

[54] COIL WINDING MACHINE

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[57] ABSTRACT

Coil winding machine for preferably conical cross-wound bobbins includes thread storage means for compensating for varying thread winding speeds, and means for automatically adjusting the length of the stored thread in accordance with the fullness with which the bobbin is wound.

2 Claims, 3 Drawing Figures

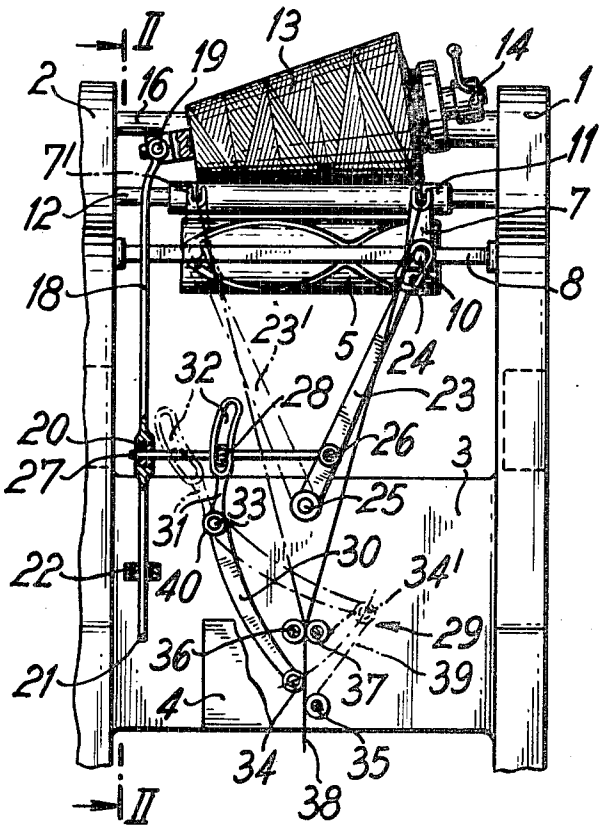


FIG. 1

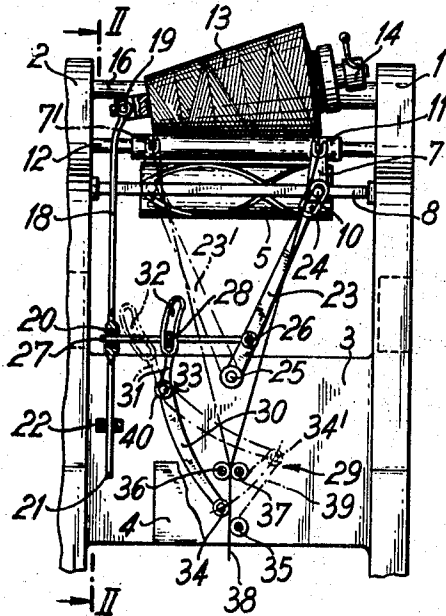


FIG. 2

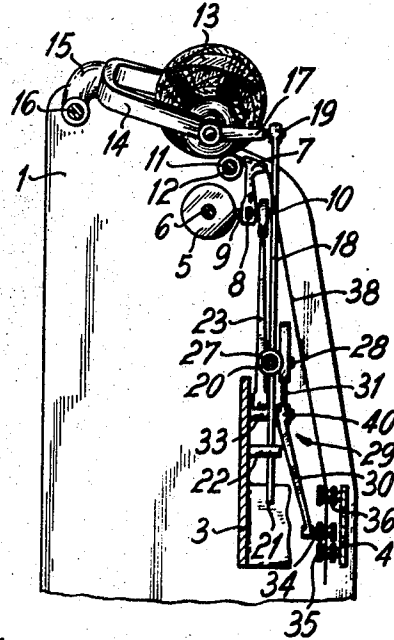
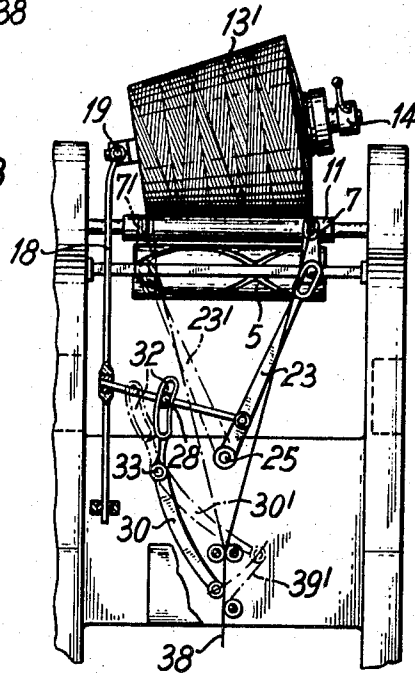


FIG. 3



COIL WINDING MACHINE

My invention relates to coil winding machine for winding preferably conical cross-wound bobbins and more particularly to such coil winding machine having thread storage means for compensating for various thread winding speeds.

