July 1, 1941. H. E. COOPER 2,247,481

CORE COVERING MACHINE

Filed May 23, 1940 2 Sheets-Sheet 1

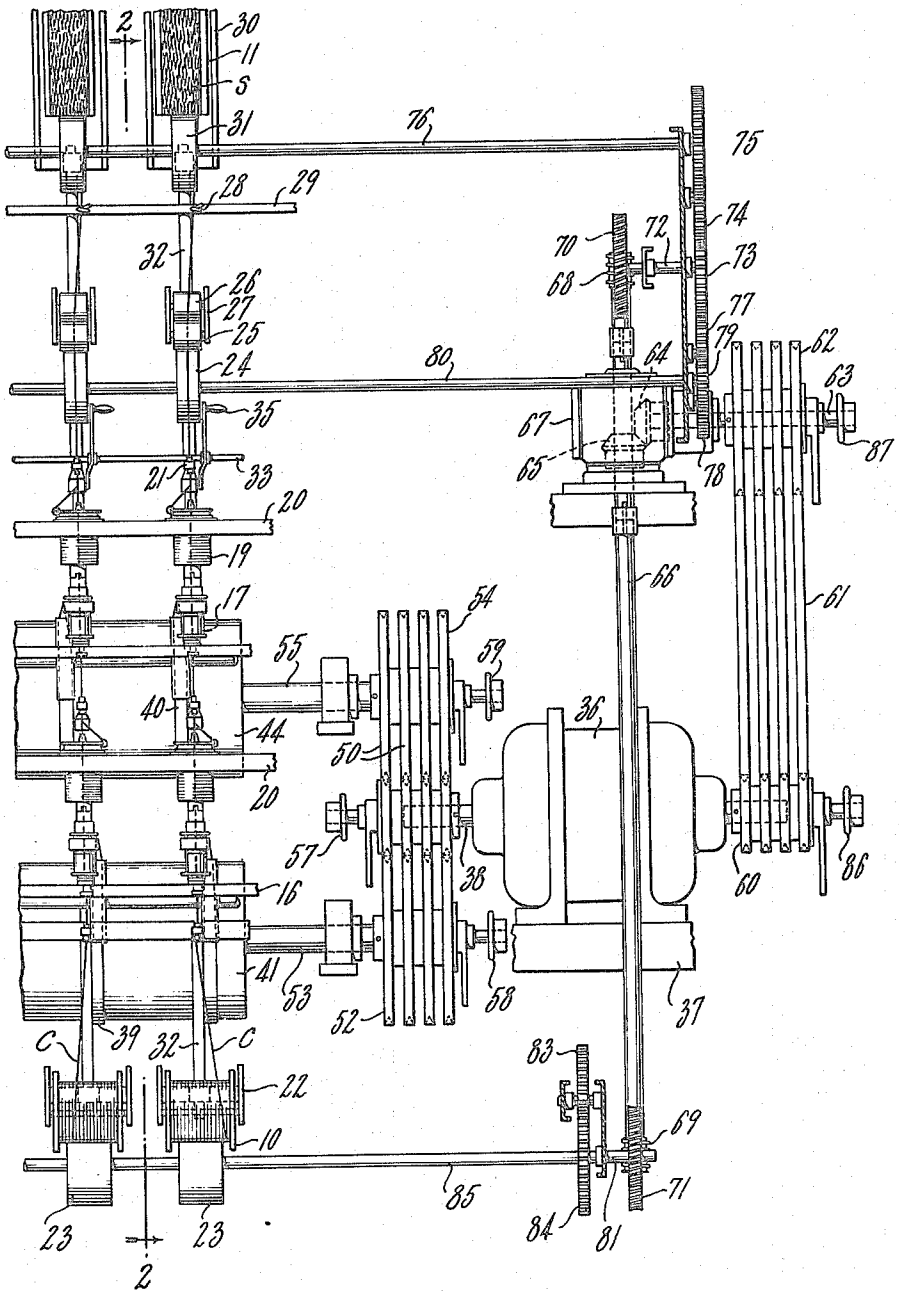

FIG. 1

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Fig. 3

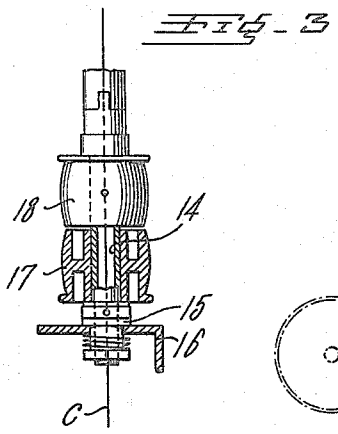

Fig. 2

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CORE COVERING MACHINE

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5 Claims. (Cl. 57—16)

