Oct. 18, 1966 R. G. RUSSELL ETAL 3,279,904

METHOD AND APPARATUS FOR PRODUCING A WOUND TEXTILE PACKAGE HAVING UNIFORM TENSION

Original Filed Sept. 11, 1956 4 Sheets-Sheet 1

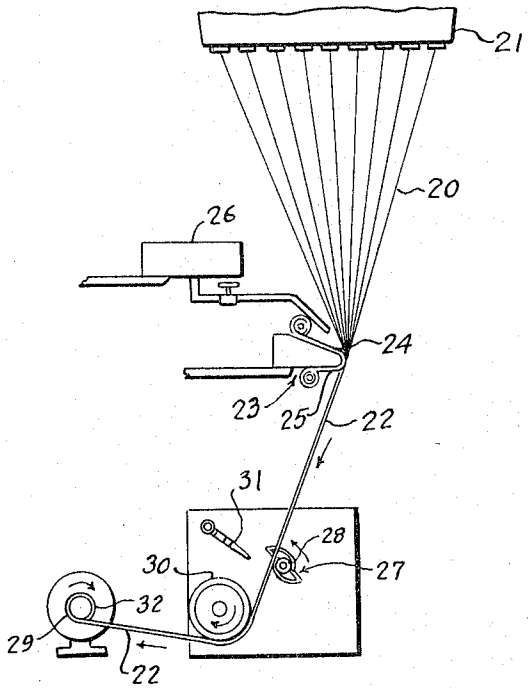


FIG. 1.

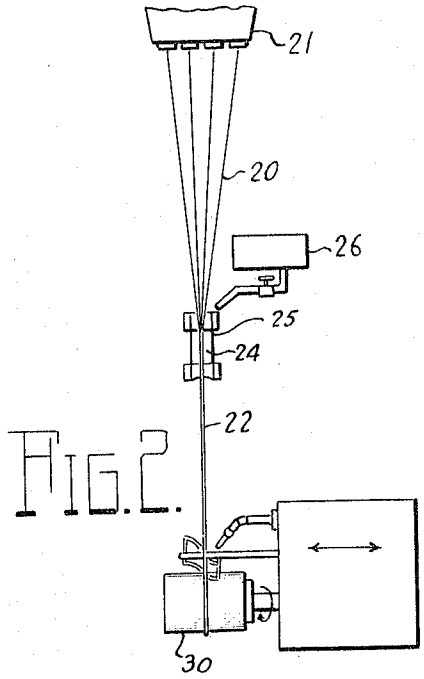


FIG. 2.

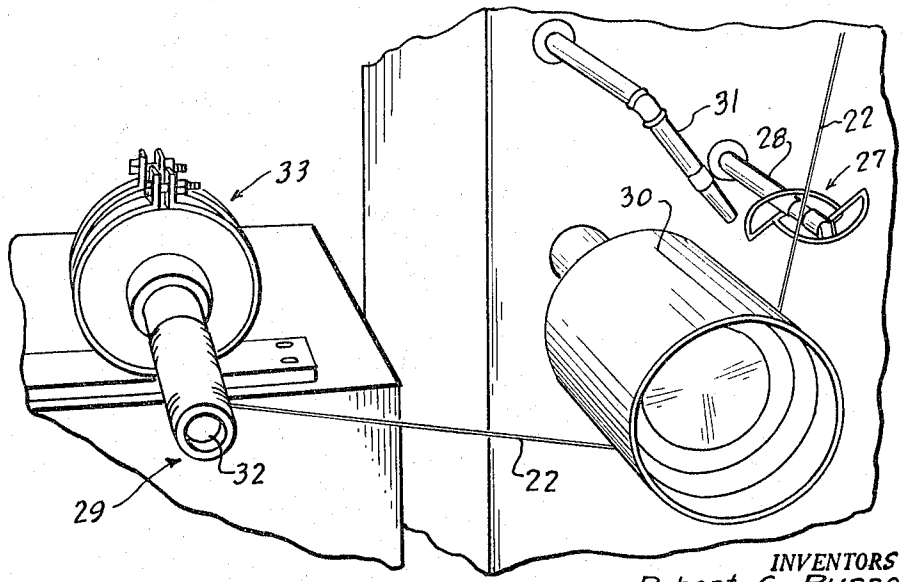


FIG. 3.

INVENTORS
Robert G. Russell
Jerry B. Holschlag
BY
Staehli & Quinman
ATTORNEYS

Oct. 18, 1966 R. G. RUSSELL ETAL 3,279,904
METHOD AND APPARATUS FOR PRODUCING A WOUND
TEXTILE PACKAGE HAVING UNIFORM TENSION
Original Filed Sept. 11, 1956 4 Sheets-Sheet 2

FIG. 4.

