Sept. 19, 1961 J. A. BRADSHAW 3,000,075

MACHINE AND METHOD OF WINDING AND COILING TEXTILE STRAND MATERIAL

Filed Oct. 30, 1959 2 Sheets-Sheet 1

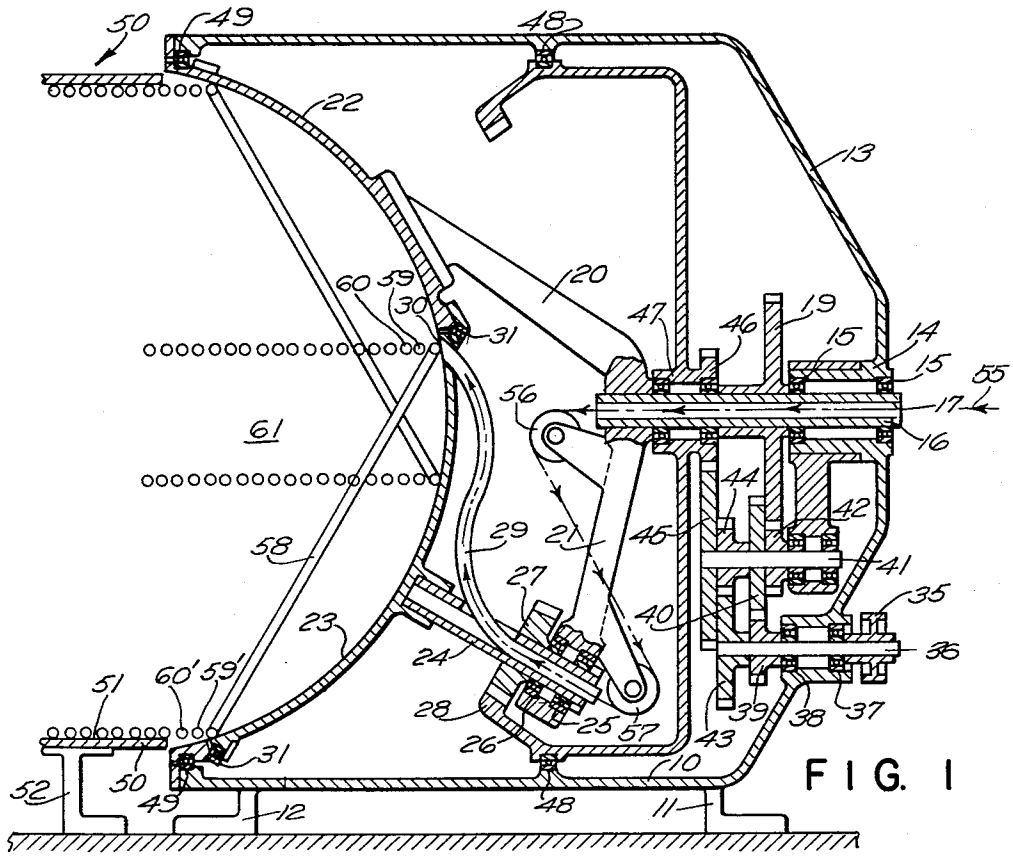

FIG. 1

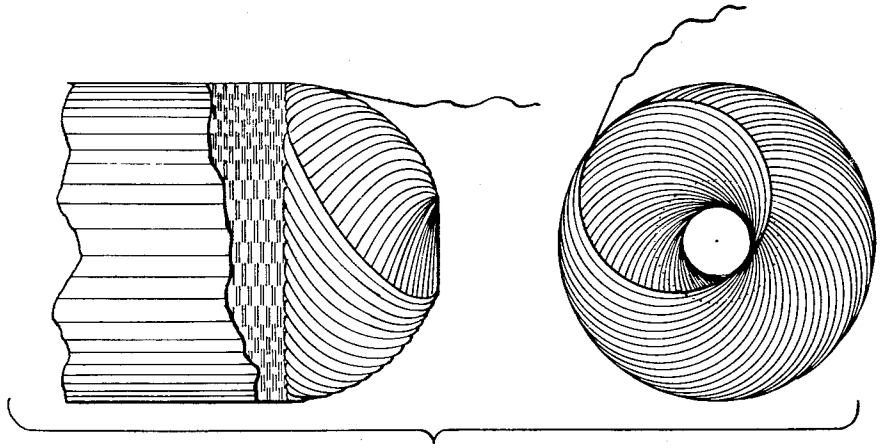

FIG. 2

INVENTOR
JOHN A. BRADSHAW
BY
Barlow & Barlow
ATTORNEYS

Sept. 19, 1961 J. A. BRADSHAW 3,000,075

MACHINE AND METHOD OF WINDING AND COILING TEXTILE STRAND MATERIAL

Filed Oct. 30, 1959 2 Sheets-Sheet 2

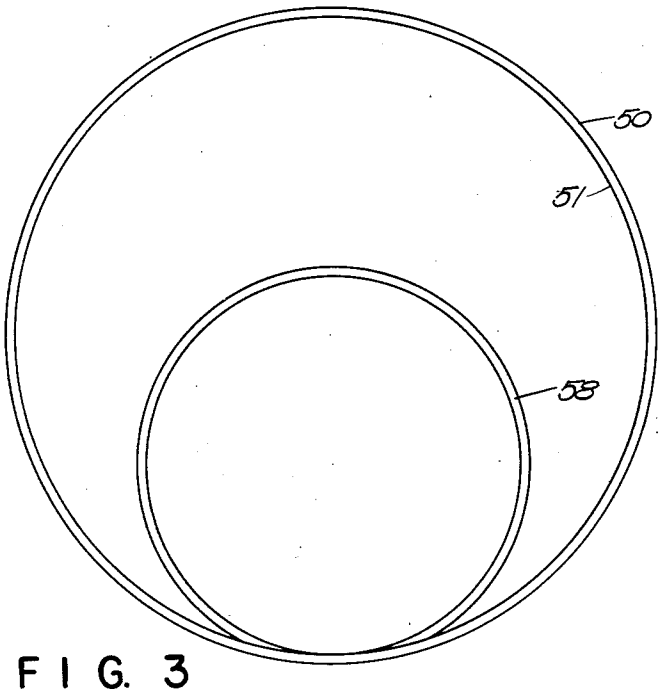

FIG. 3

INVENTOR
JOHN A. BRADSHAW

BY Barlow & Barlow
ATTORNEYS

United States Patent Office 3,000,075 Patented Sept. 19, 1961

3,000,075

MACHINE AND METHOD OF WINDING AND COILING TEXTILE STRAND MATERIAL

John A. Bradshaw, 55 Stever Ave., Hillsdale, N.J.

Filed Oct. 30, 1959, Ser. No. 849,854
4 Claims. (Cl. 28—21)

This invention relates to an improved method for winding and coiling strand-like material and a device for carrying out the method.

Conventional textile winding ordinarily employs a rotary wind up spindle, and a traverse motion to deposit the wound stock in uniform layers along the spindle. Often a tubular sleeve or various types of headed spools are first mounted on the spindle to receive and contain the wound stock and to simplify its removal or doffing from the spindle. When no sleeves or spools are employed, a coreless package will result. A relatively slow moving traverse is employed for winding successive turns of twine side by side or adjacent to each other as in sewing spool winding. A relatively fast moving traverse produces a cross wound package where each turn crosses over others and yields better self support to the wound mass such that spool heads are not always required to help support the wound package of twines or strands. Constant winding spindle speeds produce very substantial increases in twine winding speed since the wound mass builds up and increases the effective winding diameter.

