Nov. 10, 1959 W. K. RAU, JR 2,912,187

TRAVERSE APPARATUS

Filed Nov. 15, 1957 2 Sheets-Sheet 1

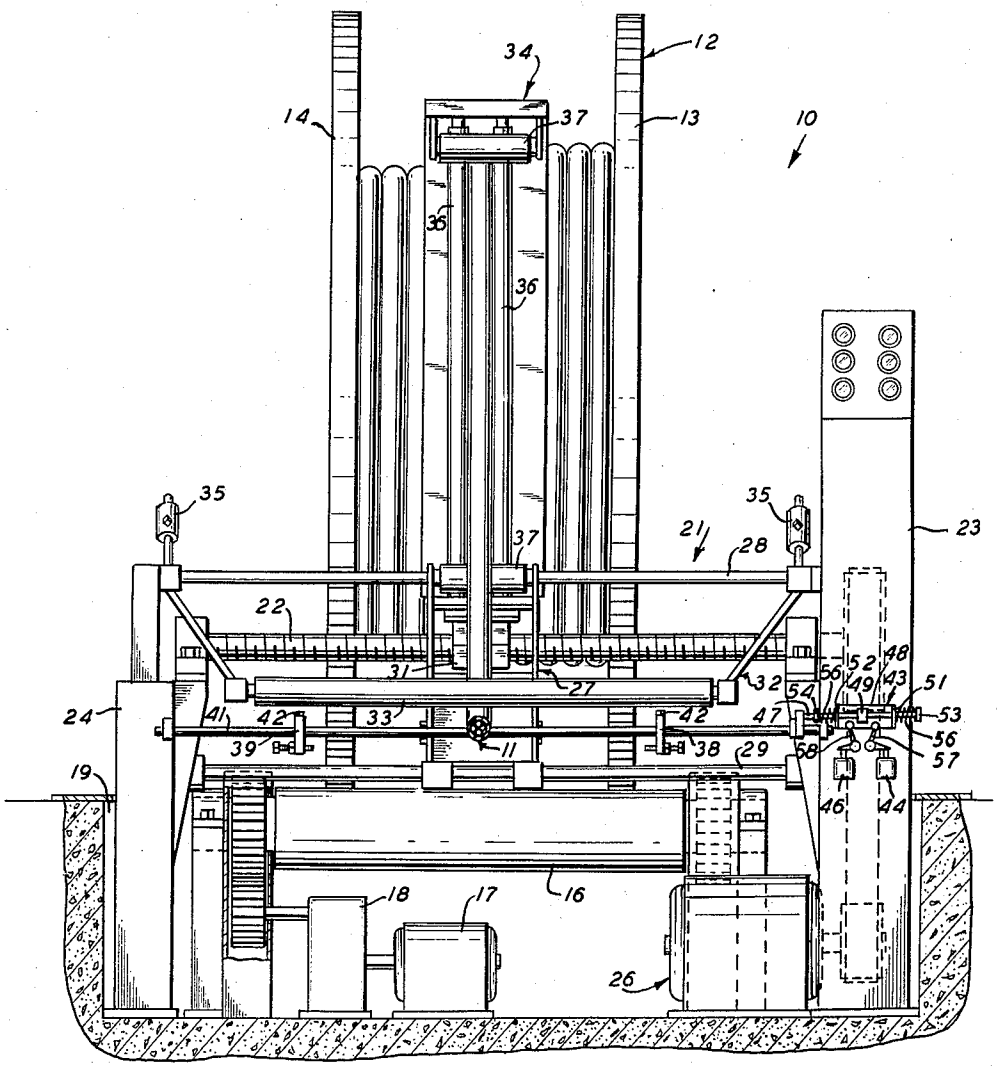

FIG. 1

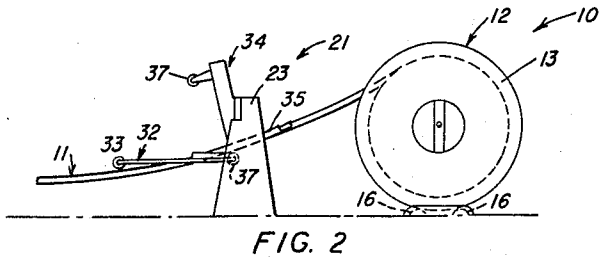

FIG. 2

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TRAVERSE APPARATUS

Filed Nov. 15, 1957 2 Sheets-Sheet 2

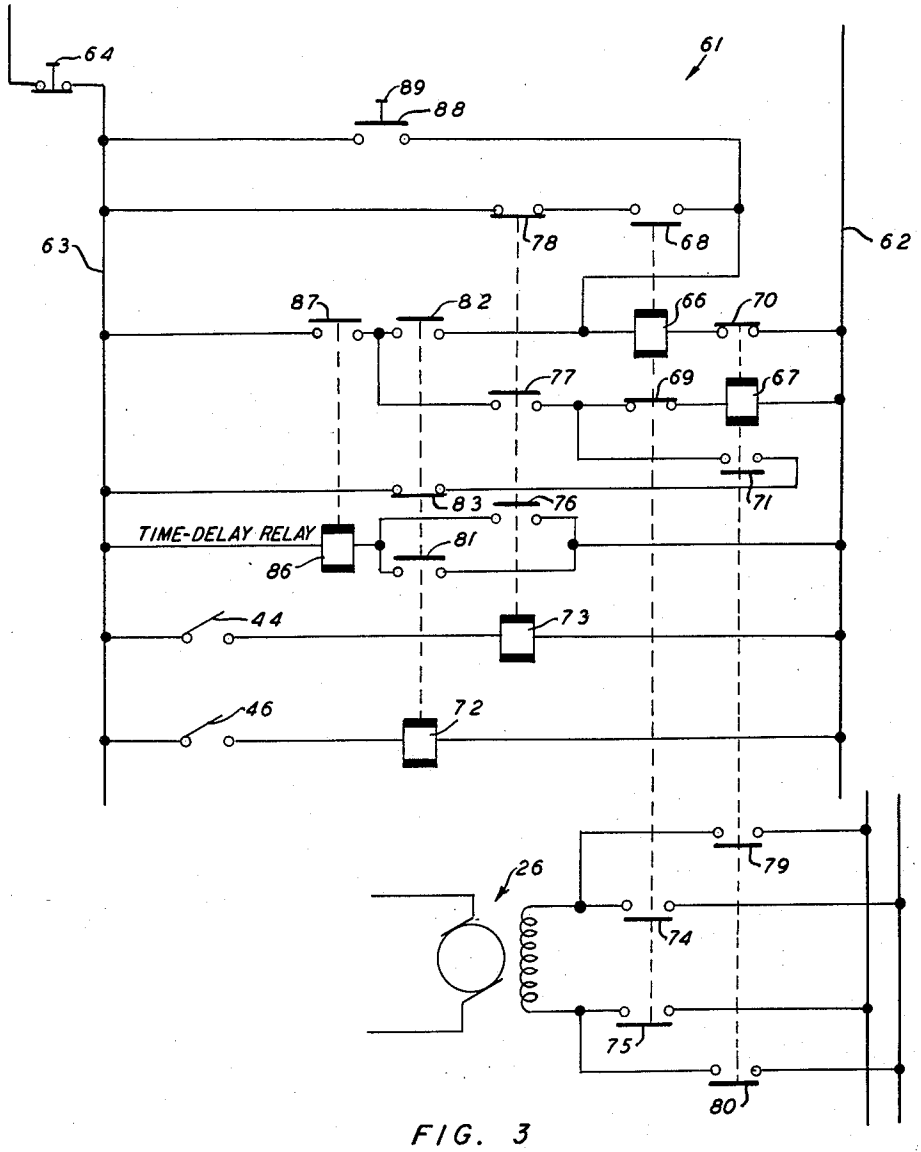

FIG. 3

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2,912,187

TRAVERSE APPARATUS

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Application November 15, 1957, Serial No. 696,780

14 Claims. (Cl. 242—158.4)

This invention relates to apparatus for reeling strand material, and more particularly, although not exclusively, to apparatus for distributing uniformly the strand upon the winding surface of a take-up reel as the strand is wound thereon.

This invention relates also to apparatus for causing intermittent operation of drive means, which may be used for reeling level layers of cable on a reel, for interrupting the reciprocating movement of the distributor adjacent to the opposing ends of the reels.

In the manufacture of multiconductor cables, especially the relatively fine stranded cables employed in the communications industry, insulated electrical conductors are drawn simultaneously from a plurality of supply reels and twisted together to form twisted pairs. The twisted pairs are stranded into units which, in turn, are cabled into a core. The core is then provided with some kind of binding to keep the units in place. The core is wrapped longitudinally or spirally with an insulating core wrap prior to the formation of a sheath thereon by an extrusion process. The final sheathed product is directed continuously from the extruder to a take-up apparatus, by means of a capstan at a substantially contant linear speed in order that the extrusion operation may continue without disturbance or interruption. The take-up apparatus is provided with means to support a take-up reel and to rotate the reel about its axis to wind up the completed cable. In this manner the finished cable is reeled onto a take-up reel for storage or shipment to the customer.

