

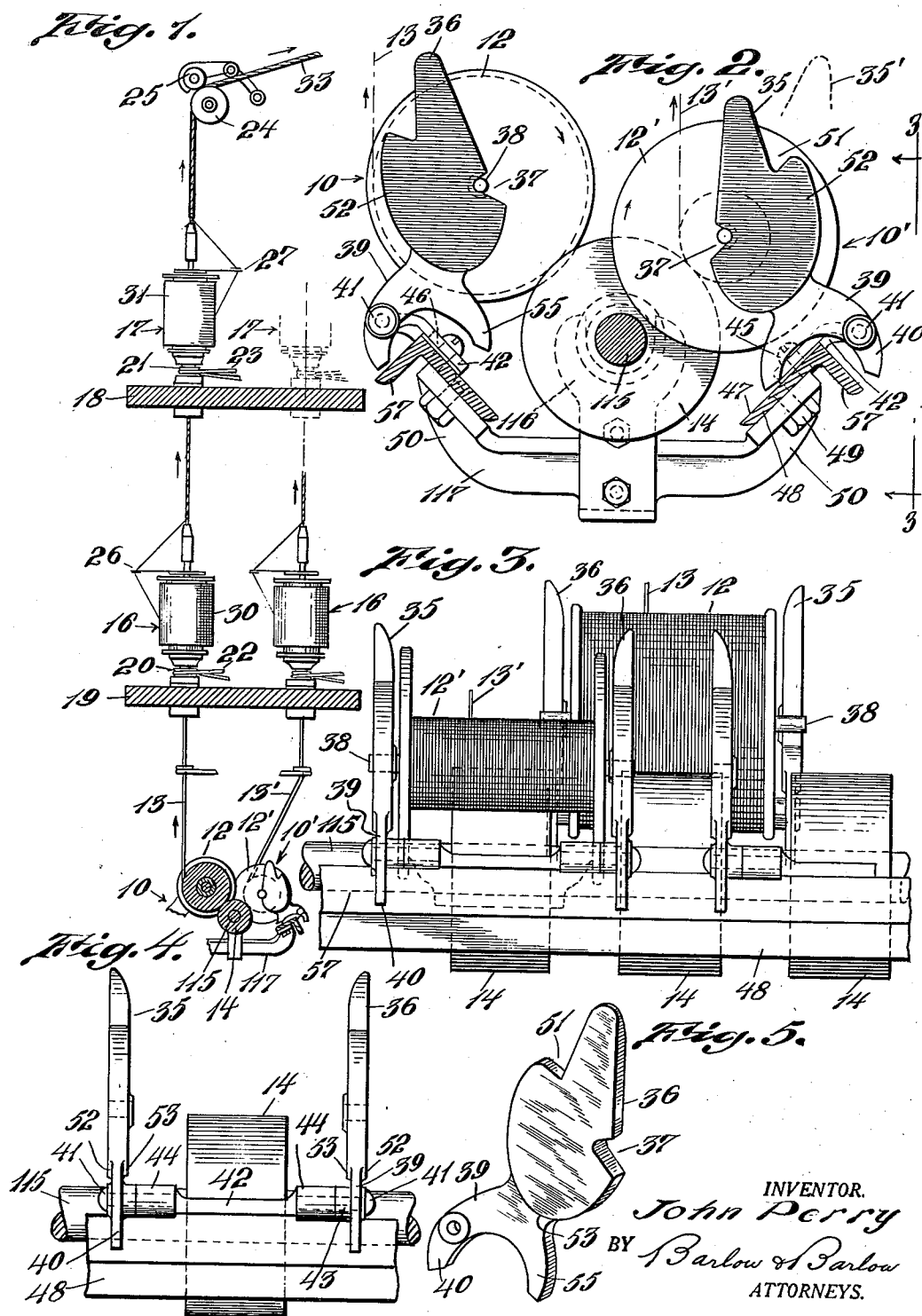
July 22, 1941.

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2,250,334

STRAND WRAPPING MACHINE

Filed April 13, 1940



UNITED STATES PATENT OFFICE

2,250,334

STRAND WRAPPING MACHINE

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Application April 13, 1940, Serial No. 329,476

5 Claims. (Cl. 242—18)

This invention relates to improvements in strand wrapping machines and more particularly to mechanisms of the type for releasing the wound masses of core threads from a rotatable supply spool or carrier in which the spool rests against a driving roll or drum and is rotated by frictional engagement of the periphery of the driving roll or drum with the exterior of the wound mass as the core threads are released from the spool; and has for one of its objects the provision of means for automatically maintaining the total resultant force between the wound core material on the spool and the driving roll or drum substantially constant as the spool moves toward its driving roll or drum as the wound mass of core threads on the spool or carrier is released from the spool due to the decreasing diameter of the core mass on the spool.