This invention relates to machines for winding an inner and outer cover helically about a core, and more particularly to mechanism whereby the speed of the core feed and speed at which each cover is wound about the core may be accurately adjusted during the covering operation.

The covering machine of the present invention may be employed to wind an inner and outer cover about a strand of wire or textile material or other type of core, but has been designed more particularly for use in manufacturing elastic yarn having an inner and outer textile cover wound about a rubber core.

In making such elastic yarn it is customary to apply the inner and outer covers so that they will hold the rubber core in a stretched condition when the finished elastic yarn is free from tension, and it is important in most cases to so apply the covers that the elastic yarn will be balanced; that is, so construct the elastic yarn that it will not tend to kink when free from tension. In order to produce an elastic yarn which is well balanced it is necessary to control accurately the number of windings per inch imparted to the inner and outer cover, and also control the tension of the rubber core at the time the covers are wound thereupon.

While it is possible to determine in advance with considerable accuracy what speed should be imparted to the core and to the lower and upper yarn packages to produce an elastic yarn that will be balanced and will have the other desired characteristics, nevertheless the variations that may occur in the covering yarns and rubber core may make further speed changes desirable from time to time. Therefore it is highly desirable to be able to make minute changes in the operating speed of the core and each cover applying device, and also to be able to make these changes without stopping the core covering operation.

Core covering machines have been provided heretofore having means for winding the first cover about the core in one direction and the second cover about the core in the opposite direction, and having means for advancing the core being covered past the covering points, but these prior core covering machines have not been equipped with mechanism whereby the speed of the core take-up mechanism and the speed of the winding mechanism for applying the inner and outer cover could be manually adjusted during the winding operation to make corrections in the elastic yarn being produced.

In making fine elastic yarn it is now customary to operate the core covering machine at high speed, for example it is now usual to operate the winding mechanism that applies the inner cover to the core at a speed of 10,000 R. P. M. or higher. At this high speed it is difficult if not impossible to stop the winding operation to make some change in the speed of the covering mechanism and then start up the winding operation again without producing a defect in the elastic yarn at the point where the winding operation was stopped.

The present invention therefore contemplates a core covering machine which is so constructed that the core take-up mechanism and mechanism for winding the first and second cover about the core are all driven from a single source of power so that each will be operated at a speed having a definite ratio to the speed of said source of power. The invention also contemplates manually adjustable means whereby the speed of said take-up mechanism and either cover applying mechanism may be increased or decreased, while the machine is in operation, without changing the speed of the other operating parts of the machine.

The various features of the invention and novel combination of parts will be more fully understood from the following description when read in connection with the accompanying drawings illustrating one good practical form of the invention.

In the drawings:

Fig. 1 is a side elevation of an end portion of a core covering machine constructed in accordance with the present invention.

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1 looking in the direction of the arrows; and

Fig. 3 on an enlarged scale shows the fast and loose pulleys for driving one core covering unit.

In the embodiment of the invention illustrated the core C is wound upon a let-off spool 10 and as it is unwound from this spool it passes upwardly through the lower and upper core covering units and through nip feed rolls to be described to the take-up drum 11 upon which the covered core or elastic yarn is wound in the form of the skein S. The lower core covering unit 12 and the upper core covering unit 13 may be identical or substantially identical in construction and operation, except that the lower unit is rotated in one direction and the upper unit is rotated in the opposite direction, and the lower unit is operated at a higher speed than the upper unit.