It is desirable that the cable be distributed uniformly to lay successive convolutions of the cable side by side throughout the width of the reel drum and that successive layers of convolutions be placed, one upon another, until the reel is filled with the desired amount of cable. The cable is distributed on the reel during the take-up operation by means of a distributor which reciprocates between adjustable limits and is provided with guide means positioned upon each side of the advancing cable.

The various types of take-up apparatus, in use at the present time, employ various types of distributing apparatus for directing the strand material, such as cables, back and forth across the winding surface of the take-up reel. In some cases the reel itself is moved laterally with respect to the delivery point of the strand being taken up thereby. In other cases, the strand is moved back and forth across the winding surface of the reel. In either case this type of take-up apparatus is generally referred to as the traverse type take-up apparatus, in which is provided a conventional traverse screw or other means driven at a timed relationship with respect to the speed of rotation of the take-up reel for traversing the reel or the distributing apparatus with respect to each other.

While such distributing apparatus are generally satisfactory, in that they distribute the strand uniformly as the distributor travels intermediate the flanges on the ends of the reels, they have been found less desirable in the application of successive convolutions of cable, one upon the other, in the region contacting the inside surfaces of

the flanges. In the above-described distributing apparatus, when the movement of the distributor is stopped at the end-of-reel position, it is immediately reversed. However, with a delay of a predetermined interval of time between the stoppage of and reversal of the distributor to permit two convolutions of cable to be wound, one on top the other, in contact with the flanged head of the reel, a more satisfactory operation is performed.

It is an object of the present invention to provide new and improved strand reeling apparatus.

It is another object of the present invention to provide new and improved apparatus for distributing a strand uniformly across the winding surface of a take-up reel.