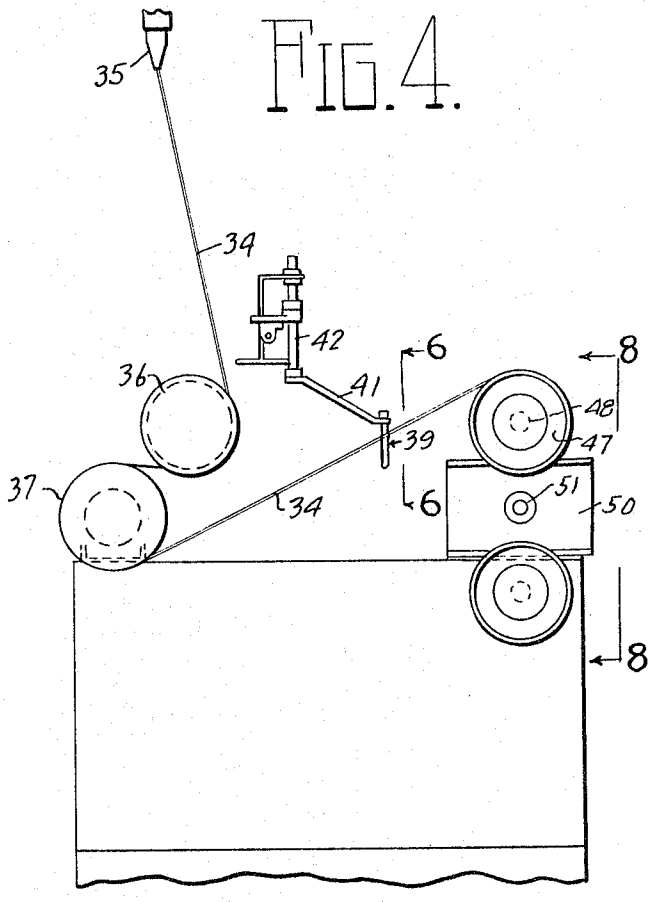
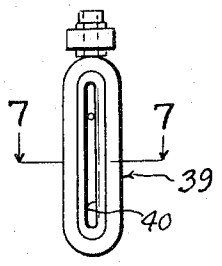


FIG. 6.



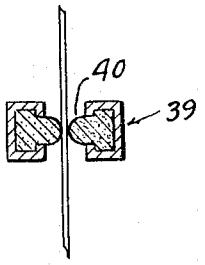


FIG. 7.

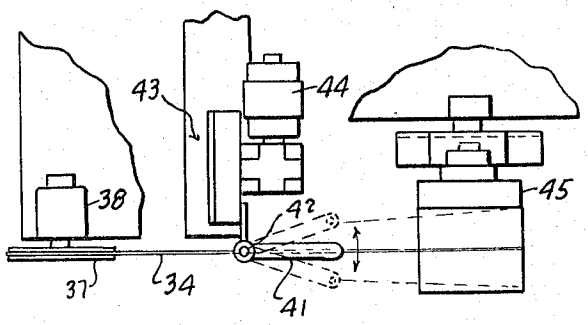


FIG. 5.

INVENTORS
Robert G. Russell
BY Jerry B. Holschlag
Staelin & Overman
ATTORNEYS

Oct. 18, 1966 R. G. RUSSELL ETAL 3,279,904
METHOD AND APPARATUS FOR PRODUCING A WOUND
TEXTILE PACKAGE HAVING UNIFORM TENSION
Original Filed Sept. 11, 1956 4 Sheets-Sheet 3

FIG. 8.

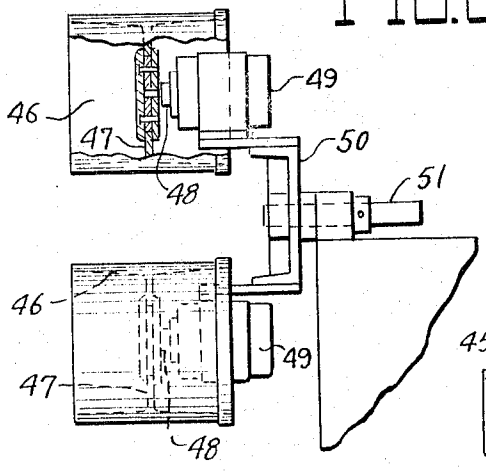
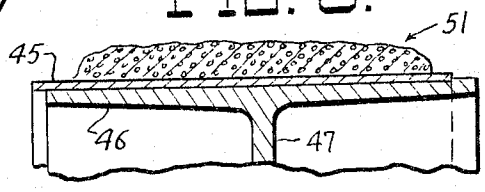


FIG. 9.



