May 19, 1942. H. DERSEN 2,283,419

THREAD GUIDES FOR THREAD WINDING MACHINES

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Fig.1.

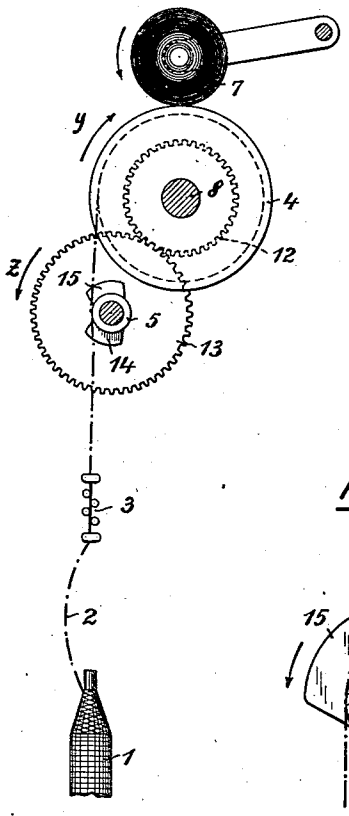

Fig.2.

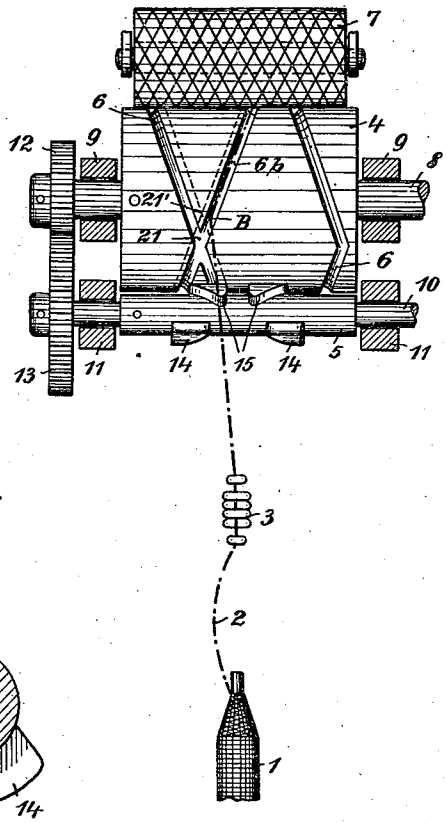

Fig.3.

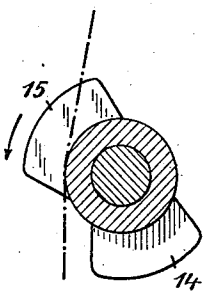

Fig.4.

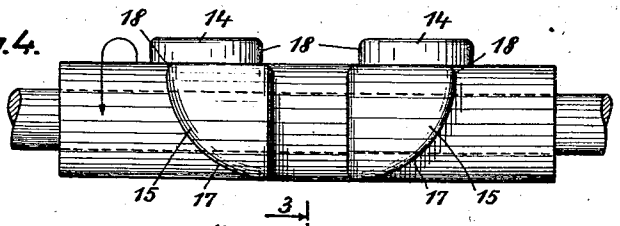

Fig.5.

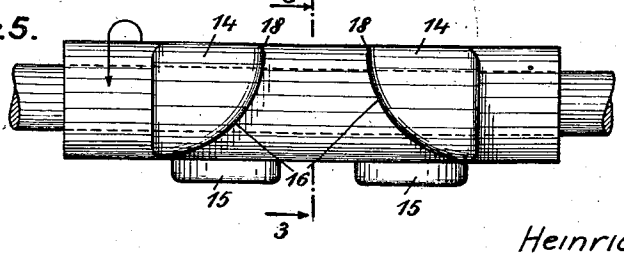

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Fig. 6.

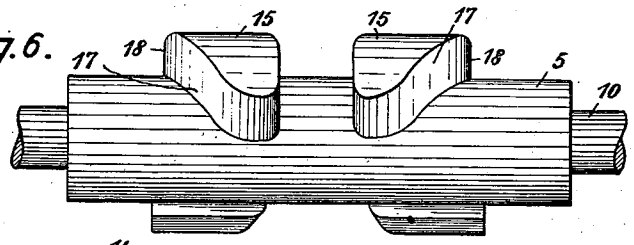


Fig. 7.