It is still another object of the present invention to provide apparatus for controlling motors or other motivating means to cause intermittent operation thereof.

Another object of the present invention is to provide apparatus for winding superimposed layers of convolutions of strand material on a take-up reel with successive convolutions placed, one upon the other, at each end of the reel.

A strand reeling apparatus for taking up an advancing strand upon a rotatably driven take-up reel embodying some of the principles of the present invention may include a take-up reel, a source of supply of strand material, drive means for rotating the reel to take up the strand material and strand guiding means for guiding the strand material onto the winding surface of the reel. Means are provided for causing relative reciprocating movement between the winding surface of the reel and the guiding means for forming superimposed layers of convolutions of the strand material on the reel. Means are provided for causing the strand guiding means to dwell for a predetermined period adjacent each end of the reel so that two successive convolutions of the strand material are placed, one on top of the other, adjacent to each end of the reel.

Other objects and features of the invention will be more readily understood from the following detailed description of a specific embodiment thereof, when read in conjunction with the accompanying drawings in which:

Fig. 1 is a fragmental, front elevation view of one embodiment of the apparatus of the present invention;

Fig. 2 is a fragmentary, side elevational view of the apparatus of Fig. 1, and

Fig. 3 is a schematic diagram of a control circuit for the apparatus illustrated in Figs. 1 and 2.

Referring now to the drawings, wherein like numerals designate the same or similar elements throughout the several views, and more particularly to Figs. 1 and 2, there is shown a strand reeling or take-up apparatus, designated generally by the numeral **10**, for taking up a strand, designated generally by the numeral **11**, which may be a sheathed cable, delivered at a substantially constant rate from an extruder (not shown) by a conventional strand advancing tractor capstan (not shown) driven by appropriate means (not shown).

The take-up apparatus **10** has a storage or shipping reel, designated generally by the numeral **12**, of a conventional design which includes a cylindrical winding drum (not shown) and a pair of flange-like heads **13** and **14** secured to the opposing ends thereof. The take-up reel **12** is positioned on conventional floor rollers **16—16** driven by a variable speed motor **17** through a conventional gear reducer **18** provided in a floor housing **19**. The floor rollers **16—16**, through friction, impart rotation to the take-up reel **12** whereby the strand **11**, which is illustrated as a sheathed cable, is wound upon the reel **12**.

It is important that as much cable **11** as possible be wound on the take-up reel **12** and that the convolutions of cable **11** lie uniformly thereon. In order to distribute the cable **11** evenly across the winding surface of the reel

12, there is provided a strand distributing apparatus, designated generally by the numeral 21, which includes a conventional distributor or traversing screw 22 mounted rotatably between spaced supports 23 and 24 and driven by a reversible D.C. motor, designated generally by the numeral 26, in a timed relationship with respect to the rotation of the reel 12.

The distributing apparatus 21 is provided with a distributor carriage, designated generally by the numeral 27, which is slidably mounted on a pair of spaced guide rods 28 and 29 positioned between the upright supports 23 and 24, for guiding the cable 11 to dispose the winding thereof on the drum of the reel 12 in close proximity to each other in the manner illustrated in Fig. 1. The guide rods 23 and 24 are parallel and vertically aligned with the traversing screw 22.

The distributor carriage 27 is provided with a block-like nut 31 which is utilized to engage the thread of the traversing screw 22, whereby when the screw 22 is driven by the reversible motor 26 the nut 31 may be reciprocated back and forth to reciprocate the distributor carriage 27 adjacent to the winding surface of the reel 12.

The nut 31 may be constructed in two halves which can be moved outwardly with respect to each other and thereby become disengaged from the thread of the screw 22. Such an arrangement is provided so that when one of the cable reels 12 has become filled with the desired amount of cable 11 and the distributor 21 is adjacent to some intermediate portion of the reel 12, the nut 31 may be disengaged from the thread of the screw 22 to permit the distributor carriage 27 to be moved manually to an end-of-reel position to permit the leading end of the cable 11 to be lashed to the succeeding reel 12 or to permit the start of the winding of the cable 11 on a separate cable reels 12 adjacent to the end of the reel.

It is important that sufficient tension exists in the strand 11 being wound upon the reel 12 in order that uniform convolutions of strand 11 be wound thereon and that uniform layers be formed thereby. During the reeling of strand material 11 of light weight, it may be necessary to actually pull the strand 11 taut. However, in the manufacture of the cable 11, especially where the cable 11 is passed through an extrusion apparatus to form a sheath thereon, the weight of the cable catenary suspended between the exit end of the capstan and the position of the distributor carriage 27, as it reciprocates to distribute the advancing cable 11 on the take-up reel 12, creates the required amount of tension needed to wind the cable 11 uniformly on the reel 12.

A substantially U-shaped arm, designated generally by the numeral 32, is provided to control the size of the catenary and thus the tension in the cable 11 between the capstan and the take-up reel 12. The arm 32 is suspended pivotally between the spaced supports 23 and 24, and has one end formed of a roller 33 which rides on the upper surface of the cable 11 adjacent to the center of the catenary. The other end of the arm 32 is provided with counter balances 35—35. An intermediate portion of the arm 32 is connected operatively to appropriate motor control means (not shown) to control the variable speed motors 17 and 26 associated with the floor rollers 16—16 and the distributor screw 22, respectively.