Another object of the invention is the pivotally supporting of the rotatable spool or carrier for the elastic core threads for bodily swinging movements toward and away from the driving rolls, and to provide means associated with pivotal spool supports for preventing the resultant pressure of the spools against their driving roll from decreasing during the unwinding operation and acting to maintain the wound mass so frictioned against the driving roll that the total driving pressure between the spool and the roll will remain constant regardless of any changes in weight of the spool or carrier due to the reduction in the diameter of the wound mass of the core material thereon.

Another object of the invention is to provide a device or an attachment of the character indicated having a movable support for the spool or carrier wherein the total effective driving force between the driving roll and the spool or carrier will be controlled or predetermined throughout the entire unwinding operation of the core threads from the spool or carrier and in direct proportion to any loss in the spool weight resulting from the gradually decreasing diameter of the core mass as it is unwound from the spool.

Another object of the invention is to provide means for applying an additional amount of weight to that of the spool as it becomes emptied during unwinding of the core threads therefrom, and to control the application of this weight during the unwinding operation so as to prevent slippage and jumping of the spool on the driving roll when rotated at high speed as the supply of core threads on the spool becomes depleted to a point where the total pressure of the spool

on the driving roll is insufficient to effect release of the core threads without undesirably affecting the tension of the same.

Another object of the invention is to provide means for swingably supporting the spool or carrier on which the wound mass of elastic core material is held at the beginning of the covering operation in which the supporting means will be so arranged and shaped that, as the spool or carrier moves toward the driving roll as the core threads are released, an additional amount of weight will be applied to the spool to maintain the total resultant pressure of the same against the driving roll substantially constant and of the required amount.

Another object of the invention is to provide a device or an attachment of the character indicated which may be readily applied to elastic yarn-making machines of standard design for use as a "let-off" mechanism for releasing the wound mass of elastic core threads from its supply spool or carrier, and also be capable of application to textile twisting frames of the "up-twister" type for use in connection with the "take-up" spool or yarn-receiving tube which is rotated through frictional contact between the periphery of a driving drum and the mass of twisted textile being wound on the spool or tube, and without material alteration in the constructions or the arrangements of such machines.

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 drawing:

Fig. 1 is a diagrammatic view, in side elevation, of an elastic-yarn-making apparatus of known type having two decks of vertically aligned covering spindles for applying to an elastic core a pair of helically wrapped, oppositely wound coverings of a strand textile material and showing a device embodying the present invention as applied to use as a "let-off" mechanism for releasing the supply of the elastic core threads to be covered from the supply spools or carriers;

Fig. 2 is an enlarged side elevational view, partly in section, of one embodiment of the invention showing an apparatus having a plurality of spools or carriers for holding the elastic core, thread or strand material arranged in two rows on opposite sides of and resting upon their respective driving rollers in frictional engagement therewith, one of the spools or carriers being represented in its full condition and the oppo-

site spool or carrier being shown in a partially full state;

Fig. 3 is a front elevation of a portion of the apparatus shown in Fig. 2 taken substantially on the line 3—3 of Fig. 2;

Fig. 4 is a front elevation of a portion of the apparatus shown in Fig. 3 without a spool or carrier in the pivotal cradle or spool holder; and

Fig. 5 is a perspective view of one of the weighted side plate members two of which in spaced relation and of right hand and left hand formation form the pivotal cradle for a spool or carrier, and showing the arrangement of the parts and the convex curved shape of the weighting device associated therewith.

