

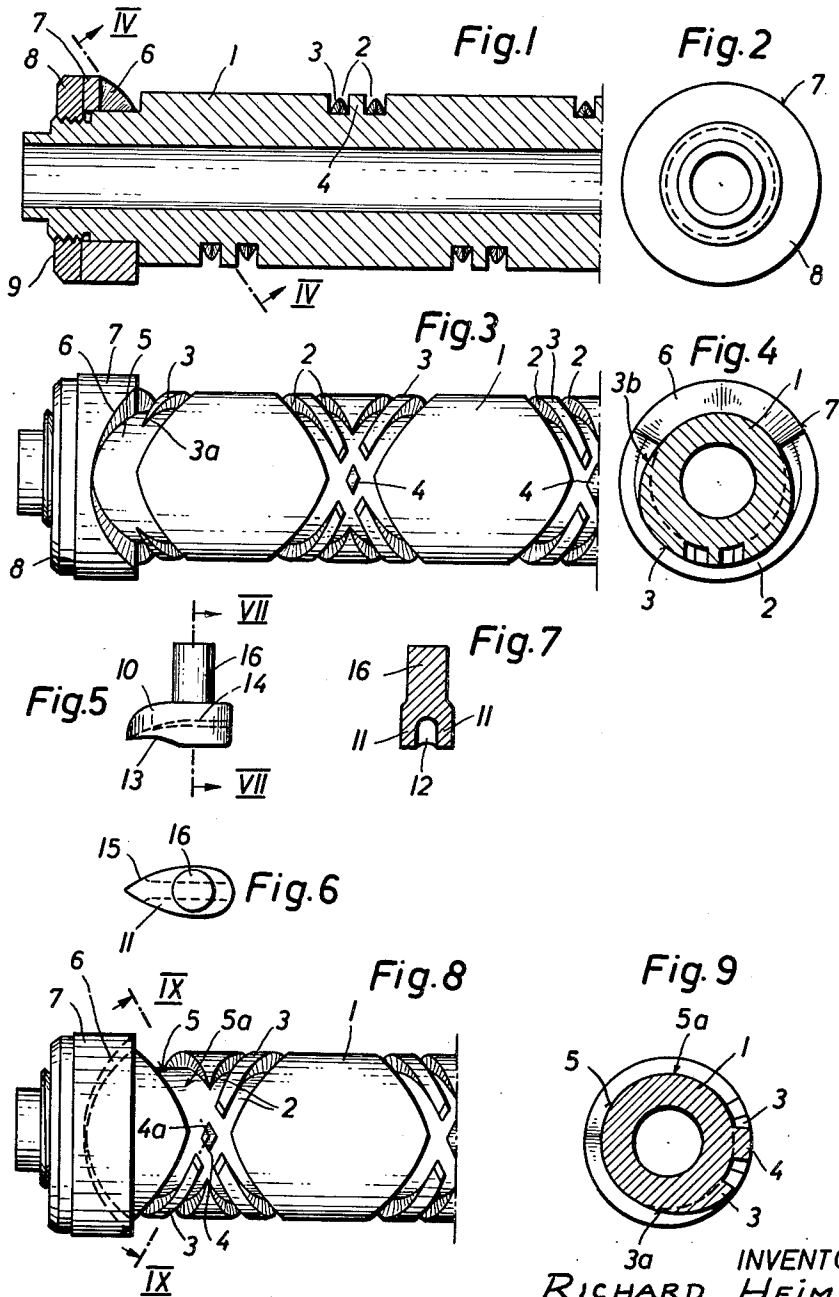
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GROOVED GUIDE ROLLER FOR TEXTILE MACHINES

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1

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GROOVED GUIDE ROLLER FOR TEXTILE MACHINES

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This invention relates to a guide roller for use in textile machines and serving the purpose of reciprocating the thread guide.

The guide roller involves the principle of utilizing the rotary motion of a member, i.e. the roller, to impart a member gliding on the roller or at the roller a translatable motion. This is achieved by means of a follower which, by means of a shoe, engages guides provided on the roller. The guide means on the roller consists of a relatively coarse pitch thread, one left hand and one right hand spiral thread being arranged on the roller, meeting at the ends of the roller and repeatedly crossing each other on the path between the ends. In this manner, as the guide roller rotates, the shoe and the follower secured thereon are moved from one end to the other. Reverse motion of the shoe and the follower takes place as the same enter the groove which spirals in the opposite direction.