The actuation of the arm 32 will result in the creation and maintenance of a catenary of the desired contour by controlling the speed of the motor 17 driving the floor rollers 16—16 which drive the reel 12 to take up the cable 11 at substantially the same rate as it is delivered by the capstan, even though the effective winding diameter of the reel 12 is changed by a buildup of successive layers of the cable 11 on the reel 12. The action of the arm 32 effects the drive motors 17 and 26 to drive the distributor 21 and the reel 12 at a slower speed required by the larger diameter of the effective winding surface of the reel 12 upon which the convolutions are wound to compensate for the travel of the cable 11 longitudinally at a constant rate of speed.

Appropriate interlocking means (not shown), such as a tachometer generator, are employed to create the required difference in the ratio of the speed of the distributor 21 with respect to the rotational speed of the reel 12 as the effective diameter of the reel 12 changes as a result of the buildup of cable 11 thereon.

A cable guide, designated generally by the numeral 34, through which the cable is passed, is mounted on the distributor carriage 27. The guide 34 includes two pairs of parallel strand guide rollers 36—36 and 37—37, which are mounted rotatably on the carriage 27 and are adjustably spaced thereon so as to have the strand pass between the rollers as it advances from the capstan to the take-up reel 12. The rollers 36—36 and 37—37 hold the advancing cable 11 in a path of travel in a plane perpendicular to the axis of rotation of the reel 12 and inclined with respect thereto. In order for the cable distributing apparatus 21 to be capable of delivering cable 11 of various diameters, the strand guiding means 34 may be adjusted so that the space between the peripheries of the rollers 36—36 and 37—37 can be adjusted to suit the size of the cable 11 to be advanced therebetween. This may be done by appropriate means, such as those disclosed in the G. A. Scheidt Patent No. 2,783,025, issued Februray 26, 1957, or the H. H. Merwin Patent No. 2,478,413, issued August 9, 1949.

The pitch of the screw 22 and rotational speed thereof must be such as to cause the distributor 21 to carry the cable 11 along at a sufficient speed to wind it regularly upon the drum along the length of the reel 12. When the flange 13 or 14 on the end of the reel 12 is reached by the distribtuor 21, it is necessary to reverse the movement of the distributor 21 so that it will return to the opposite flange 14 or 13 on the opposing end of the reel so that a successive layer of convolutions of the cable 11 will be formed spirally on the reel 12 toward the opposing flange 14 or 13. The distributing screw 22 is rotated to reciprocate the distributing carriage 27 between predetermined limits by adjustable stop or abutment members 38 and 39 to distribute the cable 11 on the take-up reel 12.

The abutment members 38 and 39 are mounted on a shiftable rod 41 at desirable positions relative to the flanges 13 and 14 of the take-up reel 12, respectively. The abutment members 38 and 39 have set screws 42—42 for securing adjustably the members 38 and 39 to the rod 41 to vary the limits between which the distributor 21 is permitted to travel, in accordance with the particular size of the cable reel 12 being utilized.

The distributor carriage 27 is provided with bifurcated portions which partially encompass the reciprocable rod 41 secured slidably in the upright supports 23 and 24 and parallel to the distributing screw 22. The portions of the distributor carriage 27 which partially encompass the rod 41 contacts alternately one of the adjustable stop members 38 and 39 secured for axial adjustment with respect to the rod 41. The rod 41 operates a limit-switch actuator mechanism, designated generally by the numeral 43, which in turn actuates alternately the contacts of limit switches 44 and 46.

The actuating mechanism has a rod 47 secured to one end of the rod 41. The rod 47 is mounted slidably in a bifurcated support 48 secured to the support 23, and has an enlarged portion 49 between the furcations 51 and 52 of the support 48. Two annular members 53 and 54 are secured in spaced relationship on opposing sides of the enlarged portion 49. A compression spring 56 is positioned between each of the annular members 53 and 54 and the associated furcation 51 or 52, so as to return the enlarged portion 49 to a central position with respect to the support 48 and thus out of engagement with actuating levers 57 and 58 associated with the respective switches 44 and 46 to permit either switch to

return to its normally open position when the carriage **27** is not in engagement with one of the abutment members **38** or **39**.

In the take-up of large cables **11** on the reels **12** by means of the above-described take-up apparatus **10**, it is desirable that a certain amount of delay in the movement of the distributor **21** be provided at each end of the reel **12** in order that a coil of cable **11** may be placed on the reel **12** immediately over the last convolution in the lower layer of convolutions of cable **11** prior to the reversal of the distributor **21**. If such were not done, with particularly large cables, the distributor would start back immediately and, instead of one cable convolution being placed directly on top of the preceding one, spaces would occur into which the coils of cable **11** might fall when successive layers are wound upon the reel **12**. This would result in uneven distribution of the cable **11**, which may result in the convolutions of the cable **11** on the reel **12** becoming loose thus permitting them to slide with respect to each other and possibly result in damage to the cable **11** as a result of vibration during handling and shipping. In order to overcome this problem, a timing circuit of the present invention is utilized with the above-described apparatus (see Fig. 3).

Referring now to Fig. 3, there is shown an electrical circuit, designated generally by the numeral **61**, for controlling the operation of the distributor **21** of the take-up apparatus. The electric circuit **61** includes two bus lines **62** and **63** supplied by a suitable 110 volt A.C. source of E.M.F. (not shown) through a suitable emergency stop switch **64**. Connected across the bus lines **62** and **63** is a pair of motor start relays **66** and **67**. The relay **66** is for causing normally-open contact pairs **74** and **75** to close, resulting in the energization of the motor **26** to cause it to be rotated in one direction. The other relay **67** is for causing normally-open contact pairs **79** and **80** to close, resulting in the energization of the motor **26** to cause it to operate in a reversed direction. The contact pairs **74**, **75**, **79** and **80** are in circuit with a pair of bus lines connected to a D.C. source (not shown).