Subsequent use of the wound twine or strand particularly in high speed delivery or in low and even tension applications usually requires that the twine be led off axially or over the end of the package. A net change of one turn of twist results in the delivered strand for each coil of strand delivered off the end of a wound package. Should the twine be pulled off tangentially to the side, such pulling direction requires that the package be unrolled which often results in a higher tension drag together with difficulties in snagging and tangling especially when the twine delivery requirement is intermittent. However, an unrolling delivery does not change the twist in the delivered twine.

Textile carding machines and drawing frames employ coiling machines to take up the sliver produced in these operations and pack it uniformly into sliver cans. Each coiler uses a combination of a coiling head, one or more pairs of calender rolls, and a can turning table to produce quite satisfactory cans of coiled sliver. Disadvantages in this general type of winding lie in the rather uncontrolled and poorly packed coiled mass in the bottom two thirds of the can, and also in the necessity for doffing and replacing the filled can at regular intervals to avoid overfilling and any related damage to the coiling device.

A principal object of this invention is the provision of a device which has the ability to wind a nonrotating and virtually stationary mass of stock. The orderly deposit of stock in a uniform distribution and pattern on one end of a non rotating package leaves the other end free and exposed to be led off at will to a subsequent operation or location with no necessity for stopping the supply winding.

A second principal object of the invention is the production of the wound package to deliver strand or twine with no change in twist.

Another object of the invention is the provision of a winding device to wind up stock with a constant linear twine or strand take up speed.

Another advantage lies in the ability of this winding device to wind any practicable size or weight of take up package and also in the ability of the wound package to be split into any smaller size.