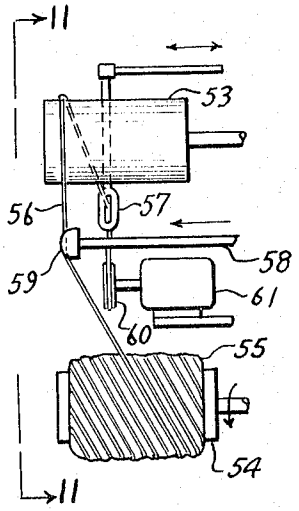


FIG. 10.

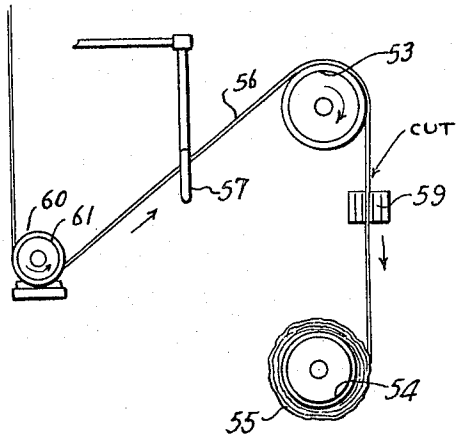


FIG. 11.

INVENTORS
Robert G. Russell
Jerry B. Holschlag
BY Stachi & Ackerman
ATTORNEYS

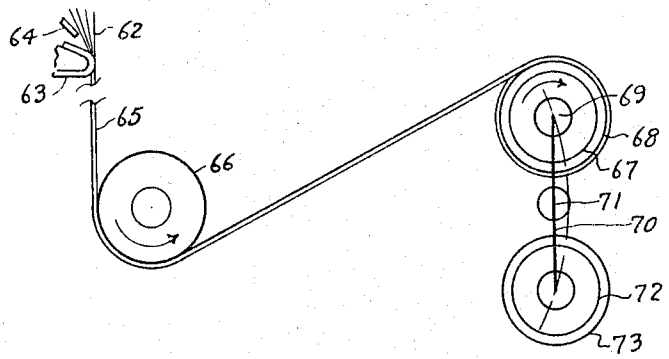


FIG. 12.

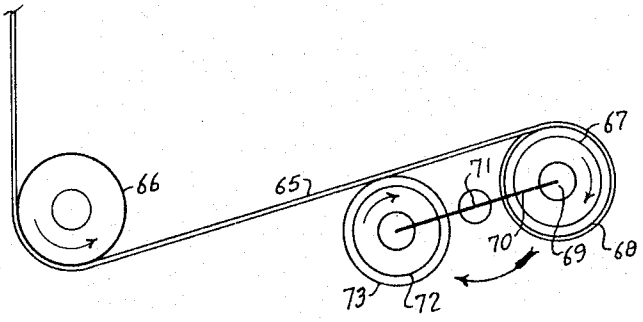


FIG. 13.

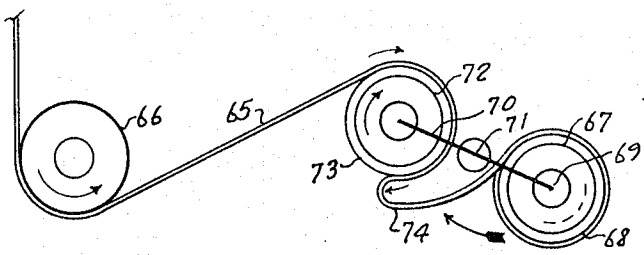


FIG. 14.

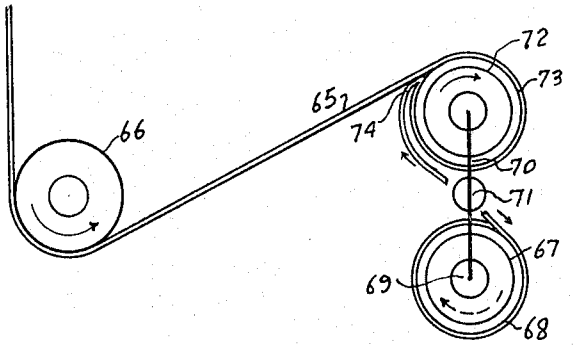


FIG. 15.