It will be assumed, for the purpose of the illustration, that the energization of the relay **66** and the closure of its associated normally-open contacts pairs **74** and **75** results in the motor **26** rotating the distributing screw **22** in a direction to cause the distributor **21** to move to the right, and that the energization of the relay **67** and the closure of its associated normally-open contact pairs **79** and **80** results in the motor **26** rotating the distributing screw **22** in a direction to cause the distributor **21** to move to the left, both as viewed in Fig. 1.

The energization of the relay **66** also results in the closure of a normally-open contact pair **68**, the closure of the contact pairs **74** and **75**, and the opening of a normally-closed contact pair **69** connected in series with the relay **67**. The energization of the relay **67** also results in the closure of a normally-open contact pair **71**, the closure of the contact pairs **79** and **80**, and the opening of a normally-closed contact pair **70** connected in series with the relay **66**.

Connected across the bus lines **62** and **63** in parallel with each other and each in series with the associated limit switch **44** or **46**, which are actuated by the rod **41** through the actuation of the stop members **38** and **39**, are two relays **72** and **73**. The limit switch **44** is closed by the distributor carriage **27** when it reaches its end-of-reel travel toward the right-hand side of the take-up apparatus, as viewed in Fig. 1. The closure of the limit switch **44** results in the energization of the relay **73** which, in turn, closes its associated normally-open contact pairs **76** and **77** and opens its associated normally-closed contact pair **78**. The closure of the limit switch **46** results in the energization of the relay **72** which, in turn, closes its associated normally-open contact pairs **81** and **82** and opens its associated normally-closed contact pair **83**. The normally-open contact pairs **76** and **81** associated with the relays **73** and **72**, respectively, are connected in parallel with each other and in series with a timing device **86**, which is known in the art and available commercially.

The timing device **86** is preferably fairly sensitive and accurate, and may be of the type which can be modified so that it will have a varying length bf time delay between the time the timing device is energized and the time its associated normally-open, time-to-close contact pair **87** closes. In this manner, successive operations of the timing device **86** will result in a longer period of delay between the time the timing device **86** is energized and the time its associated contact pair **87** is closed. This may be necessary because of the longer length of time required to wind the convolutions of the cable **11** on the reel **12** as the effective diameter of the winding surface of the reel **12** is increased by the buildup of successive layers of convolutions of the cable **11** during the take-up process.

A start switch **88** is connected across the bus lines **62** and **63** in parallel with the contact pairs **68** and **78** which, in turn, are connected in series with the normally-closed contact pair **70** and the relay **66**. When the start switch **88** is depressed the motor **17** is energized through a circuit (not shown) and the relay **66** is energized to cause the normally-open contact pair **68** to be closed and the normally-closed contact pair **69** to be opened. The motor relay **66** is therefore always energized by depressing a button **89** associated with the start switch **88** since the normally-closed contact pair **70** will always be closed at this time. This is so because the motor relay **67** will always be energized through the normally-open contact pair **77** which will result in the motor **26** always being energized through the actuation of the switch **44** associated with the relay **73** causing the distributor **21** to move away from the right-hand side of the reel or away from the abutment member **38** as long as power is supplied to the circuit **61**.

In this way the motor relay **67** can never be energized by depressing the start button **89**. However, it should be noted that if the distributing apparatus **21** is stopped at some position other than adjacent to the left-hand flange **14** and it is desirable that the distributor **21** be moved toward the left-hand flange **14**, the operator can push the rod **41** to the right to close the switch **44**.

The closure of the switch **44** will result in the energization of the relay **73** to close the normally-open contact pairs **76** and **77** and open the normally-closed contact pair **78**. The closing of the normally-open contact pair **76** will result in energization of the timing device **86** which, in turn, closes the contact pair **87** after a time delay.

The closure of the contact pair **87** results in the energization of the relay **67** through the now closed contact pairs **77** and **69**. The energization of the relay **67** will result in the closure of the contact pairs **79** and **80** to apply power to the circuit of the distributor motor **26**, however, the motor **26** will not operate because of the interlocking means (not shown) between the motors **17** and **26**. This is true because the interlock will cause the motor **26** to remain inoperative when the motor **17** is inoperative. In this way the start switch **88** can then be closed to start the motor **17** and thus cause the take-up apparatus to operate and the distributor carriage **27** to move in a left-hand direction as viewed in Fig. 1.

Operation

For the purpose of the discussion of the operation of the apparatus of the invention, it will be assumed that the cable manufacturing apparatus (not shown) is ready for operation. Further, that the adjustable abutment or stop members **38** and **39** are set at the proper position and that a reel **12** is positioned on the floor rollers **16—16** and aligned centrally with respect to the stop members **38** and **39**. In this manner, the distributor **21** will distribute the cable **11** in uniform layers of convolutions

extending from one flange 13 or 14 to the other flange 14 or 13 of the reel 12 as the cable 11 is advanced continuously from the extruder by the capstan at a uniform rate.