Each covering unit may be constructed in a well known manner and is shown as consisting of a hollow rotating spindle 14 which is rotatably mounted in a supporting bearing 15 mounted upon the longitudinally extending rail 16. Each hollow spindle 14 is provided with a lower loose pulley 17 and upper fast pulley 18. The arrangement is such that a driving belt to be described may be shifted from the loose pulley 17 to the fast pulley 18 when it is desired to drive the spindle 14, and each spindle 14 is constructed to have a yarn package 19 mounted thereupon to be rotated by such spindle to wind the yarn supplied by the package about the core C.

In the construction shown a ring and traveler of usual construction are provided for guiding and tensioning the yarn as it travels from its package 19 to the point at which it is wound about the core C. This ring is shown as mounted upon a supporting bracket or rail 20 which is formed with an opening in which the package 19 rotates. There is provided above the upper end of each hollow spindle 14 the core guide 21 adapted to limit the lateral displacement of the core by the pull exerted thereupon by the covering yarn during the covering operation.

If the core C being covered is a rubber core then it is important that the tension and amount of stretch imparted to this core at the time the covers are being wound thereupon be accurately controlled. To this end in the construction shown the let-off spool 10 is rotatably supported by a yoke like bracket 22 so that the material wound upon the spool 10 may rest upon the driving roll 23 to be driven thereby at a constant let-off speed irrespective of the amount of material wound upon this spool. This serves to control accurately the rate at which the core C is unwound from the spool 10, and the amount of stretch imparted to this core during the covering operation is controlled by providing the power driven roll 24 adapted to drive the nip rolls 25 and 26 which are operatively supported by the bracket 27. The covered core upon leaving the upper guide 21 passes part way around the drum 24 and then between the nip rolls 25 and 26 as shown. It then passes through the pig-tail 28 mounted upon the traversing bar 29, and from which it passes upwardly to the drum 11 to be wound thereupon in the skein S. The drum 11 is rotatably supported by the bracket 30 and rests upon a power driven roll 31, to be driven by this roll in the direction indicated by the arrow.

The present core let-off and take-up mechanism is or may be quite similar to that disclosed in the Cobb Patent No. 1,976,328, Apparatus for making elastic yarn.

While mechanism for covering only two cores is shown in Fig. 1, in practice the core covering machine is provided with a large number of covering units 12 and 13 arranged in spaced relation to each other lengthwise of the machine, and these covering units are preferably provided at both sides of the machine lengthwise thereof as will be apparent from Fig. 2 wherein part of the covering units 12 and 13 have been indicated at the left hand side of the machine in addition to the more complete units shown at the right hand side of the machine.

It is desirable to provide means whereby the passage of a core C upwardly to the covering units 12 and 13 and the rotation of the spindles of these units may be stopped without disturbing the operation of the other covering units of the winding machine. This may be accomplished by providing the upright rod 32 supported for vertical sliding movement and having mounted thereupon the above-mentioned brackets 22, 27 and 30. The desired vertical sliding movement may be imparted to this rod 32 by an operating lever which is pivotally mounted at 33 upon a fixed support. One end of this lever is operatively connected to the rod 32 at 34 and the opposite end of this lever is provided with a handle 35 adapted to be engaged and depressed by the machine operator when it is desired to raise the rod 32 and stop the travel of the core C upwardly through the winding units.

The present invention as above stated, contemplates a core covering machine in which all of the operating parts are driven from a single source of power such as a motor 36 which may be mounted at one end of the machine upon a suitable support 37. The motor 36 should preferably be constructed to operate at a constant speed and may therefore be an A. C. constant speed electric motor. This motor is shown as having a central driving shaft 38 extending from each end of the motor and adapted to receive belt driving means to be described.

The hollow spindles 14 of the lower core covering units 12, disposed at the opposite sides of the machine are driven in the construction shown by the endless belt 39, there being one of these belts 39 for each pair of transversely aligned units 12. The belt 39 is driven by the drum 41 extending lengthwise of the machine, and to this end one run of the belt 39 passes about an idler roll 42 and then downwardly around the drum and upwardly over a second idler roll 43, whereas the other run of this belt extends transversely across the machine from one spindle 14 to the other.

The upper belt 40 which drives the spindles for the oppositely disposed pair of upper covering units 13 is similar to the lower driving belt 39 and is driven by the longitudinally extending upper drum 44 having the idler rolls 45 associated therewith. The arrangement of these belts 39 and 40 is such that the lower spindles 14 are rotated in one direction and the upper spindles 14 are rotated in the opposite direction as will be apparent from the drawings.

