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WINDING MACHINE

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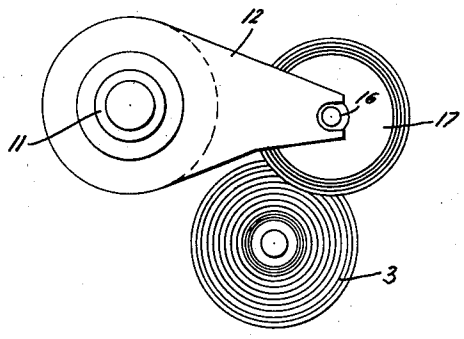


FIG. 3

FIG. 1

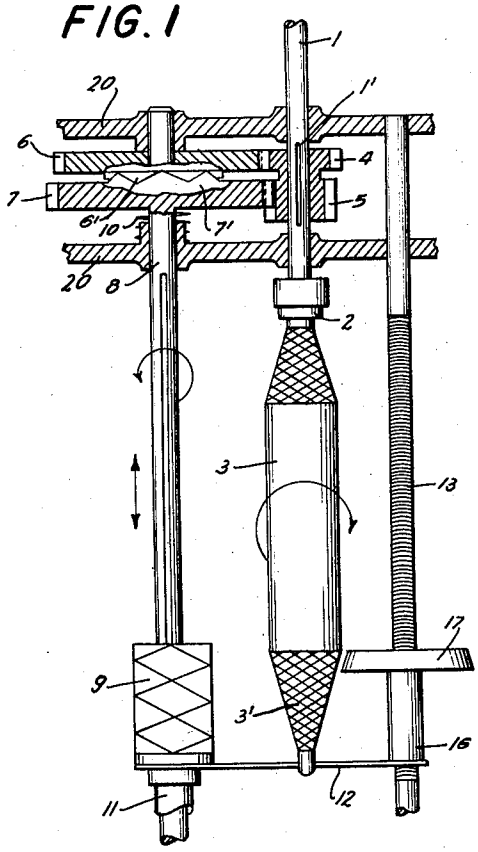
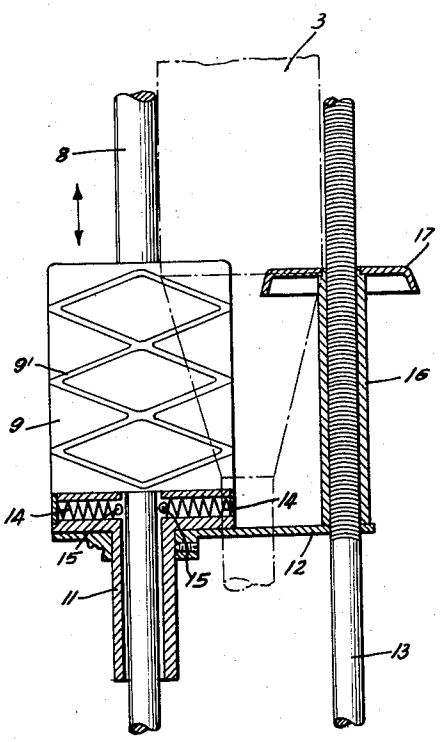


FIG. 2



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WINDING MACHINE

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4 Claims. (Cl. 242—27)

The present invention relates to winding machines, and more particularly to a winding machine of the type in which a body of thread is built up on a bobbin progressively in longitudinal axial direction of the bobbin so as to form a pirn.

In winding machines of this type it is known to provide a control arrangement for the thread guide for holding the same in a position opposite the built up end of the body of thread. In the known arrangements a threaded spindle supports a nut which frictionally engages the built up end of the body of thread and is rotated by the same so that the nut is screwed on the spindle in axial direction of the bobbin and consequently remains opposite the built-up end of the same. This nut is fixedly connected to the thread guide and pushes the same into the desired position. Consequently comparatively great force is required for turning the nut so that the nut slips when engaging the built-up body of thread and exerts undesirable friction on the same which may cause damage to the thread. Moreover, pressure is exerted on the body of thread which is highly undesirable since an even pressure is required for winding up the thread.

It is one object of the present invention to overcome the disadvantages of the known arrangements for controlling the movement of the thread guide in winding machines of the above described type and to provide a winding machine in which the thread guide is reciprocated about the desired position opposite the built-up end of the body of thread while the exact position of the thread guide is determined by sensing means which move with the built-up end of the body of thread and block the thread guide during rearward reciprocating movement of the same.