The Henry Z. Cobb Patent No. 1,976,328, granted October 9, 1934, discloses an apparatus for helically wrapping an outer cover strand of fibrous textile material on a rubber core strand for making elastic yarn, and shows a spool of elastic thread or other elastic material suitable as a core for elastic yarn placed with the opposite ends of the axle of the spool loosely journaled in the crotched ends of a pair of spaced U-shaped brackets with the outer layer of the wound thread on the spool resting against the periphery of a positively driven roll which rotates the spool to release the wound core thread at a rate of speed governed by the surface speed of the driving roll. It is found in practice that during the process of covering the core thread, certain objectionable features were encountered, one of which was the difficulty to maintain proper tension and constant elongation of the rubber core; another, the difficulty of obtaining a constant frictional pressure or driving force between the driving roll and the wound mass on the spool at high speeds during the process of releasing the same as the spool weight changes due to the gradual withdrawal of the rubber core therefrom and the resultant decrease in weight and diameter of the wound mass on the spool; and in order to overcome the foregoing difficulties heretofore existing in this prior art apparatus while adding many advantages and beneficial means for increasing efficiency, simplicity and practicability of operation, I have provided in accordance with the present invention a device comprising a pair of spaced swingable arm members forming a cradle for rotatably supporting between them the supply spool or carrier for the rubber core and pivotally mounted on a frame member to move with the spool toward the driving roll when the wound mass of the spool rests in frictional contact therewith, the center of gravity of the spool falling at all times lying in a vertical plane between the vertical plane containing the pivot axes of the arm members that support the spool and the vertical plane containing the axis of rotation of the driving roll; and associated with this cradle is a weighting device which is movable with the spool supporting arm members as the same move relative to the driving roll in response to any changes in the size and weight of the spool for applying a gradually increasing amount of additional weight to the spool or carrier and acting in conjunction with the weight of the spool and its supports and the gradually decreasing weight and diameter of the wound core mass on the spool to maintain substantially constant the total resultant force or pressure exerted by the spool or carrier against the periphery of the driving roll regardless of the amount of the strand material on the spool and to offset the gradually decreasing weight of the strand mass as it is being unwound from the

spool and thereby compensate for the amount of loss of weight of strand mass on the spool so as to maintain the tension of the released core strands constant and predetermined, and to prevent jumping or bouncing of the partially emptied spool on the driving roll when running at high speed; and the following is a more detailed description of the present embodiment of this invention, illustrating the preferred means by which these advantageous results may be accomplished:

With reference to the drawing, there is shown in Fig. 1 only such parts and elements of a machine of well known type for making elastic yarn as will serve conveniently to render apparent and illustrate the relations and the nature of the present invention. In the illustrated embodiment, 10 and 10' generally designate two cradle devices embodying the invention for rotatably supporting the spools, bobbins or carriers 12 and 12' from which are supplied the elastic threads 13 and 13' or other elastic strand material suitable as a core for the covered elastic yarn. As illustrated, the spools or carriers 12 and 12' are arranged with the exterior of the wound masses of elastic core threads 13 and 13' respectively resting against and in frictional engagement with the peripheries of the driving rolls or drums 14 (see Figs. 2 and 3). In the preferred construction, a plurality of driving rolls or drums 14 of narrower width than that of the spools 12 and 12' are mounted in spaced relation on the shaft 115 which extends longitudinally of the machine for substantially its entire length. The shaft 115 is mounted in suitable bearings 116 on the transverse frame member 117 and is driven at a high speed in any suitable manner from a suitable source of power (not shown). Consequently, the rate at which the elastic core threads 13 and 13' will be released or let off from their spools 12 and 12' respectively will be at a rate of speed governed by the surface speeds of the driving rollers 14.

The elastic threads or cores 13 and 13' may be of rubber of any desired cross-section, and they may be made by any suitable or known method in the art of producing strong durable rubber thread.

Various types of wrapping devices of well known construction may be employed for helically applying the strand covering material to the rubber core threads 13 and 13'. In the construction illustrated diagrammatically in Fig. 1, the covering machine there shown for making elastic yarn is of a conventional type and comprises a construction in which the strand covering material, such as yarn or other common textile material, is helically applied in two oppositely wrapped layers to each of the elastic cores 13 and 13' by means of the hollow rotary spindles generally designated 16 and 17 which are suitably mounted with their bores in vertical alignment upon the upper and lower decks or frame members 18 and 19 of the covering machine. The spindles 16 and 17 are arranged to form two longitudinal rows on the decks 18 and 19 respectively, the spindles of one row being staggered with respect to the spindles of the other row on the same deck. The spindles 16 and 17 may be driven in any suitable manner, such as by the whorls 20 and 21 respectively and the belts 22 and 23 driven from any suitable source of power (not shown). The lower deck of covering spindles 16 normally run at a faster speed

and in the opposite direction to the rotation of the spindles 17 on the upper deck.