In the embodiment of the invention shown the mechanism for shifting the belts 39 and 40 from the fast to the loose pulleys and vice versa comprises the vertical rod 46 mounted for siding movement, and this rod is provided with belt engaging means 47 adapted to engage and shift the upper and lower belts when the rod 46 is shifted. This rod 46 is adapted to be shifted by the operation of the manually controlled rod 32, and therefore the lower end of the rod 46 is secured to a rocking lever 48 pivoted between its ends at 49 and the opposite end of this lever is secured to the rod 32. The arrangement is such that when the handle 35 is depressed it stops the upward feed of the core C and the rod 46 is moved downwardly to shift the belts 39 and 40 to the loose pulleys to stop the covering operation.

In accordance with the present invention the drums 41 and 44 are driven from the motor 36 by variable speed means, and in the embodiment of the invention shown the lower belt driving drum 41 and upper belt driving drum 44 are driven from the left hand end of the motor shaft 38, viewing Fig. 1, by the variable speed belt 50 consisting of the belt strands shown. These belt strands pass around the pulley 51 upon the shaft 38 and around the pulley 52 upon the driving

shaft 53 for the lower drum, and also about the pulley 54 upon the shaft 55 for the upper drum. The belt 50 is preferably kept under the proper tension by the idler roll 56 which preferably is held in yielding engagement therewith.

The variable speed belt drive for operating the drums 41 and 44 from the motor shaft 38 may be of well known construction and as shown is provided with manually adjustable units mounted on each of the shafts 38, 53 and 55. These units are provided wtih the hand wheels 57, 58 and 59 respectively. The arrangement is such that by operating hand wheel 57 for the adjustable pulley 51 the effective size of this pulley may be increased or decreased to thereby increase or decrease the speed of both drums 41 and 44. Should it be desirable to change the speed of the lower spindles alone then the hand wheel 58 may be adjusted to thereby vary the effective size of the pulley 52. If it is desired to change the speed of the upper spindle alone then the hand wheel 59 may be adjusted to thereby vary the effective size of the pulley 54.

As above stated the passage of the core C upwardly through the covering units 12 and 13 is controlled by the positively driven rolls 23, 24 and 31. Means for operating these rolls from the motor 36 will now be described.

The shaft 38 for the motor 36 has mounted upon its right hand end, viewing Fig. 1, the adjustable pulley 60 which is engaged by the variable speed belt 61 adapted to drive the variable speed pulley 62 mounted on an upper shaft 63. The shaft 63 is provided at its inner end with a beveled gear 64. The beveled gear 64 meshes with a second beveled gear 65 mounted upon the vertical shaft 66. These beveled gears are preferably mounted in the housing 67.

The shaft 66 is provided at its upper end with the worm 68 and at its lower end with the worm 69. A pair of worm gears 70 engage the upper worm 68 and a pair of worm gears 71 engage the lower worm 69. Each upper worm gear 70 is mounted upon and rotates a short shaft 72, which shaft has secured to its opposite end a gear 73. This gear through the cooperating gears 74 and 75 drives the shaft 76 upon which the driving rolls 31 abovementioned are mounted. The gear 73 serves also to drive the gears 77, 78 and 79 to thereby rotate the shaft 80 upon which the driving drums 24 abovementioned are mounted. Each lower worm wheel 71 drives a short shaft 81 which is provided at its opposite end with a gear 82. This gear drives the cooperating gears 83 and 84 to thereby rotate the shaft 85 upon which the driving rolls 23 abovementioned are mounted.

It will be understood that in the actual construction the left hand side of the machine which is only partially illustrated in Fig. 2 will be a duplicate of the right hand side of this machine which is more completely shown.

The variable speed pulley 60 in the construction shown is provided with a hand wheel 86 for varying its effective size and the upper variable speed pulley 62 is preferably provided with a hand wheel 87 which may be adjusted to vary its effective size. By providing these two adjustable hand wheels a larger range of speed variations can be secured than if a single hand wheel were employed, and also by the proper adjustment of both hand wheels a uniform tension upon the belt 61 may be maintained.