The difficulty encountered in properly reciprocating the follower in a guide roller of the type described above consists in that, on the one hand, the follower should be as long as possible in order that it glides properly over the intersections of the crossing right-hand and left-hand threads. It must be long enough that, at any one moment of crossing an intersection, it remains guided with sufficient accuracy in the thread in which it is just travelling while avoiding the risk of hitting the acute edge formed by the intersecting curves or even entering the wrong thread as a result of a deviation from the guideway. On the other hand, it should be as short as is possible to be able of gliding without jamming at the two reversal points at the ends of the thread through the narrow groove which theoretically turns at an acute angle from left-hand thread to right-hand thread and reversely. These two contradictory requirements must be balanced in the practical commercial design by a compromise, which results in the necessity of largely dispensing with a proper guidance of the follower and, moreover, of having great deviations from a mathematically accurate guidance of the follower to be put up with. In consequence hereof, the guide roller cannot be rotated at any high speed desired.

Attempts were already made to overcome this difficulty by providing the roller with a stepped groove, i.e. by cutting on the base of the outer, peripherally located groove a second parallel groove of smaller width. The lower groove receives the shoe of the follower while a guided part of the follower consisting of a rotatable roll is arranged in the upper wide groove. However, this construction of the guide roller is not satisfactory.

An object of this invention is to provide a construction of the guide roller which does not only result in a simpler solution but also ensures a better and more proper guidance of the follower in the groove. The invention is characterized in that the spiral groove in the roller is designed as a twin groove with a central narrow bar or rib being formed as a guide cam between the individual grooves. Accordingly, the follower is constructed as a twin-runner slide with the runners embracing the rib and moving thereon. Since the guide means in this construction of the grooves guide roller is constituted by the spiralling narrow rib, the roller may, as an

2

alternative, be constructed such that only the guide cam is provided and appears as an embossed part on the cylindrical roller.

This construction has the advantage that at the intersections of the right hand and left hand spiral twin groove a section of the cam which has a rhomb-shaped area is retained. The follower is thus guided on a relatively great part of its length in each phase of crossing the intersections and is passed over the intersection without the tendency of deviating from its proper direction of travel and without the necessity of making the slide excessively long. The relatively short length of the slide is of benefit to its guidance at the reversal points.

Of substantial importance is also the fact that the follower is made of a single part only contrary to the follower of the stepped groove roller which is made of several members which are movable with respect to each other and subject themselves to bending stresses and are subject to wear (slide and roll). Consequently, the follower may be held smaller and lighter in weight and made of a plastic composition, e.g. by injection molding.

In accordance with a further feature of the invention, the thread groove is held free from the rib at the reversal points. The guidance of the follower is effected by a guide surface located in the reversal area. For this purpose, curved guide surfaces of greater height than the groove may be arranged at the outer walls of the twin groove.

By making the guide roller of the form in accordance with the invention, proper guidance of the follower is obtained also from the practical point of view. This correctness of guidance has the result that the follower will satisfactorily make its translatable motion with a substantially reduced risk of jams even in case of high speeds of the roller. A substantially higher number of traverse throws per unit time can be reached as compared with prior art constructions. A further substantial advantage consists in that the slide as well as the follower may be lighter in weight and of simpler construction than the followers used up to the present. The lower weight of the slide is of great importance in the sudden change of direction at the reversal points because of the low mass acceleration and deceleration.

Making a twin groove is just as easy as a single groove and substantially easier than a stepped groove. Each of the individual grooves may be held at a relatively small width and depth. Since the rib is completely omitted at the reversal points, it is furthermore suggested to arrange the guide curves on members which are detachable from the roller, e.g. asymmetrical rings on which the reversal curves are milled in. This constitutes a facilitation for the production of the thread groove at the reversal points since the tool, e.g. a side-milling cutter, may be freely moved beyond the end face of the workpiece. In addition, the reversal curve can be prepared exactly in a separate operation. The two grooves of the twin thread may be milled in a single operation with only a very moderate cutting work having to be done in view of the low depth of the grooves. With the small depth of the grooves, even a tube may be used as the roller. It is possible to use suitable plastic compositions for the rings bearing the reversal curves. In this case, because of the lower weight of rotating masses, there results a substantial reduction in unbalance which, due to the asymmetry of the rings, results in vibrations of the grooved guide roller. However, to compensate for the unbalance, it is also possible to provide bores on the side opposite of the reversal curves formed in metallic or plastic rings. The rings are preferably secured by clamping screw means. Furthermore, it is possible for the grooved guide roller of the invention to have a relatively small diameter due to the shallow and narrow twin

thread groove. The reduction in weight permits a higher speed of the roller since the unbalances become smaller especially with rollers which are arranged in overhung position.