Assuming that the distributor 21 is positioned adjacent to the left-hand side of the take-up reel 12 and the end of the cable 11 is lashed to the reel 12, the start button 89 will be depressed by the operator which will cause the motor 17 to be energized and the start switch 88 to close resulting in the energization of the relay 66. The energization of the relay 66 will close the motor-start contact pairs 74 and 75 and contact pair 68 and will open the contact pair 69 resulting in the energization of the distributing motor 26 to rotate the distributing screw 22 to move the distributing carriage 27 parallel to the winding surface of the drum of the reel 12 in a direction toward the right-hand flange 13, as viewed in Fig. 1. The closure of the contact pair 68 allows the relay 66 to continue to be energized through contact pairs 78, 68 and 70 when the switch 88 is opened when the operator releases the start button 89. The opening of the contact pair 69 prevents the relay 67 from being energized.

The strand-reeling or take-up apparatus 10 is now operating so the take-up reel 12 is in the process of being filled. As the cable 11 advances continuously the distributing carriage 27 is moved to distribute convolutions of cable 11 in uniform positions upon the winding drum of the take-up reel 12. At such time as the distributor carriage 27 reaches the right-hand side of the reel 12, the distributor carriage 27 strikes the abutment member 38 to move the rod 41 to the right to operate the limit-switch actuator 43 resulting in the closure of the limit switch 44. The closure of the limit switch 44 results in the relay 73 being energized. The energization of the relay 73 results in the closure of its associated contact pairs 76 and 77 and the opening of the other contact pair 78.

Upon the closing of the contact pair 76, the circuit including the conventional timing device 86 is energized. Upon the opening of the other associated contact pair 78, a circuit which was previously closed through the closure of the contact pairs 68, 70 and 78 was opened to de-energize the relay 66. The de-energization of relay 66 results in the closure of the contact pair 69 and opening of the contact pairs 68, 74 and 75. Therefore, the motor 26 will be precluded from further operation in the forward direction to move the distributor 21 to the right, as viewed in Fig. 1. At this time, the distributor carriage 27 will dwell or remain in a stationary position at the right-hand end of the reel 12, but the reel 12 will continue to be rotated by the floor rollers 16—16 to take up the cable 11 thereon and place two convolutions of the cable 11, one upon the other, at the end of the reel 12.

As the timing device 86 in the timing circuit is operated after a predetermined interval, which will permit the two overlapping convolutions of cable 11 to be wound on the reel 12, the associated timing contact pair 87 will be closed which will permit a circuit to be completed through the contact pairs 77 and 69 to the relay 67. This causes the relay 67 to be energized resulting in closure of the contact pairs 79 and 80 and the motor 26 being started in a reversed direction so that the distributor 21 will be reciprocated toward the left-hand side of the reel, as viewed in Fig. 1.

Upon the energization of the relay 67 and the start of the motor 26 in the reverse direction, the associated contact 71 will be closed. Thus, as the distributor carriage starts to move in the opposite direction, as a result of the rotation of the motor 26, the rod will be moved to a neutral position to open the switch 44 and thus de-energize the relay 73. The de-energization of the relay 73 will result in the opening of the contact pairs 76 and 77 and closure of the contact pair 78. The opening of the contact pair 76 de-energizes the timing device 86 resulting in the opening of the contact pair 87. However, at this time and prior to the opening of the contact pair 77 associated with the relay 73, a second circuit is completed through the normally-closed contact pairs 69 and 83 and the contact pair 71 to permit the motor 26 to operate when the contact pair 87 is opened by the timer 86 so as to cause the distributor 21 to continue its movement in the direction toward the flange 14 of the reel 12.

At such time as the distributor 21 reaches its opposite limit of movement which corresponds to the left-hand side of the reel 12, the distributor carriage 27 will strike the abutment member 39 to cause the rod 41 to be shifted in a left-hand direction to close the limit switch 46. At this time the relay 72 will be energized which, in turn, will cause the normally-open associated contact pairs 81 and 82 to close and the normally-closed associated contact pair 83 to be opened. The opening of the contact pair 83 will break the circuit to the motor relay 67 and result in the distributor carriage 27 coming to a stop while the reel 12 continues to rotate to take up the advancing cable 11.

The closure of the contact pair 81 results in the energization of the circuit including the timing device 86. After a sufficient interval of time has elapsed in order for two convolutions of the cable 11 to be placed on the reel 12, one on top of the other, the timing contact pair 87 will be closed which will complete a circuit through the contact pairs 82 and 87 to the relay 66. The energization of the relay 66 results in the motor 26 being energized and started in a direction to rotate the distributor screw 22 in the opposite direction to move the distributor carriage 27 toward the right-hand flange 13 of the reel 12. This operation will continue until such time as the reel 12 has been filled with the desired amount of the cable 11.

The above-described apparatus is merely illustrative of the application of the principles of the present invention. Other arrangements may be devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. Strand distributing apparatus for transverse movement with respect to the winding surface of a continuously rotating take-up device, which comprises traversing means movable back and forth across the winding surface of the take-up device for guiding the strand uniformly across the winding surface of the take-up device, drive means for effecting reversal of the direction of travel of the traversing means at predetermined positions adjacent to each end of the take-up device, and electrical control means for regulating the reversal of said drive means for causing delayed reversal and dwelling of said traversing means adjacent to each end of the take-up device so that two convolutions of cable are placed one on top of the other at each end of the take-up device.

