickness of the wound strand at the ends of the stroke of reciprocation is progressively moved axially along the drum during the winding operation to thereby provide a wound package having a substantially uniform thickness.

7. In a winding mechanism, a rotatable drum adapted to receive and wind a fibrous strand thereon, guide means for guiding the strand toward said drum, a traversing mechanism mounted for rotation about an axis located substantially parallel to the axis of said drum and disposed to engage said strand and reciprocate said strand axially along the drum with a given stroke of reciprocation to thereby wind the strand on the drum in a generally helical pattern, drive means for rotating said drum and said traversing mechanism, said traversing mechanism being disposed at a withdrawn position out of the plane extending from the guide means to said drum at the start of the winding operation to facilitate attachment of said strand to said drum, means responsive to said drive means operating at a given speed for moving said traversing mechanism in a direction toward said plane along an arc of a circle having the center thereof coinciding with the axis of said drum at a substantially high rate of speed to bring said traversing mechanism into engagement with the strand, means responsive to a given amount of movement of said traversing mechanism in said direction for reducing the speed of said traversing mechanism and moving said traversing mechanism in said direction along said arc at a substantially reduced speed to thereby progressively vary the length of stroke of reciprocation of the strand so that the build-up in thickness of the wound strand at the ends of the stroke of reciprocation is progressively moved axially along the drum during the winding operation to thereby provide a wound package having a substantially uniform thickness, and means for automatically returning said traversing mechanism to said withdrawn position after completion of winding of said package.

8. In a method of packaging strand material, the steps of winding the strand on the peripheral surface of a rotating support, engaging the strand with a traversing mechanism to traverse the strand axially along the surface of said rotating support with a given stroke of traverse to wind the strand on said support in a generally helical pattern, and progressively moving the traversing mechanism along an arc of a circle having the center thereof coinciding generally with the axis of said rotating support so that the build-up in thickness of the wound strand at the ends of the stroke of traverse is progressively moved axially along the drum during the winding operation to thereby provide a wound package having a substantially uniform thickness.

9. A method of packaging strand material, comprising collecting a plurality of continuous filaments into strand form, winding the strand on the surface of a rotatable support, engaging the strand with a traversing mechanism to reciprocate the strand axially along the surface of said support with a given stroke of reciprocation to provide a generally helical winding pattern, and slowly moving said traversing mechanism along an arc of a circle having the center thereof coinciding with the axis of said support to progressively vary the length of stroke of reciprocation of the strand so that the build-up in thickness of the wound strand at the ends of the stroke of reciprocation is progressively moved axially along the drum during the winding operation to thereby provide a wound package having a substantially uniform thickness.

10. A method of packaging strand material, comprising collecting a plurality of continuous filaments into strand form, winding the strand on the surface of a rotatable support, engaging the strand at a position between the location of collecting the fibers and said support with a traversing mechanism pivotally mounted about the axis of said support to thereby reciprocate the strand axially along the surface of said support with a given stroke of reciprocation and provide a generally helical winding pattern, and progressively pivoting said traversing mechanism about said axis to progressively vary the length of stroke of reciprocation of the strand so that the build-up in thickness of the wound strand at the ends of the stroke of reciprocation is progressively moved axially along the drum during the winding operation to thereby provide a wound package having a substantially uniform thickness.

11. A method of winding a fibrous strand on a rotating support by use of a rotating traversing mechanism, comprising initially moving said traversing mechanism to a withdrawn position with respect to said support to facilitate attachment of the strand to the rotating support, moving the traversing mechanism along an arc of a circle having the center thereof coinciding with the axis of said support at a high rate of speed to engage the traversing mechanism with the strand and thereby reciprocate the strand along the support and wind the strand on the support in a helical pattern, subsequently moving said traversing mechanism along said arc after engagement with said strand at a substantially slower rate of speed than said first rate of speed to progressively increase the stroke of reciprocation of the strand so that the build-up in thickness of the wound strand at the ends of the stroke of reciprocation is progressively moved axially along the drum during the winding operation to thereby provide a wound package having a substantially uniform thickness, and returning said traversing mechanism to said withdrawn position after completion of winding of said package in preparation for winding a second package.

12. In a winding mechanism, a rotatable member adapted to receive and wind a fibrous strand thereon, a traversing mechanism mounted for rotation about an axis located substantially parallel to the axis of said rotatable member and disposed to engage the strand and traverse said strand axially along the rotatable member to thereby wind the strand on the rotatable member in a generally helical pattern, and means for moving the traversing mechanism in a direction generally normal to the axis of

the rotatable member to thereby change the length of stroke of traverse of the strand with respect to the rotatable member so that the buildup in thickness of the wound strand at the ends of the stroke of traverse is moved axially along the rotatable member during the winding operation to provide a wound package having a substantially uniform thickness.

13. In a method of packaging strand material, the steps of winding the strand on the peripheral surface of a rotating support, rotating a traversing mechanism about the axis thereof, engaging the strand with the traversing mechanism to traverse the strand axially along the surface of said rotating support with a given stroke of traverse to wind the strand on said support in a generally helical pattern, and progressively moving the traversing mechanism generally normally of the axis of the rotating support while rotating said traversing mechanism to thereby vary the stroke of traverse of the strand so that the buildup in thickness of the wound strand at the ends of the stroke is progressively moved axially along the drum during the winding operation to provide a wound package having a substantially uniform thickness.

14. A method of packaging strand material, comprising collecting a plurality of continuous filaments into strand form, rotating a traversing mechanism about the axis thereof, engaging the strand with the traversing mechanism to reciprocate the strand axially along the surface of said support to provide a generally helical winding pattern, and moving said traversing mechanism in a direction toward the strand while rotating said traversing mechanism to progressively increase the length of stroke of reciprocation of the strand so that the buildup in thickness of the stroke of reciprocation is progressively moved axially outward along the drum during the winding operation to provide a wound package having a substantially uniform thickness.

References Cited in the file of this patent

UNITED STATES PATENTS

2,379,813	Loveridge et al.	July 3, 1945
2,391,870	Beach	Jan. 1, 1946
2,433,304	Stream	Dec. 23, 1947
2,629,560	Abbe	Feb. 24, 1953
2,685,763	Courtney et al.	Aug. 10, 1954
2,782,563	Russell	Feb. 26, 1957

FOREIGN PATENTS

137,997	Switzerland	May 1, 1930