A substantial increase in the speed of the grooved guide roller can be achieved if the thread groove in forward direction of the roller, i.e. in the direction opposite of the rotation beyond the reversal point formed by the curved section is designed without a rib. The higher the speed of the grooved guide roller, the longer is the stretch of way in forward direction of the roller to be made available to the follower where, after having turned to the new angle of travel, it must be free from additional guides with the exception of the outer groove walls in order to arrive more rapidly at smoothness of motion. While it is favorable that the central rib of the twin groove is retained on the way to the reversal area until the latter begins, it is necessary in case of substantially higher speeds of the guide roller that the twin groove is held free from the central cam after the area of the reversal point in forward direction of the roller. In this manner, the follower is able of arriving much sooner at smoothness of travel in the new direction and at a steady, vibrationless motion. It has been found that the design in accordance with the invention permits the speed of the grooved guide roller to be increased by about one-third and still more, e.g. from 3000 r.p.m. to 4000 r.p.m. and more. Satisfactory, smooth and steady guidance of the thread for the cross-wound bobbin is obtained even with these substantially increased speeds.

The central rib of the twin groove may be omitted to an extent such that, in forward direction of the roller, it is eliminated between the area of the reversal point constituted by the curve section and the next following intersection. This means that, on the way along the groove from the reversal point, the rib will only start with the rhomb-shaped central part at the intersection. Thus, that section of the twin groove which is free from the rib may extend to as much as 180 deg.

Several embodiments of the guide roller of this invention are illustrated in the appended drawing where

FIG. 1 is a sectional view of the grooved guide roller in accordance with the invention;

FIG. 2 is an end view of the roller shown in FIG. 1;

FIG. 3 is a plan view of the roller of FIG. 1;

FIG. 4 is a sectional view of a detail along the line IV—IV of FIG. 3;

FIGS. 5, 6, and 7 show a side view, plan view and sectional view along the line VII—VII of FIG. 5, respectively, of the follower and slide;

FIG. 8 is a plan view of a further embodiment of the grooved guide roller of the invention, and

FIG. 9 is a sectional view along the line IX—IX of FIG. 8.

The grooved guide roller of the invention consists of the roller body 1 which is provided with the spiral groove in the form of the twin groove 2 for guiding the shoe and follower, a narrow guide rib being left between the two parallel grooves. At the intersections of the right hand and left hand crossing twin grooves is provided in the center of the crossing a guide member 4 as a feature of the twin groove, this guide member permitting the guide rib 3 to be interrupted only by the width of the groove. In this manner, the shoe is properly guided when gliding over the intersection even if it is relatively short in length. The remaining central part 4 permits a substantial reduction in the length of the shoe.

In accordance with the invention, the guide rib 3 disappears completely at the wall or reversal sections as is illustrated by the wide groove 5. The guidance is now taken over by a curved section 6 which is formed in a detachable ring 7 or the like. Since the guidance of the shoe by the rib terminates and is taken over by the lateral

surface of the shoe at the reversal area, the curve 6 may be provided with a sharper return bend than was possible with prior art grooved guide rollers. In this manner, smooth and trouble-free reversal of the shoe into the opposite direction is caused, it being impossible that other interferences, e.g. by the rib 3, may occur since the rib is not existent in this area. The cam itself is preferably tapered widthwise and terminates in a point as shown by 3a. FIG. 4 also illustrates that the rib 3 gradually decreases in height until it is flush with the base of the groove as represented by the curve 3b. The ring 7 constitutes a separate member which may be detachably secured to the roller 1. The mounting means may be a nut 8 which is screwed on the thread 9. With the ring 7 detached, the twin grooves can be accurately machined at the reversal area since the tool is capable of being freely moved beyond the end surface of the work. Manufacture in quantity of the curved rings is very simple. The curved lateral surfaces on the rings 7 should be arranged such that the follower is already positively guided by tight engagement with the curved surface before positive guidance by the rib 3a which flattens out in the reversal areas terminates.

The shoe or slide 10 is provided with two runners 11 having provided between them a recess 12 which receives the guide rib 3. The base face of the slide is recessed in the front section at 13 while the base line 14 of the groove 12 slopes downward in forward direction so that the two curves join in the point. This has the advantage that the slide is not only guided at the rear part by the two runners 11 but glides with its front part on the rib thereby receiving an additional guidance. A further advantage of this design of the slide is the fact that the front part is not weakened by the groove 12. This is of importance to the slide when gliding over the reversal areas along the curved wall 6. In plan view, the slide 10 is pointed in accordance with the shape 15, it being possible to provide a slight curvature at the point. The pin 16 bears the yarn guiding arm. The slide 10 is preferably made of a plastic composition, thereby providing a slide shoe which is low in weight but has a good guidance along the rib 3 or in the twin groove 2.

In case of the further embodiment of the invention, the curved groove 2 in forward direction of the guide roller 1 is held free from the central rib 3 for a distance beyond the area of the curved section 6 as is clearly shown by 5a of FIG. 8. The twin groove 2 may be designed as a wide single groove 5a as far as to the next following rhomb-shaped guide member 4. In this manner, the follower which is suddenly reversed in direction by the reversal area at the curved section 6 has available a certain stretch of way within which it is enabled to arrive at smoothness of motion. Since an increased speed of the grooved guide roller results in an increased velocity of the follower, the time available remains about the same as with a roller which rotates at a correspondingly lower speed. The central part 4 may be left with sharp contours. At this point, the follower has already arrived at sufficient smoothness of travel that the central rib with the central part 4 may suddenly appear in the guideway 5a. In certain cases, the central part 4 may be rounded off in the direction towards the groove section 2a which is free from the rib, or the edge 4a may be slightly curved.