It is another object of the present invention to reciprocate supporting means on which the thread guide is slidably supported, and to determine the position of the thread guide on the reciprocated supporting means by sensing means engaging the built-up end of the body of thread.

It is a further object of the present invention to provide as thread guide a rotary drum formed with grooves for guiding the thread in an oscillating movement.

With these objects in view the present invention mainly consists in a winding machine for building up a body of thread in axial direction of a bobbin, comprising, in combination, a rotary bobbin support for rotating a bobbin about an axis of rotation; a thread guide means for guiding a thread in an oscillating movement to a bobbin supported on the rotary bobbin support so as to build up a body of thread on the bobbin; reciprocating means reciprocating parallel to the axis of rotation and tending to reciprocate the thread guide means parallel to the axis of rotation; and sensing means arranged movable in direction of the axis of rotation and adapted to engage one end of the body of thread and to be moved in one axial direction as the body of thread is built up, the sensing means being located in the path of the thread guide means and being engaged by the same during the reciprocating

stroke of the same in a direction opposite to the one direction whereby the thread guide means is blocked from further movement in the opposite direction and continues to build up the one end of the body of thread during the consecutive reciprocating stroke in the one direction.

Preferably, the sensing means is a rotary threaded member mounted on a spindle extending parallel to the axis of rotation of the bobbin. Consequently, the sensing member can freely rotate when engaged by the built up end of the body of thread and is only in engagement with the thread guide means at the end of the reciprocating movement of the thread guide means.

Preferably, the thread guide is slidably supported on a reciprocating shaft which frictionally engages the same.

Preferably, the thread guide according to the present invention is constructed as a rotary thread guide for instance as a cylindrical or conical drum provided with grooves or other guide means and performs in axial direction only the movements which are required for properly placing the thread.

The reciprocating movement of thread guides of this type has a much lower frequency of oscillation than the wound up thread. Consequently, the thread guide means is engaged by the forwardly moving sensing means only when required so that the sensing means is free of the load of the thread guide means and only engages the thread guide means in one end position of the reciprocating thread guide supporting means for shifting the thread guide on its supporting means for a distance corresponding to the built up portion of the body of thread.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention, itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

Fig. 1 is a plan view of a preferred embodiment of the present invention, partly in section;

Fig. 2 is a side view of a detail of Fig. 1 shown on an enlarged scale; and

Fig. 3 is a front view of the embodiment shown in Fig. 1.

Referring now to the drawings, the rotary drive means **1** rotates the bobbin **2** on which a body of thread is wound up in such manner that it is built up progressively on the end portion **3'**. A pair of gears **4** and **5** are connected for rotation to the drive means **1** by means of a key **1'**. The gears **4** and **5** have almost the same number of teeth, for instance the gear **4** has one tooth more than the gear **5**. The gear means **4**, **5** are in meshing engagement with two gears **6** and **7** which have also a slightly different number of teeth. The smaller gear of the gears **6**, **7** meshes with the larger gear of the gears **4**, **5**, in other words the gear **4** meshes with the gear **6**, and the gear **5** meshes with the gear **7**. The gear **6** is turnably mounted on a fixed support **20**. The gear **7** is fixedly connected to a shaft **8** which is mounted for rotation on the stationary support **20'**. A spring **10** urges the gear **7** and shaft **8** toward the gear **6**. On the lateral faces of the gears **6** and **7**, which face each other, corresponding projections and recesses **6'** and **7'** are provided which engage each other under the action of the spring **10**. Due to the difference in the speed of rotation between the gears **6** and **7** which is caused by the different number of teeth, the projections **6'** and **7'** are slowly forced out of the corresponding recesses in the opposite faces so that the gear **7** and the shaft **8** move away from the gear **6**, and then return after several revolutions into a position in which the projections again fully engage the recesses between

the projection 7', and the projections 7' fully engage the recesses between the projections 6'. Consequently, the shaft 8 is slowly reciprocated in axial direction.

A thread guide means 9 is mounted on thread guide supporting shaft 8 slidable in longitudinal direction of shaft 8. The thread guide 9 is preferably a drum provided with grooves 9' for guiding the thread in a manner known per se. Brake means are provided for increasing the friction of the thread guide 9 on the shaft 8.

According to a preferred embodiment of the present invention, a sleeve 11 is connected to the brake guide 9 and surrounds the shaft 8. Two springs 14 urge two brake members 15 into engagement with the shaft 8 so that the friction of the brake members 15 has to be overcome before the thread guide means 9 can be shifted in axial direction.