With these and other objects in view, the invention consists of certain novel features of construction as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings:

FIGURE 1 is a sectional view somewhat schematic illustrating the device of this invention;

FIGURE 2 is an elevation and an end view of the package produced by the device;

FIGURE 3 is an end view of the guide with one coil therein.

In proceeding with this invention, I provide for the delivery of strand material in coil form, and I so change the path of the laid coil that it overlaps the preceding coil in such a way that the strands as laid will tend to bind the previous strands so as to produce a package of a formation which will maintain itself in a unit form with a hollow center formed in the package with no core.

In FIGURES 1 and 2 I have shown a device for forming a package of generally cylindrical form with a round nose of convex shape and somewhat along the surface of a sphere, which I find is better from the standpoint of sustaining itself in a unit form inasmuch as the coils overlap each other in such a way as to bind the package into this unit form, and yet the yarn may be drawn from the package at will. In FIGURE 1, **10** designates a framework having supporting legs **11** and **12**. The frame work is in generally cylindrical form or may be spider-like as it acts primarily as a support for other parts. One end of the frame is necessarily open while the other end is generally closed as at **13**, and in this closure portion **13** and centrally or on the axis of the cylindrical casing **10**, there is provided a bearing **14** which supports through ball bearings **15** a tubular shaft **16** having a central bore **17** therethrough, through which the strand to be wound passes. A gear **19** is keyed to this shaft **16** for rotating the same. Fixed to the inner end of the shaft **16**, there are two arms **20** and **21**. The former of these supports a thrust plate **22** fixed to the arm **20** and which is shaped on the segment of a sphere. The arm **21** supports a segment **23** of this thrust plate which conforms to the sphere segment and is complemental thereto but which itself is supported by a shaft **24** centrally thereof, the plate being circular about the axis of its shaft. This shaft is supported in ball bearings **25** and **26** supported at the end of the arm **21**, and the shaft is driven by gear **27** meshing with a sun gear **28**. Extending through this shaft **24**, there is a guide tube **29** which receives the yarn to be wound axially of the shaft **24** and then guides it radially outwardly of shaft **24** in somewhat of an **S** bend to a delivery point **30** which is adjacent the outer periphery of the rotating plate **23**, this plate being guided in bearings **31** at its periphery in the plate **22**.

The drive for the shaft **16** and its arms **20** and **21** and the mechanism mounted thereon is from a motor pulley **35** which drives the drive shaft **36** mounted in ball bearings **37** and **38** in the frame **10**. A gear **39** is fixed on this shaft **36** and drives the gear **40** on the intermediate gear shaft **41**. Also on this intermediate gear shaft, there is a gear **42** which meshes with the gear **19** on the shaft **16**. These gears **40** and **42** are fixed to rotate together such as by being secured to each other in driving relation or through the gear shaft **41** both being keyed thereto.

A further driving relation occurs by reason of the gear **43** keyed to the drive shaft **36** which drives gear **44** loose on the intermediate gear shaft **41** which in turn is fixed to the gear **45** also loose on the intermediate gear shaft **41** so as to drive the gear **46** which is fixed on the hub **47** of the sun gear **28**. This sun gear is thus capable

of rotation itself so that through the change gears **43**, **44**, **45** or the change gears **39**, **40**, **42** a selective relative speed of rotation of the shaft **16** and the shaft **24** may be had. The sun gear is suitably supported by bearing **48** in the framework **10** while bearing **49** also support the thrust plate **22** at its outer periphery in this framework. Adjacent the open end of the supporting framework **10**, I have provided a guide **50** in the form of a tubular sheath having an inner supporting surface **51** spaced from its central axis. This guide **50** is mounted upon suitable supporting legs **52** spaced along its length at sufficient intervals to provide the proper support.

In operation the drive is such as to rotate the shaft **16** carrying the arms **20** and **21** relatively slowly while the rotation of the shaft **24** carrying the guide **29** and plate **23** rotate much faster, the ratio being about forty to one. It will be observed that the rotation of the shaft **24** is obtained by the meshing of the gears **27** and **28**, the gear **27** being rotated with the sun gear stationary or with the sun gear rotating much slower by reason of the movement of the arms **20** and **21** revolving about the axis of the shaft **16**. A strand of textile material is drawn in through the hollow shaft **16** as shown by the arrow **55** and then passes over pulleys **56** and **57** on arm **21** and thence axially into the shaft **24** and thence through the guide tube **29** to the outer periphery of the plate **23**. Here the strand material designated **58** is deposited in a coil whose plane is shown by the double lines to which the lead line of **58** extends. The coils are built up as shown by their diametrical sections **59**, **59'**, **60**, **60'**, and so forth, while at the same time each deposited coil advances circularly a small amount about the axis of the shaft **16**. Thus, if the ratio is forty to one, there will be 40 coils deposited in one complete revolution of the arms **20** and **21**, thus forming a package which has a hollow center **61**. The yarn as deposited on yarn previously laid, presses into this yarn previously laid and gets a strong frictional grip thereon so that as the arms **20** and **21** are revolved about an axis **16** this incoming yarn is actually pulled out of the tube **29** by reason of the rotation of the arms **20** and **21**. Also as this package builds up and acquires weight, the deposited yarn causes the package to be moved forward into arcuate plate **22** which acts as a thrust plate against which the deposited yarn may push to force the package which has been previously formed ahead of it to move further ahead and through the guide **50** and along the supporting surface **51** on the inner side of this tube.