For convenience of description, the operation of the covering machine is hereinafter described with reference to the covering of the elastic core strand 13, it being understood that a similar covering operation occurs in the covering of the elastic core strand 13' as well as other individual core strands which are led through the covering spindles 16 and 17 in each row on the machine, and therefore the description of the covering process is to be interpreted as being applied separately to each of the individual elastic core strands 13 and 13' to be covered. Thus, the elastic thread or core strand 13, as it leaves the supply spool 10 is successively advanced upwardly in a predetermined stretched condition under a uniform tension by the positively driven feed wheel 24 and the idler roller 25 and led successively through the bores of the hollow spindles 16 and 17 respectively in the course of which progressive upwardly-advancing movement of the core the rotary flyers 26 and 27 associated with the covering spindles 16 and 17 respectively helically apply in succession to the rubber core strand 13 the inner and outer wrappings of the strand covering materials 28 and 29 respectively which are supplied from the packages 30 and 31 carried by the respective covering spindles 16 and 17.

The feeding and tensioning mechanism illustrated in Fig. 1 and comprising the feed wheel 24 and the idler roller 25 is of a construction in accordance with the tensioning and feeding mechanism described and claimed in the disclosure of my co-pending application, Serial No. 276,782, filed June 1, 1939, now Patent No. 2,211,434, granted August 13, 1940.

The finished double-covered elastic yarn 33 after the second covering operation and immediately on leaving the bight of the feed wheel 24 and roll 25 is then wound either on a tube take-up member (not shown) or upon a revolving reel (not shown) mounted on top of the machine, as desired, such take-up devices being well known to those versed in the art and being common to the present type of covering machine.

Referring to Figs. 2 and 5 in detail, the cradle devices 10 and 10' for supporting the spools or carriers 12 and 12' respectively are shown as being of similar construction but arranged at opposite sides of the shaft 115 for driving the rolls 14, a plurality of the cradles 10 and 10' being employed and arranged to provide an alternating arrangement extending longitudinally of the machine to correspond to and generally simulate the staggered arrangement of the spindles 16 and 17 carried by the decks of the machine so that a description of the construction of one of the cradle devices is sufficient and will apply to the others.

As illustrated, each of the cradle devices comprises a pair of spaced arm members or side plates 35 and 36 which form the swinging spool supporting members for retaining a spool or carrier 12 or 12' in proper working relation with the periphery of one of the driving rolls or drums 14, the side plates being provided with deep notches 37 in their inwardly facing edges for receiving and rotatably supporting the gudgeons 38 of a spool when the same are located between the side plates, and including the depending leg members 39 which are integral with the plates and have a curved finger portion 40 pivotally mounted by the pivot pins 41 upon the bifurcated

bracket 42. The pins 41 loosely fit and extend through suitable openings formed in the hubs 43 located on the inside face of the inner ends of the fingers 40 of the legs 39 and the pins are received by and are fixedly secured within the bores of the sleeves 44 formed at the free ends of the arms of the bifurcated bracket 42. A screw 45 passing through a suitable slot 46 formed in the body of the bracket 42 serves to adjustably mount and secure the bracket 42 to the upwardly facing sloping side 47 of the inverted V-shaped channel member 48 which extends longitudinally of the machine for substantially its entire length, and in turn is affixed in any suitable manner, as by the studs 49, to the flat upper faces of the upwardly inclined arms 50 at the opposite ends of the transverse member 17. Another deep notched portion 51 is provided above the notch 37 and on the outwardly facing edge portion of each of the sides 35 and 36 respectively in order to provide a rest portion for supporting the spools 12 and 12' whenever desired yet render them readily available but out of frictional surface contact with the driving drum or roll 14.