The thread guide means include a transverse link 12 which surrounds the sleeve 11 and follows the axial movement of the thread guide 9. The free end of the link 12 cooperates with a threaded nut 16 which is fixedly connected to the rotary sensing member 17. The nut 16 is movable on a threaded spindle 13 which extends parallel to the axis of rotation of the rotary bobbin support 1. The threaded means 16, 17 extend parallel to the axis of rotation of bobbin 3.

The rotary sensing member is a disc having a rim portion which engages the built up end 3' of the body of thread 3. Consequently, the built up end 3' rotates the disc 17 and turns the nut 16 on the spindle 13 so that the nut 16 is moved on the spindle 13 in the direction in which the end of the body of thread is built up.

During the winding of the body of thread 3 on the bobbin 2, the thread guide supporting shaft 8 is reciprocated parallel to the axis of rotation of the bobbin support and the thread guide 9 oscillates the thread and builds up one end 3' of the body of thread. As the end 3' is further built up, the rotary sensing member 17 correspondingly moves the nut 16 on the spindle 13. When the thread guide supporting means 8 moves rearwardly during reciprocation, the link 12 engages the shifted nut 16 and is preventedd from completing the rearward reciprocating stroke of the thread guide support 8 so that the same completes such rearward stroke, while the thread guide means 9 slides thereon. Of course, during the next forward reciprocating stroke of the thread guide supporting means 8, the thread guide means 9 is taken along with the same due to the friction exerted by the brake members 15. Every time the link 12 engages the nut 16, the thread guide drum 9 is shifted in forward direction of the bobbin the same distance which the nut 16 was screwed on the spindle. In the new position of the thread guide means 9, the brake means 14, 15 prevent sliding of the thread guide means 9 during the reciprocating movement of the thread guide supporting shaft 8 in forward direction in which the bobbin is built up. This operation is continuously repeated so that the pirn is gradually built up in one axial direction.

It will be understood, that the thread guide means, namely the thread guide drum 9, produces an oscillating movement of the thread in a manner known per se. The reciprocating movement caused by the reciprocation of the thread guide supporting means 8 takes place in addition to such oscillating movement and at much longer intervals. The sensing means 17, 16 are located in the path of the link 12 which is part of the thread guide means and block at least part of the rearward reciprocating movement of the thread guide means so that the thread guide 9 gradually moves in forward direction to build up the bobbin 2 due to the fact that the stroke in forward direction is always longer than the stroke in rearward direction which is interrupted by the sensing means 17 and 16. It is apparent that the reciprocating means 8 move the thread guide means 9 which may be considered as thread supplying means during spaced primary time periods in the direction of build up of the thread on the bobbin, and tend to move the thread supplying means 9 in inbetween time periods in opposite direction. The sensing means 17, 16 are actuated by the built up bobbin for limiting movement of the thread supplying means 9 during the inbetween time periods to a distance which is smaller than the distance during said primary time periods.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of winding machines differing from the types described above.

While the invention has been illustrated and described as embodied in a winding machine in which a thread guide means is reciprocated in axial direction of a rotating bobbin and is prevented by sensing means engaging the built-up end of a pirn to complete its reciprocating stroke in the direction opposite to the building up direction of the pirn, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. A winding machine for building up a body of thread in axial direction of a bobbin, comprising, in combination, a rotary bobbin support for rotating a bobbin about an axis of rotation; a thread guide means for guiding a thread in an oscillating movement to a bobbin supported on said rotary bobbin support so as to build up one end of a body of thread on the bobbin; reciprocating means reciprocating parallel to said axis of rotation and tending to reciprocate said thread guide means parallel to said axis of rotation; a rotary sensing means adapted to engage said one built-up end of the body of thread and to be rotated by the same; and threaded means extending parallel to the axis of rotation of said rotary bobbin support and including a stationary threaded member and a movable threaded member, said movable threaded member being connected to said rotary sensing means for rotation therewith so as to be screwed on said stationary threaded member in one axial direction as the body of thread is built up whereby said sensing disc moves along with said built-up end of said body of thread in axial direction of said spindle member, said movable threaded member being located in the path of said thread guide means and being engaged by the same during the reciprocating stroke of the same in a direction opposite to said one direction whereby said thread guide means is blocked by said movable threaded member from further movement in said opposite direction and continues to build up said one end of said body of thread during the consecutive reciprocating stroke in said one direction.