If desired a manually operable brake (not shown) may be mounted adjacent each spindle 14 to act upon the pulley 18 when it is desired to stop the rotation of a spindle after the driving belt has been shifted from its fast to its loose pulley.

It will be seen from the foregoing that if while the core covering machine of the present invention is in operation it is found that the elastic yarn being produced is not properly balanced, or can be improved by making a limited change in the speed of operation of either covering unit or in the speed of the core feed, any one of these changes can readily be made without stopping the machine. It will also be understood that these changes in speed may be as slight as desired so that a more accurate adjustment of the speed of each part of the machine can be secured than in the prior constructions in which it is necessary to determine in advance as far as possible the speed change desired, and then stop the winding machine and make such changes in the driving gears as may be necessary to give the desired speed ratio.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. In a core covering machine in combination, core covering units arranged one above the other in axially aligned pairs disposed lengthwise of the machine, each unit including a hollow spindle and a surrounding package adapted to wind a cover upon a core passing through said hollow spindle, a take-up means for advancing a core through aligned lower and upper spindles, a lower driving drum for rotating the lower packages in one direction and an upper driving drum for rotating the upper packages in the opposite direction, a single source of power, means for driving both drums and said take-up independently from said source of power so as to operate each therefrom, and independent manually-adjustable variable speed means for each drum and for said take-up and adjustable while the machine is in operation to vary the speed of the take-up alone or of either spindle alone relative to said source of power.

2. In a core covering machine in combination, core covering units arranged one above the other in axially aligned pairs disposed lengthwise of the machine, each unit including a hollow spindle and a surrounding package adapted to wind a cover upon a core passing through said hollow spindle, take-up means for advancing a core through aligned lower and upper spindles, a lower driving drum for rotating the lower packages in one direction and an upper driving drum for rotating the upper packages in the opposite direction, a driving motor, and manually adjustable variable speed means for independently operating each drum and said take-up from said motor and adapted to be adjusted while the machine is running to thereby vary the speed of the take-up alone or of either spindle alone relative to said motor.

3. In a core covering machine in combination, core covering units arranged one above the other in axially aligned pairs disposed lengthwise of the machine, each unit including a hollow spindle and a surrounding package adapted to wind a cover upon a core passing through said hollow spindle, take-up means for advancing a core through aligned lower and upper spindles, a lower driving drum for rotating the lower packages in one direction and an upper driving drum for rotating the upper packages in the opposite direction, a driving motor having a central driving shaft extending from both ends of the motor, variable speed belt driving means for operating

both drums from one end of said motor shaft and variable speed driving means for operating said take-up from the opposite end of said motor shaft, and manual means adapted to be adjusted while the machine is running to change the operation of any variable speed driving means, to thereby vary the speed of the take-up alone or of either spindle alone relative to said motor.

4. In a core covering machine in combination, core covering units arranged one above the other in axially aligned pairs disposed lengthwise of the machine, each unit including a hollow spindle and a surrounding package adapted to wind a cover upon a core passing through said hollow spindle, take-up means for advancing a core through aligned lower and upper spindles, a lower driving drum for rotating the lower packages in one direction and an upper driving drum for rotating the upper packages in the opposite direction, a driving motor, and variable speed means for driving both drums from said motor including an adjustable variable speed pulley secured to said motor and one secured to each drum, a belt engaging these three pulleys, and a hand wheel associated with each pulley, whereby the speed of the belt may be varied by adjusting one hand wheel and the speed of the lower drum alone may be varied by adjusting a second hand wheel and the speed of the upper drum alone may be varied by adjusting the third hand wheel.

5. In a core covering machine in combination, core covering units arranged one above the other in axially aligned pairs disposed lengthwise of the machine, each unit including a hollow spindle and a surrounding package adapted to wind a cover upon a core passing through said hollow spindle, take-up means for advancing a core through aligned lower and upper spindles, a lower driving drum for rotating the lower packages in one direction and an upper driving drum for rotating the upper packages in the opposite direction, a driving motor, mechanism for operating both drums and take-up from said motor including manually adjustable variable speed means for said take-up and at least one of the drums, and adapted to be adjusted while the machine is running and covering the core to vary the speed of the take-up alone or of a drum alone relative to said motor.

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