For the purpose of holding the wound masses of elastic core threads on the supply spools or carriers 12 and 12' against the peripheries of the drums 14 so that the total resultant force exerted by the spools and core masses on the driving drums shall remain constant during release of the core threads, each of the side plates 35 and 36 respectively are provided at an intermediate section thereof with the lobes 52 and 53, which in the embodiment illustrated project from opposite sides of the associated plate member. The shape and location of the lobes 52 and 53 are preferably such that the material thereof will be so distributed with relation to the plate member that the weight of the lobes will be applied to the gudgeons of the spool carried by the side plates 35 and 36 so as to impart a gradual increase in the total effective pressure of the combined weight of the spool or carrier 12 or 12' and the wound material thereon, upon the driving roll or drum 14 respectively by an amount equal to the gradual decrease in weight due to removal of the wound material on the spool and thereby offset the gradual loss in spool weight due to the diminishing diameter of the wound mass of elastic threads on the spool to produce a constant total resultant pressure for holding the spools 12 and 12' against the peripheries of driving rolls or drums 14. To this end, the shape and size of these lobes are constructed so as to have a convexly curved contour of gradually increasing radius as shown in Figs. 2 and 5, and a distribution of mass such as to provide an additional force acting vertically on a line falling between the pivot 41 and the driving shaft 115 and applied to the spool gudgeons 38 to augment the spool weight at any instant to produce a substantially constant resultant pressure force against the driving drum 14.

Fingers 55 are provided on the leg members 39 the ends of which serve as stops to prevent the side plates 35 and 36 from falling too far inwardly toward the driving rolls 14 under action of the weight of the lobes 52 and 53 after the spools 12 and 12' are removed from the cradles. The outer ends of the fingers 40 of the legs 39 also act as stops for preventing too great an outwardly swinging movement of the side plates 35 and 36, as indicated at 35' in Fig. 2, by engagement with the arms 57 of the channel members

48 and serve to hold the cradles in a loading position for receiving fresh spools 12 and 12' without necessitating the use of handling levers on the cradles. The side plates 35 and 36 are shown as being rights and lefts in that the inside upper edge portions of the respective plates which face the spool ends are shown as being convexedly curved outwardly, thus preventing their interchangeability, although it will be apparent that such formation is not essential as both side plates may be made of like shape.

If it is desired to further increase the resultant force of the spools 12 and 12' against the driving drums the effective leverage radius of the cradles may be varied considerably by adjusting the heights and the positions of the pivot pins 41 in any suitable manner, as by providing for longitudinal adjustment of the bracket 42 across the sloping face 47 of the channel member 48 by the use of a bolt and slot connection for attaching the bracket to the channel member.

From the above it will be apparent that I have provided an arrangement by which sufficient additional weight is applied to the spool during depletion of its wound core mass to prevent the spool from jumping with respect to the surface of the driving roll when rotating at high speed during the unwinding operation as the weight of the spool becomes too light to hold it against the driving roll, and preferably for controlling and for gradually increasing the total resultant pressure of the spool weight, the weight of the wound mass thereon by an amount equal to the loss in weight of the wound mass as it is being gradually unwound from the spool during movement inwardly of the same toward the driving roll 14 in response to lowering of the weighted swinging arm members 35 and 36. When the unwinding operation has been completed the arm members 35 and 36 will be elevated and stand in the position indicated by the dotted lines 35' shown in Fig. 2 with the spool out of contact with the driving roll 14 and freeing the arm members from the weighting effect of lobes 52 and 53 so that the gudgeons of the spool may be readily lifted from the notches 37 to remove the empty spool and replace it with a filled spool.

While I have specifically described the invention as being applied to a machine for making elastic yarns, it will be understood that the basic features are equally applicable to the take-up or winding mechanism in textile twisting frames of the "up-twister" type in which case the take-up spool, tube or other carrier on which is wound the twisted textile material, such as rayon yarn, silk yarn, or cotton yarn is located above and rests substantially on the top of and in frictional surface contact with the periphery of a driving roll or drum, the weighted side arms of the cradle for supporting the spool serving to apply their maximum amount of weighting force at commencement of the winding operation when the spool is empty and then letting off or gradually decreasing their action as the yarn is wound on the spool as it becomes filled, whereby the total resultant force or pressure of the spool against the driving roll or drum will remain substantially constant and also prevent jumping or bouncing of the spool.

The foregoing description is directed towards the specific embodiment disclosed herein, which is intended to be illustrative only and not restrictive as it will be obvious that various changes and modifications may be made in the form, construction and arrangement of parts other than

those illustrated, without departing from the spirit and scope of the invention, such changes and modifications being restricted only by the scope of the appended claims.