INVENTORS
Robert G. Russell
BY Jerry B. Holschlag
Stachis & Quesman
ATTORNEYS

United States Patent Office 3,279,904 Patented Oct. 18, 1966

3,279,904

METHOD AND APPARATUS FOR PRODUCING A WOUND TEXTILE PACKAGE HAVING UNIFORM TENSION

Robert G. Russell, Granville, Ohio, and Jerry B. Holschlag, Greenwood, S.C., assignors to Owens-Corning Fiberglas Corporation, a corporation of Delaware

Continuation of abandoned application Ser. No. 259,776, Feb. 14, 1963, which is a continuation of abandoned application Ser. No. 609,217, Sept. 11, 1956. This application Mar. 24, 1965, Ser. No. 442,294

7 Claims. (Cl. 65—11)

This application is a continuation of our copending application Serial No. 259,776 now abandoned which is a continuation of our application Serial No. 609,217, filed September 11, 1956, now abandoned.

This invention relates to a method and apparatus for producing a wound textile package such as a spool, tube or bobbin, with a continuous textile strand wound thereon as it is produced. The invention will be illustrated with respect to the concomitant attenuation and packaging of a continuous multifilament strand of glass fibers. The invention is, however, particularly directed to the production of the wound package itself wherein accumulating tension is eliminated.

In the conventional textile art for the packaging of continuously attenuated glass strands, the rotary package itself is relied upon to provide the attenuation force. The repeated wraps of strand on the package gradually build up an increasing inward compressive force on the package caused by the continuation of the tension of attenuation of the strand. The inward compressive force of a multiple layer wound package is so great in this conventional process that complex collets have been developed to apply outward force against the cylindrical sleeve or package so as to hold it distended during its winding. Without such collet means the paper or thin plastic sleeve or tube upon which the strand is wound is compressed inwardly so tightly on its spindle or arbor as to prevent its removal when the package is completed.

A further difficulty arising from the considerable tension and its increase during the winding of the strand is the resulting "loopers" or other snarls where the tension on the strands adheres it to or squeezes it between underlying loops so that it cannot be unwound without entanglements.

Another difficulty is peculiar to the packaging of any material such as glass or other artificial material where the package is used to apply the attenuation force for drawing the filaments from a bushing or spinnerette. In the formation of any synthetic filament through a minute orifice, its final diameter depends not only upon the diameter of the forming orifice and upon the temperature and physical characteristics of the material, but also upon the speed at which the material is attenuated. With all other conditions the same, an increase in speed of attenuation causes greater reduction in diameter and thus a progressively finer fiber. Where the fiber is drawn by wrapping it on the exterior of a package the accumulating fiber or strand on the package increases the effective diameter of the package and thus the lineal speed of attenuation. As a result, the diameter of the fiber or of the fibers grouped to form the strand is not uniform from one end of the package to the other.

It is the principal object of this invention to provide an apparatus and a method for packaging a continuous strand upon a wound package of textile type wherein the attenuating force is separate from the force rotating the package for the accumulation of the strand thereon.

It is a further object of this invention to provide a method and apparatus for the attenuation and concomitant packaging upon a wound textile package of a continuous strand wherein the tension in the package remains uniform from one end to the other and thus the problems resulting from cumulative inward stress are eliminated.

It is a still further object of this invention to provide a method and apparatus wherein a strand of synthetic material, for example glass fibers, comprising a large number of individual continuous filaments may be attenuated by tractive force applied from a rotating instrumentality and the strand then packaged upon a conventional textile package that is rotated with only sufficient force to take up the strand as it is made available by the attenuating instrumentality.

These and other and more specific objects of the invention will be better understood from the description which follows and from the drawings, in which:

FIG. 1 is a simplified somewhat diagrammatic view in front elevation of apparatus for carrying out the invention as utilized in the attenuation and packaging of a continuous glass fiber strand.

FIG. 2 is a side view in elevation of the apparatus shown in FIG. 1.

FIG. 3 is a fragmentary view in perspective, and on a greatly enlarged scale, illustrating the operation of the portions of the apparatus shown in FIGS. 1 and 2 and according to the process of the invention.

FIG. 4 is a view in end elevation of a commercial apparatus designed according to the invention and embodying automatic package doffing equipment.

FIG. 5 is a fragmentary plan view of the apparatus shown in FIG. 4.

FIG. 6 is a fragmentary, greatly enlarged, sectional view taken along the line **6—6** of FIG. 4.

FIG. 7 is a still further enlarged, fragmentary, sectional view taken along the line **7—7** of FIG. 6.

FIG. 8 is a fragmentary view in end elevation taken from the position indicated by the line **8—8** of FIG. 4 and shown on an enlarged scale.

FIG. 9 is still further enlarged, fragmentary, vertical, sectional view of a portion of a package wound according to the invention.

FIG. 10 is a fragmentary, plan view, somewhat diagrammatic in nature, of apparatus similar to that shown in FIGS. 4–8 and incorporating automatic means for shifting the position of the strand being packaged upon the completion of the winding of a package and the beginning of the winding of a subsequent package.