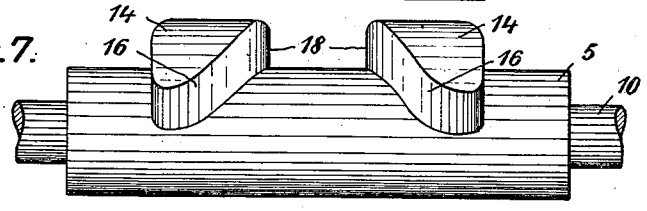


Fig. 8.

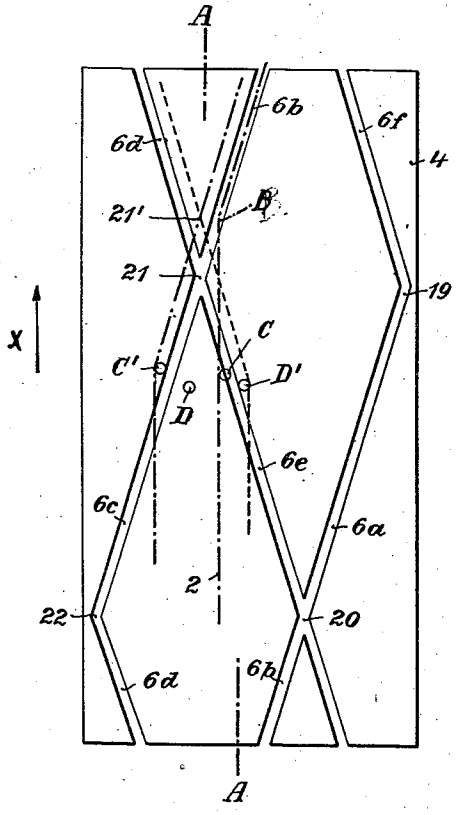
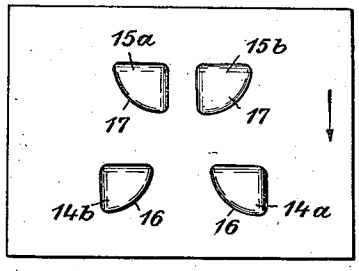


Fig. 9.



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UNITED STATES PATENT OFFICE

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THREAD GUIDE FOR THREAD WINDING MACHINES

Heinrich Dersen, Krefeld, Germany

Application March 13, 1941, Serial No. 383,066
In Germany June 26, 1939

10 Claims. (Cl. 242—26)

My invention relates to improvements in thread guides for thread winding machines, and more particularly in thread guides for making cross-wound bobbins in which the thread is supplied to the bobbin by means of a rotary drum provided with a helical groove for imparting the traverse to the thread. Such drums are provided with two helical grooves of opposite pitch merging into each other at the ends of the drum and intersecting at one or more points of the circumference. In such thread guides the thread guided in one groove for being moved longitudinally of the bobbin in one direction frequently engages in the oppositely directed groove as it passes a point of intersection.

The object of the improvements is to provide means for preventing the thread from thus leaving the proper groove and with this object in view my invention consists in providing subsidiary guiding means which are adapted to engage the thread passing a point of intersection and to hold the same in the proper position.

For the purpose of explaining the invention an example embodying the same has been shown in the accompanying drawings in which the same reference characters have been used in all the views to indicate corersponding parts. In said drawings

Fig. 1 is a diagrammatical side elevation of the thread winding apparatus,

Fig. 2 is an elevation partly in section and showing a cross-wound bobbin and the guiding means,

Fig. 3 is a sectional elevation on an enlarged scale taken on the line 3—3 of Fig. 5 and showing the subsidiary guiding means,

Figs. 4 and 5 are respectively an elevation and a plan view on an enlarged scale showing the subsidiary guiding means,

Figs. 6 and 7 are similar elevations showing the guiding means in different positions,

Fig. 8 is a diagram showing a development of the grooved drum and subsidiary guiding means, and

Fig. 9 is a development of the roller carrying the subsidiary guiding means.