In the production of cross-wound bobbins or cheeses, a nonuniformity in the thread unwinding speed occurs between the run-up point at the middle of the coil or bobbin and the run-up points at the rims of the coil. With the conical cross-wound bobbins preferably produced today due to the advantages unwinding qualifications or conditions thereof, this nonuniformity in thread unwinding speed is additionally increased because the wound-up length of the thread at the larger diameter end of the conical cross-wound bobbin is greater than at the smaller diameter end thereof. A further nonuniformity in the threads unwinding speed occurs during the winding of the cross-wound bobbin because the ratio of the larger and smaller diameters of the coil or bobbin on to the other continuously varies with the fullness with which the coil is wound.

A nonuniform thread unwinding speed has an especially highly disturbing effect when a thread from spinning or twisting frames is to be fed at absolutely constant speed to the conical cross-wound bobbins or cheeses, because varying speeds disadvantageously effect the quality of the thread in that, for example, the twist or thickness of the thread no longer remains uniform.

Winding machines with constant thread feed have been known heretofore to be provided with thread storing means. They are of rather complex construction, however, and therefore susceptible to trouble. Moreover, they are adjusted to control the members driving the cross-wound bobbins, which calls for intervention thereof in the path of the driving force and thereby necessarily causing complications. Furthermore, the control pulses only have a delaying effect on the winding speed so that the control circuit operates relatively sluggishly and tends toward over control.

It is accordingly an object of my invention to provide a coil winding machine with a thread storage device which avoids the foregoing disadvantages of heretofore known devices of this general type and, moreover, to provide such a device having relatively simple construction.

With the foregoing and other objects in view, I provide in accordance with my invention, coil winding machine for winding preferably conical cross-wound bobbins comprising thread storage means for compensating for varying thread winding speeds, and means for automatically adjusting the length of the stored thread in accordance with the fullness with which the bobbin is wound.

In accordance with another feature of my invention, the thread storage means comprises a device for forming thread loops having at least one member connected to a carrying member for the cross-wound bobbin.

To equalize or compensate the thread unwinding speed it has been known heretofore, in the case of cylindrical cross-wound bobbins, to make the length of stored thread portion dependent upon the run-up point of the thread onto the bobbin, the length of the loop being, for example, thereby controllable in dependence upon the position of the thread guide. Consequently, in accordance with a further feature of my invention, in the case of a coil winding machine of this type, I provide thread storage means comprising a device for forming thread loops that is connected in such a manner to the thread guide and to a carrying member for the cross-wound bobbin so that in a predetermined thread guide position, the length of the thread loop is the same independently of the fullness with which the bobbin is wound. More particularly, in accordance with yet another feature of my invention, I provide a lever system connecting the loop-forming device to the thread guide, the lever system having an effective length of lever arm that is variable in dependence upon the position of a support member for the cross-wound bobbin.

Other features which are considered as characteristic for the invention are set forth in the appended claims.

Although the invention is illustrated and described herein as embodied in coil winding machine, it is nevertheless not intended to be limited to the details shown, since various modifications and structural changes may be made therein without departing from the spirit of the invention and within the scope and range of equivalents of the claims.

The construction and method of operation of the invention, however, together with additional objects and advantages thereof will be best understood from the following description of a specific embodiment when read in connection with the accompanying drawings, in which:

FIG. 1 is a front elevational view of a winding station forming part of a winding machine wherein a frustoconical bobbin is shown at a stage shortly after the start of the winding operation;

FIG. 2 is a side elevational view of FIG. 1; and

FIG. 3 is another view of FIG. 1 wherein the bobbin is shown at a stage wherein it is nearly fully wound.

Referring now to the drawings and first, particularly to FIGS. 1 and 2 thereof, there is shown a winding station of a coil winding machine having a frame support made up of lateral partitions 1 and 2, and intermediate wall 3 extending therebetween, and a crosspiece 4 extending substantially parallel to the intermediate wall 3 and secured thereto by a projection extending therefrom (note especially FIG. 2). A helically grooved drive or cam roller 5 is mounted on a shaft 6 that is journaled on the lateral partitions 1 and 2, and a winding shaft 11 is mounted on a rotary spindle 12 similarly journaled on the lateral partitions 1 and 2. Both the drive roller 5 and the winding shaft 11 are rotatably driven by conventional means which have been omitted from the figures in the interest of clarity and because they of themselves are not essential to the invention of this application.