FIG. 11 is a fragmentary view in side elevation taken from the position indicated by the line **11—11** of FIG. 10.

FIGS. 12, 13, 14 and 15 are simplied views similar to FIG. 11 and showing four positions of the take-up packages during a doffing sequence in which no auxiliary mechanism is employed for changing packages.

Apparatus embodying the invention and designed for carrying out the process of the invention will be illustrated and explained in this specification in combination with apparatus for the formation and attenuation of a strand of continuous glass fibers. In FIGS. 1 and 2 individual fibers **20** are shown as being attenuated from streams flowing through orifices of a housing fragmentarily indicated at **21**. The individual fibers **20** are gathered together to form a multifilament strand **22** having as many as, say, 200 or more individual fibers, by being led around the nose of an applicator generally indicated at **23**. The applicator **23** has a concave former **24** over which a felt **25** is positioned. The felt **25** absorbs a coating, lubricating or sizing liquid fed from a supply tank **26** and transfers it to the fibers **20** making up the strand **22**.

In the simplified showing of FIGS. 1, 2 and 3 the strand **22** is led downwardly over a butterfly traverse general-

ly indicated at 27 that is mounted upon a rotating and reciprocating spindle 28. The butterfly traverse 27 rotates to traverse the strand across a narrow zone and the spindle 28 is reciprocated to move the zone back and forth across a tube or spool generally indicated at 29.

After passing through the traverse 27 the strand 22 is led around a portion of the periphery of a winding drum 30. The drum 30 is rotated at high speed to produce a lineal speed of the strand in the order of 10,000–15,000 feet per minute.

It has been discovered that contact of a continuous multifilament strand carrying a liquid with as little as, say, 60–80° of the periphery of a smooth wettable surface will transfer sufficient tractive force to the strand to supply tension to the strand to attenuate its fibers from the streams of molten material flowing from the bushing 21 or, in the case of other artificial filaments, from spinnerettes or similar forming means. The liquid employed may simply be water applied by the applicator 23 or it may be a liquid lubricant or coating composition intended to coat the individual filaments 20 to protect them from each other, to cause them to adhere together in the strand 22, to pre-condition the filaments for subsequent treatment, or to provide a specific surface condition to facilitate subsequent handling or combinations of the strand 22 with other materials in finished products. The only requirement of the coating, lubricant, etc., insofar as the present invention is converned, is that it shall be capable of wetting the surface of the winding drum 30. For example, if the winding drum 30 has a surface formed from highly polished steel, water may be used successfully according to the invention.

If an inadequate amount of lubricant, coating or liquid is applied to the applicator 23 it may be desirable to add further or a different liquid to the strand 22 or to the surface of the pulling drum 30. A nozzle 31 is, therefore, positioned above the winding drum 30 in line to spray any such material upon the strand 22 or upon the strand 22 and the surface of the winding drum 30.

After leaving the winding drum 30 the strand is carried to and wrapped around the periphery of the spool or tube generally indicated at 29, the tube 29, in this case, being frictionally mounted upon a short cylindrical arbor 32 rotated by a motor 33. The motor 33 may be an electric motor having a small but constant torque of sufficient force to rotate the package 29 with its accumulating load of wound strand and to apply to the strand 22 only sufficient tension to take it away from the pulling drum 30 or to "take up" the strand 22 as it is delivered from the drum 30. Similarly, the motor 33 may be a pneumatic motor operated under a low air controlled pressure and similarly functioning. If desired, the arbor 32 may be mounted on the output side of a slipping clutch, say a magnetic or air clutch, so that again, the torque or tension applied will be only sufficient to take up the strand 22 as it is presented by or made available from, the attenuating drum 30.

It will be observed that the axial length of the drum 30 is much greater than that of the package or tube 29 so that the traversing of the strand 22 from the traverse 27 causes the strand 22 to move axially along the drum 30 as it is attenuated and thus to be displaced axially on the spool or spindle 29 as it rotates to build up the desired wind thereon, for example, a way wind or a compound way wind.

In operation upon the simple mechanism of FIGS. 1, 2 and 3 an operator slides the tube or sleeve 29 onto the arbor 32, manually wraps a few turns of the strand 22 around the package 29 and then starts the motor which drives the drum 30 and the take up motor 33. Upon the accumulation of a sufficient quantity or length of the strand upon the package 29 the operator cuts or breaks the strand 22 between the drum 30 and the package 29, slips the finished package 29 off the arbor 32 and replaces it with an empty tube or package 29. He then again starts the taking up of the strand being presented.