2. A winding machine for building up a body of thread in axial direction of a bobbin, comprising, in combination, a rotary bobbin support for rotating a bobbin about an axis of rotation; a thread guide means for guiding a thread in an oscillating movement to a bobbin supported on said rotary bobbin support so as to build up one end of a body of thread on the bobbin; a thread guide supporting means supporting said thread guide means for movement parallel to said axis of rotation and frictionally engaging said thread guide means; means for reciprocating said thread guide supporting means parallel to said axis of rotation; a rotary sensing means adapted to engage said one built-up end of the body of thread and to be rotated by the same; and threaded means extending

parallel to the axis of rotation of said rotary bobbin support and including a stationary threaded member and a movable threaded member, said movable threaded member being connected to said rotary sensing means for rotation therewith so as to be screwed on said stationary threaded member in one axial direction as the body of thread is built up whereby said sensing disc moves along with said built-up end of said body of thread in axial direction of said spindle member, said movable threaded member being located in the path of said thread guide means and being engaged by the same during the reciprocating stroke of said thread guide supporting means in a direction opposite to said one direction whereby said thread guide means is blocked by said movable threaded member from further movement in said opposite direction with said thread guide supporting means, slides on the same, and continues to build up said one end of said body of thread during the consecutive reciprocating stroke in said one direction.

3. A winding machine for building up a body of thread in axial direction of a bobbin, comprising, in combination, a rotary bobbin support for rotating a bobbin about an axis of rotation; a rotary thread guide means for guiding a thread in an oscillating movement to a bobbin supported on said rotary bobbin support so as to build up one end of a body of thread on the bobbin; a link secured to said thread guide means and projecting from the same transversely to said axis of rotation; a thread guide supporting means supporting said thread guide means for movement parallel to said axis of rotation and frictionally engaging said thread guide means; means for reciprocating said thread guide supporting means parallel to said axis of rotation; a rotary sensing means adapted to engage said one built-up end of the body of thread and to be rotated by the same; and threaded means extending parallel to the axis of rotation of said rotary bobbin support and including a stationary threaded member and a movable threaded member, said movable threaded member being connected to said rotary sensing means for rotation therewith so as to be screwed on said stationary threaded member in one axial direction as the body of thread is built up whereby said sensing disc moves along with said built-up end of said body of thread in axial direction of said spindle member, said movable threaded member being located in the path of said link and being engaged by the same during the reciprocating stroke of said thread guide supporting means in a direction opposite to said one direction whereby said thread guide means is blocked by said movable threaded member from further movement in said opposite direction with said thread guide supporting means, slides on the same, and continues to build up said one end of said body of thread during the consecutive reciprocating stroke in said one direction.

4. A winding machine for building up a body of thread in axial direction of a bobbin, comprising, in combination, a rotary bobbin support for rotating a bobbin about an axis of rotation; a rotary thread guide means for guiding a thread in an oscillating movement to a bobbin supported on said rotary bobbin support so as to build up one end of a body of thread on the bobbin; a link secured to said thread guide means and projecting from the same transversely to said axis of rotation; a thread guide supporting means supporting said thread guide means for movement parallel to said axis of rotation and frictionally engaging said thread guide means; means for reciprocating said thread guide supporting means parallel to said axis of rotation; a rotary sensing disc adapted to engage said one built-up end of the body of thread and to be rotated by the same; and threaded means extending parallel to the axis of rotation of said rotary bobbin support and including a stationary threaded spindle member and a movable threaded nut member, said movable threaded nut member being connected to said rotary sensing disc for rotation therewith so as to be screwed on said stationary threaded spindle member in one axial direction as the body of thread is built up whereby said sensing disc moves along with said built-up end of said body of thread in axial direction of said spindle member, said movable threaded nut member being located in the path of said link and being engaged by the same during the reciprocating stroke of said thread guide supporting means in a direction opposite to said one direction whereby said thread guide means is blocked by said nut member from further movement in said opposite direction with said thread guide supporting means, slides on the same, and continues to build up said one end of said body of thread during the consecutive reciprocating stroke in said one direction.

References Cited in the file of this patent

UNITED STATES PATENTS

1,865,970	Schweiter	July 5, 1932
2,267,899	Dersen	Dec. 30, 1941
2,365,115	Siegenthaler	Dec. 12, 1944
2,681,183	Muschamp et al.	June 15, 1954