2. Strand distributing apparatus for transverse movement with respect to the winding surface of a continuously rotating take-up device, which comprises traversing means movable back and forth across the winding surface of the take-up device of varying sizes for guiding the strand uniformly across the winding surface of the take-up device, drive means for effecting reversal of the direction of travel of the traversing means at predetermined positions adjacent to each end of the take-up device, abutment members positioned adjacent to the ends of the take-up device of varying sizes to vary the given limits between which the traversing means are moved to accommodate take-up devices of varying sizes, actuating means operatively connected to abutment members, and electrical control means actuated by the actuating means for regulating the reversal of said drive means for causing delayed reversal and dwelling of said traversing means adjacent to each end of the take-up device so that two convolutions of cable are placed one on top the other at each end of the take-up device.

3. Distributing apparatus for guiding strand material onto a rotating take-up reel, which comprises a distributor

screw mounted parallel to the longitudinal axis of the take-up reel, reversible means for driving the distributor screw in timed relation to the peripherial speed of the winding surface of the reel, guide means engaged threadedly to and motivated by the distributor screw for transverse movement along the winding surface of the reel for forming superimposed layers of convolutions of strand material on the reel, and means actuated by the transverse movement of the guide means for causing intermittent operation of the reversible drive means and dwelling of the guide means for a predetermined period of time when the guide means is positioned adjacent to the opposing ends of the rotating reel so that two successive convolutions of the strand material are placed one upon the other adjacent to the opposing ends of the reel.

4. Distributing apparatus for guiding strand material onto a rotating take-up reel, which comprises a distributor screw mounted parallel to the longitudinal axis of the take-up reel, guide means engaged threadedly to and motivated by the distributor screw for transverse movement along the winding surface of the reel for forming superimposed layers of convolutions of strand material on the reel, reversible means for driving the distributor screw in timed relation to the peripherial speed of the winding surface of the reel and to reverse when the guide means are positioned adjacent to each end of the reel, and means actuated by the transverse movement of the guide means for causing the reversible drive means to become inoperative for a predetermined period prior to reversing when the guide means is positioned adjacent to each end of the rotating reel so that two successive convolutions of the strand material are placed one upon the other adjacent to the opposing ends of the reel.

5. Distributing apparatus for directing strand material onto rotating take-up means, which comprises an automatically operated traversing guide for guiding the strand material back and forth across a winding surface of the take-up means to wind successive layers of convolutions of the strand material in opposite directions with each convolution in close contact with the preceding convolution, means for driving the traversing guide, means for stopping the movement of the traversing guide adjacent to each end of the rotating take-up means, and electrical means for preventing a reversal of the traversing guide until after a predetermined time interval so that successive convolutions of the strand material are superimposed at predetermined positions on the take-up means.

6. Strand reeling apparatus for taking up an advancing strand upon a rotatably driven take-up reel, which comprises a take-up reel, a source of supply of strand material, drive means for continuously rotating the reel to take up the strand material, strand guiding means for guiding the strand material onto the winding surface of the reel, means for causing relative reciprocating movement between the winding surface of the reel and the guiding means for forming superimposed layers of convolutions of the strand material on the reel, and electrical means actuated by the relative movement between the strand guiding means and the reel for stopping the means for causing relative reciprocating movement between the winding surface and the guiding means when the guiding means is positioned adjacent to each end of the rotating reel and to prevent the reciprocation of the guiding means from causing relative reciprocating movement for a predetermined time interval so that two successive convolutions of the strand material are placed one on top of the other adjacent to each end of the reel.

7. Distributing apparatus for directing strand material onto rotating take-up means, which comprises an automatically operated traversing guide for guiding the strand material back and forth across a winding surface of the rotating take-up means to wind successive layers of convolutions of the strand material in opposite directions with each convolution in close contact with the preceding convolutoin, means for driving the traversing guide, and electrical means actuated by the transverse movement of the traversing guide for causing intermittent operation of the driving means for stopping the movement of the traversing guide adjacent to predetermined positions on the rotating take-up means and causing a delayed reversal of the traversing guide after a predetermined time interval so that successive convolutions of the strand material are superimposed at predetermined positions on the take-up means.

8. Distributing apparatus for directing strand material onto rotating take-up means, which comprises an automatically operated traversing guide for guiding the strand material back and forth across a winding surface of the take-up means to wind successive layers of convolutions of the strand material in opposite directions with each convolution in close contact with the preceding convolution, means for driving the traversing guide, and electrical means controlled by the transverse movement of the traversing guide for stopping the movement of the traversing guide adjacent to each end of the take-up means during the continuing rotation thereof and for causing a reversal of the traversing guide after a predetermined time interval so that successive convolutions of the strand material are superimposed at predetermined positions on the take-up means.

9. Strand reeling apparatus for taking up an advancing strand upon a rotatably driven take-up reel, which comprises a take-up reel, a source of supply of strand material, drive means for rotating the reel to take up the strand material, strand guiding means for guiding the strand material onto the winding surface of the reel, means for causing relative reciprocating movement between the winding surface of the reel and the guiding means for forming superimposed layers of convolutions of the strand material on the reel, and electrical means actuated by the relative movement between the strand guiding means and the reel for causing intermittent operation of the means for causing relative reciprocating movement when the guiding means is positioned adjacent to each end of the rotating reel to cause the guiding means to dwell for a predetermined interval of time so that two successive convolutions of the strand material are placed one on top of the other adjacent to each end of the reel.