The apparatus illustrated in FIGS. 4–8 is provided with a doffing equipment permitting an operator to remove a filled package and place an empty spool in position to receive strand during the winding of another package. In these figures a strand 34 is illustrated as being led from forming means 35 around a portion of the periphery of an idler roller 36 and then around a portion of the periphery of an attenuating wheel 37. In these illustrations the attenuating wheel 37 is driven by a motor 38 to apply the force for attenuating the strand 34. Upon leaving the wheels 37 the strand 34 is led through an elongated eye 39 having a smooth liner 40 which may be formed of graphite or a similar self-lubricating, non-abrasive material. The eye 39 is swivelably mounted upon the end of a rocker arm 41 that is pinned on the lower end of a vertical rocker shaft 42. The shaft 42 is oscillated by cam mechanism generally indicated at 43 driven by its own motor 44. Oscillation of the shaft 42 and thus of the arm 41 swings the eye 39 back and forth through a path and at speeds determined by the cam mechanism 43 to traverse the strand 34 across the surface of a winding tube 45.

In this structure the winding tube 45 (see also FIGS. 8 and 9) is frictionally mounted upon the exterior of a hollow drum 46 having a transverse web 47 by which the drum 46 is mounted upon the shaft 48 of a motor 49. In this embodiment of the invention there are two motors 49 mounted upon opposite arms of a frame 50 that is in turn mounted upon a horizontal shaft 51. The frame 50 may be rotated on the shaft 51 to revolve the two motors 49 and their drums 47 between upper and lower position.

The strand 34 is wound upon the upper one of the drums 46 with its motor 49 having only sufficient torque to take up the strand made available to it from the attenuating wheel 37. When a sufficient yardage of the strand has accumulated upon the exterior of the tube 45 (see FIG. 9) to provide either the desired yardage or desired weight of strand in a wound mass generally indicated at 52, the operator swings the frame 50 on its shaft 51 revolving the upper drum 46 to lower position. This automatically leads the strand 34 into contact with and around the surfaces of the other one of the drums 46.

In FIG. 11 a pair of drums 53 in upper position and 54 in lower position are shown at this step in the winding process. A mass of strand 55 has just been wound upon the drum 54 and the operator has just swung the drums around on their spider so that a strand 56 is still being led onto the lower drum 54 but around and in contact with the upper drum 53. During this change of position of the two drums 53 and 54, of course, the strand 56 continues to be fed through and guided by a traverse guide eye 57.

Apparatus embodying the invention may be provided with a pusher generally indicated at 58 having a V-shaped shoe 59 on its forward end in order to engage the strand 56 and carry it toward the front or operator's side of the apparatus. As can be seen in FIG. 10, the strand 56 has been wound in the mass 55 on the lower sleeve 54 and is now shoved forward by engagement of the shoe 59 therewith. At this stage the operator sharply cuts the strand at the position indicated by the legend "cut" in FIG. 11 and with one sweeping movement carries the cut end of the strand around the upper tube 53 so that it continues to be wound thereon.

As in the earlier figures in the apparatus of FIGS. 10 and 11 attenuating force is applied to the strand 56 by an attenuating wheel 60 driven by its motor 61. The strand 56 is, therefore, presented to the take up packaging mechanism free of tension and the motors 59 driving the tubes 45, 53 or 54 need have only sufficient force to take up the strand and wind it upon the sleeve-like package with uniform tension throughout the accumulation of the packaged mass.

FIGS. 12, 13, 14 and 15 illustrate the operation of apparatus embodying the invention and according to the method of the invention for "doffing" a filled package and beginning the wind-up of a second package.

In FIG. 12 a plurality of individual filaments **62** are shown as being led over a gathering and coating shoe **63** onto which a suitable lubricant, binder or other coating liquid is dripped from a supply pipe **64**. The filaments **62** are gathered by the shoe **63** into a continuous multifilament strand **65**. Tractive force for attenuating the individual filament **62** from conventional filament forming means, for feeding the filaments over the shoe **63** and for projecting the multifilament, substantially parallel strand **65** to the packaging station is provided by engaging the strand **65** with the peripheral surface of a rotary pulling wheel **66**.

The pulling wheel **66** delivers the strand **65** upwardly and toward a rotary drum **67** upon which is removably mounted a sleeve **68**. The drum **67** is rotated on an axis **69** by a motor, not shown, to have a lineal speed at least equal to the lineal speed of the pulling wheel **66**. As explained above, the torque of the motor for rotating the drum **67** need be only sufficient to take up the strand **65** as it is delivered from the pulling wheel **66**. In practice it has been found effective to so energize the motor driving the drum **67** that when it is free, i.e., when it is not taking up strand, it will rotate at a lineal speed slightly in excess of the lineal speed at which the strand **65** normally will be delivered.