The thread winding apparatus comprises a spool 1 from which the thread 2 is taken, a brake 3, a grooved drum 4, and a bobbin 7. The drum 4 is formed with two helical grooves 6 having oppositely directed pitches and merging into each other at the ends of the bobbin 7, the said grooves being adapted to impart the traverse to the thread being wound into a cross-wound bobbin. The drum 4 is mounted in bearings 9. In addition to the drum 4 guiding means are provided which are in the form of a roller 5 mounted parallel to the drum 4 in bearings 11 and operatively connected with the drum 4 by gear wheels 12 and 13, the said roller 5 being provided with wings or lugs 14 and 15.

Referring now to the diagrammatical elevation shown in Fig. 8, the groove 6 of the drum comprises portions 6*a*, 6*b*, 6*c*, 6*d*, 6*e* and 6*f*, in which the thread is guided for imparting thereto the traverse from the right to the left and from the left to the right of the bobbin, and, when the drum 4 rotates in the direction of the arrow *x* the sections 6*a*, 6*b* and 6*c* carry the thread from the left to the right and the sections 6*d*, 6*e* and 6*f* carry the same from the right to the left. As shown, the said sections of the groove intersect at the points 20 and 21. The thread 2 is supplied to the drum from a point located on the median line A, A of the drum, and it is inclined from the said line more or less. While the thread engages in an unbroken part of the groove it safely engages in the same, though it is inclined from the said groove, because it is guided by the margin of the groove, as is shown for example at the point B. But when the drum has further advanced into the position in which the thread merges into the groove at a point of intersection, say at the point 21, it is not supported any more by the margin of the groove, and therefore, there is the possibility of the thread leaving the portion 6*b* of the groove and getting into the portion 6*e* instead of getting into the portion 6*c*. To avoid this irregularity, subsidiary guiding means are provided which are operative while the thread merges into the groove at the point of intersection 21 or 20, and the said subsidiary guiding means are disposed so as to hold the thread in alignment with the portion of the groove to be engaged thereby. In Fig. 8 I have shown in full lines the groove 6*b* in which the thread 2 is engaged, and I have indicated by a small circle C the subsidiary guiding means. Preferably the said circle C is located so that it guides the thread when it merges into the groove 6*b* at the point B and before the point of intersection 21 gets into position for engagement by the thread. The circle C is located so that in this position of the point B in the groove 6*b* it engages the thread. After the drum has moved in the direction of the arrow *x* and the point of intersection 21 is in the position 21′ (shown in the figure in dotted lines) the thread must be held to alignment with the groove 6*b* and therefore the circle C has been shifted into the position C′.

The guiding means indicated by the circle C afford abutment for the advancing thread; and nothing more elaborate than a round abutment is requisite. This abutment is shifted from position C to position C' as the drum advances in the direction indicated by the arrow *x*; and it will be understood that the abutment is suitably mounted independently of the drum and is in its operation coordinated with drum operation, to make the described traverse in the direction of the length of the drum while the drum rotates.

In a similar way a thread guided in the guide 6*d* is first engaged by a subsidiary guide member represented by a circle D, and, as the point of intersection 21 moves into the position 21', the member D is moved into the position D'.

In a similar way, subsidiary guiding members such as C and D are provided in connection with the point of intersection 20, and therefore, where the groove has two points of intersection, four subsidiary guiding members are needed.

It appears therefore, that the subsidiary guiding members must be so mounted that the points at which they engage the thread shall be shiftable respectively in the direction of the length of the drum 4 from the median line A—A outwardly or from the ends of the drum inwardly. Further, the subsidiary guiding members must be constructed so that they do not interfere with the traverse of the thread, and therefore, they must be disposed so as to get out of guiding position and out of the path of the thread after they have guided the thread through the points of intersection.