A thread guide 7 is displaceably guided on a slide bar 8 secured at its ends to the lateral partitions 1 and 2. A pin 9 (FIG. 2) extends from the thread guide 7 into the helical endless groove formed in the drive roller 5 and, as the latter is rotated, reciprocates the thread guide 7 along the slide bar 8. A substantially U-shaped coil carrying member 14 has an angular extension 15 and is pivotally mounted thereby on a shaft 16 secured at the ends thereof to the lateral partitions 1 and 2, respectively. A cross-wound bobbin or cheese 13 is rotatably carried by the carrying member 14 between the free ends of the legs of the U-shaped member 14. The cross-wound bobbin 13, due to its own weight, as well as the weight of the carrying unit 14, 15, pivots in clockwise direction about the axis 16, as seen in FIG. 2, so as to be in frictional engagement with the winding shaft 11 and consequently driven thereby. A lifting rod 18 is connected at one end thereof by a ball-and-socket joint 19 to one end of an arm 17 which is in turn connected at the other end thereof to the coil carrying member 14. The lifting rod 18 is articulately guided at the other end 21 thereof in a bearing 22 secured to the intermediate wall 3. The lifting rod 18 is formed with a pivot or swing guide bearing 20 located intermediate the ends thereof. A lever 23, pivotally mounted at one end thereof on a pin 25 secured to the intermediate wall 3, has a free end formed with an elongated slot 24 into which a pin 10 secured to the thread guide 7 projects. Thus, as the thread guide 7 is reciprocatingly pivoted about the pin 25. A pin 26 is moreover secured to the lever 23 on which one end of an adjusting rod 27 is pivotally mounted. The other end of the adjusting rod 27 is guided in the swing bearing 20. A guiding pin 28 extends transversely from the adjusting rod 27.

A thread storage device 29 is provided at the winding station and is formed of a double-armed lever 40, which is pivotally mounted on a pin 33 extending from the intermediate wall 3 and carries a thread deflecting roller 34 at the end of one arm 30 thereof. The other arm 31 of the double-armed lever 40 is formed with an arcuate elongated guiding slot 32 into which the guiding pin 28 extending from the adjusting rod 27 projects. Also forming part of the thread storage device 29 of my invention are thread guide rollers 35, 36 and

37 that are rotatably mounted on pins extending from the crosspiece 4. As can be readily seen in the stage depicted in FIG. 1, a thread 38 is being applied by the thread guide 7 at the large diameter end of the cross-wound bobbin 13 and in the illustrated position, thread is provided with no additional loop by the thread deflecting roller 34 as shown in solid lines in FIG. 1. When the thread guide 7 is in the position 7' thereof, shown in phantom in FIG. 1, the lever 33 then necessarily pivots into the position 23' thereof, also shown in phantom in FIG. 1. The lever 23 accordingly displaces the thread deflecting roller 34 through the pin 26, the adjusting rod 27, the guiding pin 28, the guiding slot 32 and the arms 30 and 31 to the roller position 34 shown in phantom in FIG. 1. A thread loop 39, shown in phantom in FIG. 1, is thereby formed and a length thereof is accordingly stored and cannot be wound up at the small diameter end of the bobbin 13 when the delivery speed of the tread 38 is constant.

In the stage of the winding process illustrated in FIG. 3, the fullness with which the cross-wound bobbin 13' is wound with the thread 38 is considerably greater than that in the stage illustrated in FIG. 1. It is particularly clear from FIG. 3, that the greater the fullness or extent of the thread winding on the bobbin, the higher the lifting rod 18 is raised through the ball-and-socket joint 19 of the coil-carrying member 14 and accordingly, the more the guiding pin 28 is pivoted counter-clockwise about the pivot bearing 20 and within the arcuate guiding slot 32 so that when the lever 23 is displaced into the position 23' thereof, the angle traversed by the arm from the position 30 to the position 30' thereof is smaller for the more fully wound bobbin 13' of FIG. 3 than for the lesser wound bobbin 13 of FIG. 1, and the tread loop 39' of FIG. 3 is consequently of shorter length than the thread loop 39 of FIG. 1. Since the difference between the smaller and larger diameters of the bobbin 13, 13' becomes smaller with increasing fullness of the winding on the bobbin, the stored thread length is always automatically accommodated to the respective fullness of the winding on the bobbin. It can be seen moreover from

FIGS. 1 and 3 that, in the extended position 7 of the thread guide at the large-diameter end of the bobbin, the length of thread loop, depending upon the shape of the guiding slot 32 is always the same and is independent of the degree of fullness to which the bobbin is wound. In both FIGS. 1 and 3, the length of thread loop in the last-mentioned position of the thread guide 7 is equally zero.

The advantages derived from the invention of this application are attributable especially to the fact that the thread storage means built as a loop-forming device, is of such simple construction that it reacts with virtually no delay to changes in the thread delivery speed that occur during the winding of frustoconical bobbins.

I claim:

1. In a coil winding machine, thread storage means for compensating for varying speeds of thread being wound on a bobbin, a carrying member for the bobbin, means for automatically adjusting the length of the thread stored by said thread storage means in accordance with the degree of fullness to which the bobbin is wound, said thread storage means comprising a device for forming a loop of the thread, said loop-forming device having at least one member connected to said carrying member, and a thread guide reciprocable along the bobbin, the length of the loop being controllable in accordance with the position of the thread guide along the bobbin, said loop-forming device being connected to said thread guide in addition to said carrying member so that at a predetermined position of the thread guide along the bobbin, the loop has a constant length for any degree of fullness to which the bobbin is wound.

2. Coil winding machine according to claim 1, wherein the carrying member for the bobbin is variable in position in accordance with the degree of fullness to which the bobbin is wound, and including a system of levers connecting said loop-forming device to said thread guide, said system of levers having an effective lever arm length that is variable in accordance with the position of the bobbin carrying member.

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