The drum **67** is mounted upon the upper arm of a rotary spider diagrammatically indicated at **70**, which rotates on its axis **71** to revolve the drum **67** and a second similar drum **72** around the axis **71** as a planetary movement. Like the drum **67**, the drum **72** may removably mount a sleeve **73** upon which the continuous strand **65** is to be wound.

In the position of the apparatus shown in FIG. 12 the upper drum **67** is being driven by its motor and the strand **65** is accumulating upon the sleeve **68**. For purposes of simplification, no traversing mechanism is shown in FIGS. 12–15. When a sufficient length of the strand **65** has been wound on the sleeve **68** to make a full package, either the operator or some automatic, timed mechanism rotates the spider **70**, swinging the two drums **67** and **72** to the positions shown in FIG. 13. In this figure it is shown that the periphery of the sleeve **73** on the drum **72** has just been moved into contact with the strand **65**. In this position the strand **65** is still being taken up on the sleeve **68** rotated by the drum **67**.

As the spider **70** continues to swing into the position shown in FIG. 14, the sleeve **73** begins to pick up the strand **65** which tends to wrap around this sleeve **73** now being rotated by its motor, whereas at the same time the motor for the drum **67** has been de-energized. It should be observed that the solid arrows on the ends of the drums **67** and **72** in FIGS. 12–15, inclusive, indicate that power is being applied to those drums; the absence of an arrow indicates that whether or not that particular drum is rotating is immaterial; a broken arrow on one or more of the drums indicates that that particular drum is not under power but may be rotating due to its own momentum.

When the drum **72** and its sleeve **73** begin to wrap the strand **65**, a loop generally indicated at **74** and travelling in the direction indicated by the short arrow within the loop, is formed in the strand between the drums **67** and **72**.

As the spider **70** continues to rotate to its inverted position as shown in FIG. 15, the loop **74** of strand moves around the package **73** on the drum **72** a distance sufficiently far so that it is caught beneath the oncoming strand **65** moving over from the pulling wheel **66**. Because the drum **67** is no longer powered and now is only coasting in a clock-wise direction under its momentum, the positive driving traction of the drum **72** abruptly snaps the span of strand extending between the two sleeves **72** and **68**. As can be seen in FIG. 15, as soon as the strand loop **74** is definitely caught on the package **73** the span of strand extending between the two drums is under tension from opposite directions. Since the loop of strand **74** is loose (see FIG. 14) the movement in opposite directions abruptly tautens the length of the strand which snaps it. This frees the now lower sleeve **68** and drum **67** and it is allowed either to coast to a stop or suitable braking means are employed to bring the drum **67** to a stop. An operator then slides the sleeve **68** off the drum **67** replacing it with an empty sleeve. The strand **65** in the meantime continues to be wound up on the now upper collecting drum **72**.

Subsequent doffing operations are performed as each of the drums in the upper wind-up position becomes filled by merely rotating the mounting spider **70** through a 180° turn. This alternates the positions of the two drums **72** and **67** winding upon one while the other is doffed and receives an empty sleeve.

This method of doffing the filled packages may be carried out manually, as by an operator actually grasping the spider **70**, or turning a hand crank upon its shaft or it may be performed as a series of automatic operations being triggered by the elapse of time, the measurement of the number of rotations of either the pulling wheel **66** or the wind-up drum **72** or by weighing means responsive to the accumulation of strand **65** on the drum **72** or other indicating methods.

Because the drums **67** and **72** according to the invention need to be rotated only with sufficient torque to merely take up the strand **65** as it is made available by the pulling wheel **66**, the necessary motors and other mounting and driving apparatus for rotating the take-up packages is light in weight, small in size and not subject to excessive mechanical or other failures. This simplified doffing method thus results from the basic concept of the invention whereunder wound up packages are free of cumulative tension and the strand may be wound thereupon at a constant lineal speed. This latter objective is particularly important where artificial filaments are concomitantly attenuated since only by the use of constant lineal speed through the packaging operation can the diameter of the attenuated filament and/or strand be maintained uniform throughout the length of the packaged material. Where strands measuring in the order of 15,000 yards or more per pound are accumulated as in the attenuation and packaging of continuous glass filaments, achieving accurate control of the lineal speed of attenuation throughout the accumulation of many, many pounds of the material has heretofore been substantially impossible.

We claim:

1. A method of producing and packaging continuous glass fiber strand of uniform diameter which comprises attenuating glass fibers from a supply of molten glass, applying a substantially constant force to said fibers at a first position spaced from the region of fiber withdrawal to withdraw the fibers at a substantially constant linear rate of speed, thereafter at a second position spaced from the first position and the region of fiber withdrawal applying another force to said fibers of less magnitude than the withdrawal force, exerting a tension on the fibers throughout the length thereof between the first and second positions, said tension being less than that exerted between the glass supply and the first position by the application of the withdrawal force, and laying said fibers in a plurality of layers on a rotating surface at said second position.