What is claimed is:

1. A drive unit for use in textile machines for reciprocating a thread guide at a constant linear rate, said drive unit comprising a guide roller and a follower, said guide roller having a constant angle spiral groove having crossing intermediate portions and reversing end portions, said spiral groove being in the form of twin groove portions separated by a central guide rib, and said follower having spaced parallel runners engaged in said groove portions and a longitudinal groove between said runners receiving said rib, said rib being interrupted at each of said crossing portions and there being a

5

rhomb-shaped central rib member at the center of each crossing portion in alignment with adjacent portions of said rib, said rib terminating short of said reversing end portions to facilitate the reversal of direction of movement of said follower longitudinally of said guide roller, each of said reversing end portions having an outside curved guide surface of a greater height than the height of said groove portions.

2. A drive unit for use in textile machines for reciprocating a thread guide at a constant linear rate, said drive unit comprising a guide roller and a follower, said guide roller having a constant angle spiral groove having crossing intermediate portions and reversing end portions, said spiral groove being in the form of twin groove portions separated by a central guide rib, and said follower having spaced parallel runners engaged in said groove portions and a longitudinal groove between said runners receiving said rib, said rib being interrupted at each of said crossing portions and there being a rhomb-shaped central rib member at the center of each crossing portion in alignment with adjacent portions of said rib, said rib terminating short of said reversing end portions to facilitate the reversal of direction of movement of said follower longitudinally of said guide roller, each of said reversing end portions having an outside curved guide surface of a greater height than the height of said groove portions, said groove, in the forward direction of the roller, being free of a rib to a point beyond the range of the reversal area formed by said curved section.

3. A drive unit for use in textile machines for reciprocating a thread guide at a constant linear rate, said drive unit comprising a guide roller and a follower, said guide roller having a constant angle spiral groove having crossing intermediate portions and reversing end portions, said spiral groove being in the form of twin groove portions separated by a central guide rib, and said follower having spaced parallel runners engaged in said groove portions and a longitudinal groove between said runners receiving said rib, said rib being interrupted at each of said crossing portions and there being a rhomb-shaped central rib member at the center of each crossing portion in alignment with adjacent portions of said rib, said rib terminating short of said reversing end portions to facilitate the reversal of direction of movement of said follower longitudinally of said guide roller, each of said reversing end portions having an outside curved guide surface of a greater height than the height of said groove portions, each of said outside curved guide surfaces being on a member separate from said roller and being removable therefrom, said member being formed of a wear-resistant plastic material.

4. A drive unit for use in textile machines for reciprocating a thread guide at a constant linear rate, said drive

6

unit comprising a guide roller and a follower, said guide roller having a constant angle spiral groove having crossing intermediate portions and reversing end portions, said spiral groove being in the form of twin groove portions separated by a central guide rib, and said follower having spaced parallel runners engaged in said groove portions and a longitudinal groove between said runners receiving said rib, said rib being interrupted at each of said crossing portions and their being a rhomb-shaped central rib member at the center of each crossing portion in alignment with adjacent portions of said rib, said rib terminating short of said reversing end portions to facilitate the reversal of direction of movement of said follower longitudinally of said guide roller, each of said reversing end portions having an outside curved guide surface of a greater height than the height of said groove portions, said rib decreasing in height and width towards each of said reversing end portions in the direction of follower movement and said rib starting again at the ones of said crossing portions adjacent said reversing end portions.

5. A drive unit for use in textile machines for reciprocating a thread guide at a constant linear rate, said drive unit comprising a guide roller and a follower, said guide roller having a constant angle spiral groove having crossing intermediate portions and reversing end portions, said spiral groove being in the form of twin groove portions separated by a central guide rib, and said follower having spaced parallel runners engaged in said groove portions and a longitudinal groove between said runners receiving said rib, said rib being interrupted at each of said crossing portions and there being a rhomb-shaped central rib member at the center of each crossing portion in alignment with adjacent portions of said rib, said rib terminating short of said reversing end portions to facilitate the reversal of direction of movement of said follower longitudinally of said guide roller, each of said reversing end portions having an outside curved guide surface of a greater height than the height of said groove portions, said follower having an upwardly and forwardly sloping undersurface and said follower grooves sloping downwardly and forwardly and meeting with said undersurface in a point, said follower tapering in a forward direction to a pointed forward end and said runners having pointed forward ends.

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