10. A take-up apparatus, which comprises a reel, a source of supply of material, means for rotating the reel to take up the material, a distributor carriage mounted for transverse movement axially of the reel and adjacent to the winding surface thereof, a material guiding means mounted on said distributor carriage, means for moving the distributor carriage in timed relation to the speed of rotation of the reel, means actuated by the movement of the carriage for controlling the operation of the distributor carriage, means for stopping the distributor carriage adjacent to each end of the reel during the continuing rotation of the reel, electrical means for preventing a reversal of the distributor carriage until after a predetermined time interval, and means for reversing the movement of the distributor carriage so that two successive convolutions of the material are placed one upon the other adjacent to each end of the reel.

11. A take-up apparatus for advancing continuously strand material to a take-up reel and winding the strand material on the take-up reel, which comprises a source of supply of strand material, a driven take-up reel for reeling the strand material in a series of convolutions along the effective winding surface of the take-up reel, friction rollers for driving the take-up reel, means for causing the rollers through frictional engagement to rotate the reel to take up the strand material with a catenary formed therein for forming tension in the strand material advancing longitudinally from the source of supply to the take-up reel at a predetermined linear speed, means controlled by the catenary for varying the speed of rotation of the take-up reel, a distributor screw mounted parallel to the longitudinal axis of the reel, a reversible motor

for rotating the distributor screw in timed relationship to the peripherial speed of the effective winding surface of the take-up reel, a distributor carriage engaging threadedly the distributor screw and supported for traverse movement along the winding surface of the take-up reel, a shiftable rod positioned parallel to the longitudinal axis of the reel, abutting members at opposing ends of the limits of travel of the strand distributing carriage secured adjacent to the opposing ends of the shiftable rod, means actuated by the shiftable rod in response to the traversing movement of the carriage for causing intermittent operation of the reversible motor to effect a delayed reversal of rotation of the distributor screw at a predetermined point in the path of travel of the distributor carriage adjacent to each end of the reel after a predetermined interval, and a control circuit for causing the distributor carriage to stop for the predetermined time interval prior to its end-of-reel reversal which includes a timing control initiated by the distributor carriage actuating the abutment members to de-energize the reversible drive motor and prevent it from energizing in a reversed direction for the predetermined time interval, and means to energize the reversible motor in the opposite direction after two convolutions of the strand material are placed one on top of the other at the end of the reel in contact with the reel head.

12. A take-up apparatus for advancing continuously strand material to a take-up reel and winding the strand material on the take-up reel, which comprises a source of supply of strand material, a driven take-up reel for reeling the strand material in a series of convolutions along the effective winding surface of the take-up reel, a distributor screw mounted parallel to the longitudinal axis of the reel, a reversible motor for rotating the distributor screw in timed relationship to the peripherial speed of the effective winding surface of the take-up reel, a distributor carriage engaging threadedly the distributor screw and supported for traverse movement along the winding surface of the take-up reel, means actuated in response to the traversing movement of the carriage for causing intermittent operation of the reversible motor to effect a delayed reversal of rotation of the distributor screw at a predetermined point in the path of travel of the distributor carriage adjacent to each end of the reel after a predetermined interval, and a control circuit for causing the distributor carriage to stop for the predetermined time interval prior to its end-of-reel reversal which includes a timing control initiated by the actuation of the distributor carriage, means to de-energize the reversible drive motor and prevent it from energizing in a reversed direction for the predetermined time interval, and means actuated by the timing control to energize the reversible motor in the opposite direction after two convolutions of the strand material are placed one on top of the other at the end of the reel in contact with the reel head.

13. A take-up apparatus for advancing continuously strand material to a take-up reel and winding the strand material on the take-up reel, which comprises a source of supply of strand material, a driven take-up reel for reeling the strand material in a series of convolutions along the effective winding surface of the take-up reel, means for driving the take-up reel to rotate the reel to take up the strand material at a predetermined linear speed, means for varying the speed of rotation of the take-up reel, a distributor screw mounted parallel to the longitudinal axis of the reel, a reversible motor for rotating the distributor screw in timed relationship to the peripherial speed of the effective winding surface of the take-up reel, a distributor carriage engaging threadedly the distributor screw and supported for traverse movement along the winding surface of the take-up reel, a shiftable rod positioned parallel to the longitudinal axis of the reel, abutting members at opposing ends of the movement of the strand distributing carriage secured adjacent to the opposing ends of the shiftable rod, means actuated by the shiftable rod in response to the traversing movement of the carriage for causing intermittent operation of the reversible motor to effect a delayed reversal of rotation of the distributor screw at a predetermined point in the path of travel of the distributor carriage adjacent to each end of the reel after a predetermined interval, and a control circuit for causing the distributor carriage to stop for the predetermined time interval prior to its end-of-reel reversal which includes a timing control initiated by the distributor carriage actuating the abutment members to de-energize the reversible drive motor and prevent it from energizing in a reversed direction for the predetermined time interval, and means to energize the reversible motor in the opposite direction after two convolutions of the strand material are placed one on top of the other at the end of the reel in contact with the reel head.

14. Strand distributing apparatus for transverse movement with respect to the winding surface of a continuously rotating take-up device, which comprises traversing means movable back and forth across the effective winding surface of the take-up device for guiding the strand uniformly across the winding surface of the take-up device, drive means for effecting reversal of the direction of travel of the traversing means at predetermined positions adjacent to each end of said winding surface, and control means including a variable timing device for regulating the reversal of the drive means for causing delayed reversing and dwelling of the traversing means adjacent to each end of said winding surface for variable periods of time as the effective diameter of the winding surface of the take-up device varies so that each time the traversing means is reversed two convolutions of cable are placed one on top of the other at the ends of said winding surface.

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