2. A method of producing and packaging continuous glass fiber strand of uniform diameter which comprises attenuating glass fibers from streams from a supply of molten glass, applying a substantially constant force to said fibers at a first position spaced from the region of fiber withdrawal to attenuate the fibers at a substantially constant linear rate of speed, thereafter at a second position spaced from the first position and the region of fiber with-

drawal applying a second force to said fibers of less magnitude than that of the attenuating force, the force applied at the second position being substantially constant, exerting tension on the fibers throughout the length thereof between the first and second positions, said tension being less than the attenuating tension between the streams of glass and the first position by the application of the attenuating force, and laying said fibers in a plurality of layers on a rotating surface at said second position.

3. Apparatus for producing and packaging continuous glass fiber strand which comprises a container for molten glass, said container having orifices through which streams of glass flow, said streams being solidified and attenuated into fibers, means to gather said fibers into a strand as they are being attenuated, means to wind the strand, the attenuating force being applied by strand pulling means adapted to deliver said strand at a constant rate to the winding means, said latter means being adapted to collect and package the so-delivered strand at a predetermined tension which is substantially less than the tension imposed on the strand by the attenuating force of said pulling means.

4. Apparatus for producing and packaging continuous glass fiber strand which comprises a feeder for molten glass, said feeder having orifices through which streams of glass flow, said streams being solidified and attenuated by an attenuating force into fibers, means gathering said fibers into a strand as they are being attenuated, means to wind the strand, the attenuating force being applied by strand pulling means adapted to deliver said strand at a constant rate to the winding means, said winding means being driven through a slipping clutch actuated by a positively driven motive means to collect and package the so-delivered strand at a predetermined tension which is substantially less than the tension imposed on the strand by the attenuating force of said pulling means.

5. Apparatus for producing and packaging continuous glass fiber strand which comprises a feeder for molten glass, said feeder having orifices through which streams of glass flow, said streams being solidified and attenuated by an attenuating force into fibers, means gathering said fibers into a strand as they are being attenuated, means to wind the strand into a package, the attenuating force being applied by the strand pulling means adapted to deliver said strand at a constant rate to the package winding means, said package winding means comprising a collet for rotating a forming tube, and a constant torque electrically energized motor driving the collet and tube to collect and package the so-delivered strand at a predetermined tension which is substantially less than the tension imposed on the strand by the attenuating force of said strand pulling means.

6. Apparatus for producing and packaging a contiguous glass fiber strand which comprises a feeder for molten glass, said feeder having orifices through which flow streams of glass, means for attenuating the streams to fibers comprising a single pulling wheel, the fibers being guided to contact the single pulling wheel throughout a portion of the periphery of the single wheel, the extent of the contacting distance of the strand with the wheel being sufficient to provide tractive force to the strand to attenuate the streams to fibers, means to wind the strand into a package, said means comprising a rotatable collet supporting a forming tube upon which the strand is wound, the attenuating force being applied by the strand pulling wheel adapted to deliver said strand at a constant linear rate to the winding means, and electrically energizable means for driving said winding means providing a torque only sufficient to collect and package the strand as it is delivered from the pulling wheel.

7. Apparatus for producing and packaging a continuous glass fiber strand which comprises a feeder for molten glass, said feeder having orifices through which flow streams of glass, means for attenuating the streams to fibers comprising a single pulling wheel, the fibers being guided to contact the single pulling wheel throughout a peripheral portion of the single wheel of not more than 90° providing tractive force to the strand to attenuate the streams to fibers, means to wind the strand into a package, said means comprising a rotatable collet supporting a forming tube upon which the strand is wound, the attenuating force being applied by the strand pulling wheel adapted to deliver said strand at a constant linear rate to the winding means, and electrically energizable means driving said winding means providing a torque only sufficient to collect and package the strand as it is delivered from the pulling wheel.

References Cited by the Examiner

UNITED STATES PATENTS

1,809,660	11/1928	Wild et al.	242—18
2,054,786	9/1936	Alibert	156—181
2,161,348	6/1939	Guenther	242—46.4
2,778,578	1/1957	Keith	242—43
2,947,489	8/1960	Russell	242—18
3,029,993	4/1962	Russell	226—190
3,126,268	8/1962	Roberson	65—11

References Cited by the Applicant

FOREIGN PATENTS

979,228	2/1963	Great Britain.

DONALL H. SYLVESTER, *Primary Examiner.*

R. L. LINDSAY, *Assistant Examiner.*