I claim:

1. In apparatus of the class described, the combination of a frame, a positively driven roll rotatably mounted on said frame, a carrier holding a wound mass of strand material, a pair of spaced plate members pivotally mounted on said frame member for swinging movement toward and from said driving roll, said swingable members rotatably supporting said carrier between them and movable bodily with said carrier to hold the exterior of the wound mass of strand material in frictional driving engagement with the peripheral surface of said driving roll and to move the spool towards the driving roll as the strand material is unwound from the spool at high speed, and a weighting device associated with said plate members comprising two convexedly-curved lobes one acting on each of said plates and movable bodily therewith, the curvature of said lobes being on a curve of gradually-increasing radius, said lobes acting to impart a gradual increase in the effective pressure of the spool and its associated mass of strand material, on the driving roll in an amount proportional to the loss in weight of the strand mass on the spool and thereby compensate for the corresponding pressure loss due to the gradually-diminishing weight of the strand mass as it is unwound from the spool, and to maintain substantially constant the effective resultant pressure of the spool and its strand mass on the driving roll regardless of the amount of strand material on the spool.

2. In a strand wrapping machine, a frame, a positively-driven drive roll rotatably mounted on said frame, a carrier holding a wound mass of strand material, an adjustable member on said frame, two spaced swingable arm members forming a cradle on which is rotatably mounted said carrier and its wound mass with the axis of rotation of said carrier disposed above and at one side of the axis of rotation of said driving roll, each of said arm members being pivotally mounted on said adjustable member for swinging movement toward the driving roll as the strand material is unwound from the said carrier, said arms each having a convexedly-curved lobe the curvature of which being on a curve of gradually-increasing radius, said lobes acting to impart a gradual increase in the effective pressure of the carrier and its associated strand mass on the driving roll in an amount proportional to the loss in weight of the strand mass on the carrier and thereby compensate for the corresponding pressure loss due to the gradually-diminishing weight of the strand mass as it is withdrawn from the carrier, and to maintain substantially constant the effective resultant pressure of the carrier and its strand mass on the driving roll regardless of the amount of strand material on the said carrier, said adjustable member being adjustable laterally of said frame for varying the position of the pivots of said swingable arm members and for adjusting the axis of rotation of said carrier in reference to the axis of the rotatable drive roll.

3. In an apparatus of the class described, the combination of a support, a positively driven roll rotatable on said support, a carrier provided with gudgeons at its opposite ends and carrying a wound mass of strand material, and a pair of

spaced swingable arm members pivoted on said support, each arm member being provided with a pair of abutment surfaces arranged to form a recess extending inwardly from a side edge of the arm member to provide bearing portions for receiving the gudgeons of said carrier and rotatably supporting it between the arm members, said carrier being movable bodily with said arm members to cause the wound strand mass on the carrier to rest against the periphery of said driving roll for rotation thereby and to move toward the same as the supply of strand material is unwound from the carrier during rotation of the latter by frictional engagement of the driving roll with the strand material, each of said swingable arm members having a convexedly curved lobe, the curvature of said lobes being on a curve of gradually-increasing radius whereby they will act to impart a gradual increase in the effective pressure of the carrier and its associated mass of strand material on the driving roll as the arm members and the carrier thereon move bodily toward the driving roll as the wound mass decreases in size so as to maintain substantially constant the resultant pressure of the carrier on the said driving roll as the strand material is unwound from the carrier.

4. A support for a rotatable spool comprising a base, a pair of spaced plate members pivotally mounted upon said base, a lobe intermediate of the ends of each of said plate members, each plate member being provided at one side edge with a notch arranged to provide a bearing for receiving and rotatably supporting a spool in

its normal working position on said support, the other side edge of each member having a notch located obliquely across the member from the first-named notch and arranged to provide a rest for receiving and supporting the spool in an inactive position when the spool has been removed from its normal working position in the first-named notch, the pivot of each of said plate members being at a point thereon distal from either of said spool-supporting notches.

5. As a new article of manufacture, a rigid, generally plate-like body having a convexedly curved lobe intermediate its ends, one end portion of said body being bifurcated to provide a pair of spaced leg members one of which is provided with an element of a pivotal mounting for swingably supporting the body upon a support, and the other leg member providing a stop for the body when swung in one direction upon its pivotal mounting, the convexity of said lobe being mainly in the general direction of the bifurcated end portion of the body, the body having notches in its side edges, said notches extending inwardly therefrom and having curved inner ends, one of said notches being arranged to provide a bearing for receiving and rotatably supporting the gudgeon at one end of a spool when the spool is positioned in its normal working position and the other notch being located diagonally across the body from the first-named notch to provide a rest for supporting the spool in an inactive position after it has been removed from the first notch.

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