In Figs. 1 to 7 and 9 I have shown a preferred construction of the guiding members, the said guiding members being provided on the rotary roller 5 and being in the form of the said lugs or wings 14 and 15. The said roller is rotated so that the lugs or wings get into thread guiding positions slightly before the thread passes a point of intersection and they get out of guiding position slightly after the thread has passed the said point of intersection. Further, the roller is located so that normally the thread slides on its cylindrical surface, as is indicated in Fig. 3, so that a slight additional braking action is exerted on the thread being wound on the bobbin. The lugs or wings are not shiftable axially on the roller, as has been described with reference to the circles C and D, but in lieu thereof they are formed with cam faces 16 and 17 adapted to be engaged by the said thread, the said cam faces being curved in opposite senses as is best shown in Figs. 4 and 5. In Fig. 2 I have indicated the path of the thread 2 in dashes and dots. The thread 2 engages in the portion 6*b* of the groove 6 at a point near the point of intersection 21, and accordingly the thread engages the rounded margin of the cam 17 of the lug or wing 15 near the forward end of the cam. As the drum 4 rotates in the direction of the arrow *y* and the roller 5 in the direction of the arrow *z*, the point of intersection 21 is shifted upwardly, and gradually the left hand part of the cam 17 gets into position for engagement with the thread. The point of abutment of the lug 15 upon the thread 2 shifts along the cam surface 17 in a direction that is longitudinal of the drum 4. And by such abutment the thread is maintained in alignment with the groove 6*b*. Thus, while the thread passes the point of intersection 21 it is held in alignment with the groove 6*b* so that it is prevented from leaving the said groove. Finally the thread slides on the radial portion 18 of the wing and onto the circumferential portion of the roller 5.

After the drum 4 has completed nearly one rotation, the thread engages in the section 6*d* of the groove, and now the lug or wing 14 gets into thread guiding position, which lug or wing has the same function as the lug or wing 15. However, it carries the thread from the left to the right in order to hold the same in alignment with the part 6*d*. Accordingly, the cams 16 and 17 have oppositely directed pitches as is shown in Figs. 4 and 5.

At the right hand part of the roller 5 similar lugs or wings 14 and 15 are provided.

It will be understood that by the rotation of the roller 5 the lug or wing engaging the thread 2 gets out of the path of the thread after it has guided the same through the point of intersection 20 or 21, so that the thread is free to perform its traverse. The roller 5 must be rotated so that the correct lug or wing 14 or 15 is in operating position whenever one of the points of intersection meets the thread, and accordingly the relative movements of the drum 4 and roller 5 must be regulated. Preferably the drum 4 has a comparatively large diameter, say 4½ inches, and with this diameter each groove extends around the circumference of the drum with 1½ windings. This large diameter is desirable, because there are only two points of intersection, and the number of the wings or lugs is only four. Further, the coating of the bobbin is not subject to felting when it is running idle in the same degree as a drum of small diameter, which felting easily occurs in case of rayon being wound on the bobbin.

The number of revolutions of the roller 5 is found as follows: When the thread engages in the part 6*b* of the groove as is shown in Fig. 2, and the drum 4 continues its rotation, the thread passes into the groove 6*c* and it is moved to the left and to the reversing point 22 shown in Fig. 8. Thereafter the thread engages the part 6*d* of the groove and passes again the point of intersection 21. But now the lug 15 does not operate. Now the drum has made one rotation. The thread moves further through the parts 6*e* and 6*f* of the drum, and to the reversing point 19. Now the drum has performed the second rotation. At the end of the third rotation of the drum the thread is again in the first position illustrated in Fig. 2, and now also the lug or wing 15 must be in the position shown in the said figure. It appears therefore that whenever the drum makes three revolutions the roller 5 must perform one revolution. However, I prefer to rotate the roller 5 at higher velocity, because thereby the lug or wing is more rapidly moved out of the path of the thread, and the pitch of the cams 16 and 17 is larger. Good results have been obtained, where the roller 5 performs two rotations while the drum 5 performs three rotations, so that the drum and roller are rotated at the ratio of 3:2. Figs. 1 and 2 show a construction in which the drum and roller have this ratio, the gear wheels 12 and 13 having the gear ratio 2:3. It will be understood that this gear ratio is adapted to the diameter of the drum and the arrangement of the groove 6 referred to above, and that the gear ratio must be changed if the dimensions of the drum and the arrangement of the grooves are altered.

Preferably the cams 16 and 17 of the lugs or wings 14 and 15 are shaped so that they engage the thread with their outer margins, and for this

purpose the walls of the said cams are perpendicular to the cylindrical wall of the roller 5 and the said margins are rounded as is shown in Fig. 3. Thus the thread slides on the said rounded margin, so that the friction is reduced to a minimum.