As will be apparent the yarn package is stationary not being revolved about any axis, and thus the yarn as it is deposited will have no permanent twist laid in, such twist as occurs is of the false twist type. This arrangement of building the package by additions of yarn to one end of the package leaves the opposite end of the package free to have yarn drawn therefrom without stopping the winding operation. Also from such a continuously formed package units may be severed in a pre-determined size without stopping the winding operation. Thus many disadvantages of previous windings will be eliminated, and a package is formed which is unique in its ability to deliver the yarn without twist as drawn therefrom.

In some cases instead of having the sheath or guide as a complete tube, a trough-like guide may be employed leaving access to the top of the package where it is horizontal. Also the package may not be formed along a horizontal axis but could be caused to be moved upwardly vertically by the yarn being deposited over a vertically disposed guide. In this latter case, however, it will be apparent that a greater friction is provided by reason of the weight of the package on the freshly deposited yarn.

For initially starting the winding operation it is only necessary to gather up a mass in random form of the strand material to be wound and press this layer of material against the face of the winding machine generating disk from which the strand end has previously been led out of the guide opening. This free end would be trapped by pressure or friction against the resilient column of material so positioned, and then winding could be started. At a convenient time, the balled up mass of material would be removed from the face of the package so that only properly wound material would remain.

Further, should the winding strand become parted during winding, it would then be necessary to stop the machine, press the wound mass away from the face of the winding disk, lead the broken end along the guide path and out of the guide mouth probably with a "lead-through" wire. The broken end is then tied to the last wound and at the rear of the wound package, the wound package mass is pressed back in place against the face of the winding head, and then the winding machine may be started up again to resume winding.

It is further suggested that at the conclusion of a winding assignment it should prove desirable to not strip the wound package back to the face of the winding head but to always leave a small practicable portion in position against the winding disk so that its very presence develops sufficient back pressure to allow a prompt start up on the next winding assignment.

I claim:

1. The method of handling strand-like material which comprises providing a fixed guide open at its opposite axial ends having a lengthwise axis extending generally horizontally and a supporting surface spaced from said axis, directly placing strand material in its final relative position in non-rotating coils with each coil of a diameter greater than the distance from the axis to the supporting surface with the plane of each coil at an acute angle to the axis of said guide and with successive coils displaced circularly in echelon relation with respect to the previous coil to provide the shape of a portion of a generally sphere to the end of a mass thus formed whereby they provide an overlapping binding relation, the progressive depositing of the strand material causing endwise pressure on the mass of deposited strand-like material causing it to be pushed along the supporting surface, and withdrawing the deposited material at the opposite end of said guide.

2. An apparatus for handling strand-like material comprising a fixed guide having a lengthwise axis extending generally horizontally and open at its opposite axial ends and providing a supporting surface spaced from said axis, a thrust plate shaped to generally conform to the concave surface of a portion of a sphere and located with its concavity adjacent one end of said guide, means to rotate said plate about the axis of said guide, said plate having an independent segment as a portion of said plate including said axis, means to rotate said segment relative to said plate about an axis at one side of the axis about which said plate rotates, and a strand guide carried by said segment at a location to cross the axis of said guide every revolution of the segment and means to direct said material along the axis of rotation of said plate and thence to the strand guide on said segment.

3. An apparatus as in claim 2 wherein the guide is tubular.

4. An apparatus as in claim 2 wherein the segment is driven through rotation of said plate.

References Cited in the file of this patent

UNITED STATES PATENTS

795,982	Hubbard	Aug. 1, 1905
1,433,723	Hubbard	Oct. 31, 1922
1,955,719	Malkomes	Apr. 17, 1934
2,035,268	Johnson	Mar. 24, 1936
2,478,960	Wilkie	Aug. 16, 1949
2,598,738	Wilkie	June 3, 1952
2,882,673	Buddecke	Apr. 21, 1959

FOREIGN PATENTS

12,823	Great Britain	Nov. 2, 1849
305,299	Germany	Apr. 26, 1918