The thread may be automatically filed on the guide without arresting the same because the grooves of the drum and the wings or lugs 14 and 15 always get into the correct relative positions.

By my improved construction the thread safely performs its traverse. It is not subject to wear, because it is only in slight contact with the roller 5 and the rounded margin 18 of the lugs. Therefore, even threads of small elasticity can be safely guided, and I am enabled to use the same for winding coarse threads and twines.

In describing the invention reference has been made only to the thread guiding means. The other parts of the winding machine may have any known or preferred construction and I deem it not necessary to describe the same. The thread guide may be used in connection with winding machines of any type, and it may also be used in twisting machines.

I claim:

1. A thread guiding mechanism for thread winding apparatus, comprising, in combination with the bobbin on which the thread is to be wound, a rotary drum mounted with its axis parallel to the said bobbin and formed with substantially helical intersecting grooves having opposite pitches, the improvement described herein, which consists in subsidiary thread guiding means in position for guiding the thread passing a point where said grooves intersect and to hold the same substantially in alignment with the groove engaged by the thread, such means consisting of an abutment upon which the drum-guided thread makes bearing, the point of bearing advancing longitudinally of the drum as the drum turns.

2. In a thread guiding mechanism as defined in claim 1, the further improvement described herein, which consists in the said subsidiary guiding means being arranged for engaging the thread before and after it passes the said point of intersection.

3. In a thread winding mechanism as defined in claim 1, the further improvement described herein, which consists in the said subsidiary thread guiding means being in the form of a lug mounted for rotating about an axis parallel to the axis of said drum.

4. In a thread winding machanism as defined in claim 1, the further improvement described herein, which consists in the said subsidiary thread guiding means being in the form of a lug mounted for rotating about an axis parallel to the axis of said drum, said lug being formed with a thread engaging or guiding portion extending from the point located forwardly in the direction of the rotary movement of said lug laterally and rearwardly of the axis of said lug and shaped so as to continuously hold said thread substantially in alignment with the groove engaged thereby as the said drum and lug rotate.

5. In a thread winding mechanism as defined in claim 1, the further improvement described herein, which consists in the said subsidiary thread guiding means being in the form of a lug mounted for rotating about an axis parallel to the axis of the said drum, said lug being formed with a thread engaging or guiding portion extending from the point located forwardly in the direction of the rotary movement of said lug laterally and rearwardly of the axis of said lug and shaped so as to continuously hold said thread substantially in alignment with the groove engaged thereby as the said drum and lug rotate, and said lug being formed at the rear part of the laterally and rearwardly directed portion with a portion adapted to guide the thread as it is being disengaged from said lug.

6. In a thread guiding mechanism as defined in claim 1, the further improvement described herein, in which two subsidiary thread guiding means are provided for each point of intersection one for guiding said thread engaging in one of the intersecting grooves and the other one for guiding the thread moving in the other one of said intersecting grooves.

7. In a thread guiding mechanism as defined in claim 1, in which the grooves made on said drum have a plurality of points of intersection, the further improvement described herein, which consists in two subsidiary guiding members being provided for each point of intersection, one of said guiding members of each pair guiding said thread engaging in one of said grooves and the other one guiding said thread engaging in the other one of said intersecting grooves.

8. In a thread guiding mechanism as defined in claim 1, the further improvement described herein, which consists in the subsidiary guiding member being mounted on a roller disposed with its axis parallel to the axis of said drum, said roller being located so as to be in frictional engagement with the thread moving onto said drum.

9. In a thread guiding mechanism as defined in claim 1, the further improvement described herein, which consists in the said thread guiding mechanism comprising a rotatable shaft disposed with its axis parallel to the axis of said drum and a lug on said shaft having a thread engaging portion directed from the forward point of the lug laterally and rearwardly of said shaft, said lug being formed at the part engaging the thread with a wall disposed substantially radially of the shaft and having a rounded margin.

10. In a thread guiding mechanism as defined in claim 1, the further improvement described herein, which consists in the said thread guiding mechanism comprising a rotary shaft and a thread engaging lug carried by said shaft, and means for rotating said drum and shaft in opposite directions, said shaft carrying the lug having a number of revolutions relatively to the number of revolutions of said drum a multiple of that needed for setting said lug into thread guiding position relatively to the point of intersection associated therewith.

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