This invention relates to textile fabricating machines and more particularly to improvements in strand carriers for braiding machines and the like.

In braiding strand material on a braiding machine and more particularly such strand material having a plurality of individual filaments, the individual filaments are commonly wound or coiled in parallel relation on the bobbin of a braiding carrier and the individual filaments are then fed under tension in such parallel relation from the bobbin to the braiding point of the machine. In a prior braiding carrier structure for this purpose, the strand was fed along a path from the bobbin over a fixed lead-off guide roller, around the bobbin and thence over a grooved guide roller mounted in fixed position on the carrier. From the fixed guide roller, the strand continued to and over a guide roller on a tension lever which acted to maintain a constant tension in the strand and to release the bobbin to permit withdrawal of the strand therefrom as it was braided into a fabric. From the tension lever the strand continued through a guide eyelet and thence to the braiding point of the machine.

In its path between the lead-off guide member and the fixed guide roller, the strand re-engaged the coils of the strand on the bobbin to control the movement of the bobbin when released by the tension lever to permit the withdrawal of the strand. However, inasmuch as the diameter of the coiled material on the bobbin continually changes as the strand is withdrawn therefrom, the angle of the strand path between the bobbin and the fixed guide roller also continually changes. This causes the strand to at times ride in the bottom of the groove and at other times ride up the side walls of the groove in the guide roller which in turn caused the individual filaments of the strand to bunch up and in many instances to cross each other thereby disrupting the parallel relation of the individual filaments and resulting in the formation of defective braided material.

Another defect in such a prior braiding carrier structure has been in the operation of the tension lever to maintain a constant and uniform tension on the strand material. In the usual practice the tension lever is under the control of compression type coil springs or coil springs which act on the tension lever principle and such springs act under predetermined prestressed conditions to provide the necessary resistance in the tension lever. However, such springs, due to constant flexing during operation of the tension lever, quickly become weakened and lose their effectiveness and must be replaced. In the case of the tension type springs such replacement also becomes a problem inasmuch as this type spring must be replaced in prestressed condition.

It is an object of the invention to provide a braiding carrier of novel structure which will overcome the above mentioned and other defects of prior carrier structures.

Another object of the invention is the provision of means in a braiding carrier for feeding a multilament strand from a strand supply to a braiding point of the machine and for maintaining the individual filaments of the strand in parallel relation throughout the feeding path of the strand.

A further object of the invention is the provision of means in a braiding carrier for feeding and tensioning a strand from a strand supply carried by the carrier to a point at which said strand is formed into a braided fabric, which means includes a tension lever over which the strand passes, spring means acting on the tension lever, and means for adjusting the spring means relative to the tension lever to vary the tension on said strand by said tension lever.

A still further object is the provision of means in a braiding carrier for feeding and tensioning a strand from a strand supply carried by the carrier to a point at which the strand is braided into fabric, which means includes a tension lever over which the strand passes, a torsion type coil spring having one end thereof acting on the tension lever, and means for adjusting the other end of the spring from an unstressed to a stressed condition whereby tension is applied to the strand by the tension lever.

With these and other objects in view which will become apparent from the following detailed description of the illustrative embodiment of the invention shown in the accompanying drawings, the invention resides in the novel elements, features of construction and cooperation of parts, as hereinafter more particularly pointed out in the claims.

In the drawings:

FIG. 1 is a side elevational view of a braiding carrier according to the instant invention;

FIG. 2 is a view of the braiding carrier as seen from the right of FIG. 1;

FIG. 3 is a sectional view on an enlarged scale taken along the line 3-3 of FIG. 1;

FIG. 4 is a top plan view on an enlarged scale of the carrier of FIG. 1;

FIG. 5 is a sectional view on an enlarged scale taken along the line 5-5 of FIG. 1;

FIG. 6 is a view on an enlarged scale of a portion of the carrier of FIG. 2 taken in the direction of the arrows 6-6;

FIG. 7 is a sectional view on an enlarged scale taken along the line 7-7 of FIG. 2;

FIG. 8 is a sectional view on an enlarged scale taken along the line 8-8 of FIG. 1; and

FIG. 9 is a sectional view on an enlarged scale taken on the line 9-9 of FIG. 6.

The braiding carrier of the instant invention is adapted for use in both vertical and horizontal type braiding machines and is particularly suited to the feeding of wire strand material and preferably such strand material having a multiplicity of individual filaments from a supply bobbin on the carrier to a point at which the strand is braided into a fabric. Specifically the braiding carrier includes a bobbin on which the individual filaments of the strand are coiled in parallel relation, a series of fixed guide members for guiding the strand along a path from the bobbin to the braiding point while maintaining the parallel relation of the individual filaments in the strand, means for tensioning the strand and means for adjusting the tensioning means to vary the tension applied thereby to the strand.

Referring to FIGS. 1 and 2 of the drawings, the braiding carrier of the instant invention includes a foot 10 having spaced upper and lower plate portions 11 and 12 for engaging upper and lower surfaces of the usual race plate of a braiding machine (not shown), a heart piece 15 connecting the upper and lower plate portions and adapted to engage in the sinusous raceway formed in the race plate and a lug or pin 16 depending from the lower plate portion for engagement with the horn or driving gears of the machine. Secured to the upper plate 11 by screws 17 or the like (FIGS. 3 and 6) is a base member 20 which supports in upright position a post or standard 21 and a spindle 22 for rotatably supporting a bobbin 24 for strand material 25 such as wire or the like. In its path from the bobbin 24 to the braiding
point of the machine, the strand material passes from the bobbin over guide posts 26 and 27 which are mounted in fixed position on the standard 21, and over a grooved guide roller 30 rotatably mounted in fixed position on the standard (FIGS. 1 and 5). From the roller 30 the path of the strand continues around a grooved guide roller 31, which is rotatably mounted on a tension lever 32, through a guide eyelet 35 and thence to the braiding point.

As shown in FIG. 5, the guide posts 26 and 27 are positioned adjacent the bobbin 24 at opposite sides of a center line passing through the standard 21 and spindle 22 so that the strand in its path between the guide posts engages a short arc of the strand material coiled on the bobbin to produce a slight braking action on the bobbin as it is rotated upon the withdrawal of the strand therefrom, as heretofore set forth. Also, the guide post 27 is so positioned in relation to the guide roller 30 so that the strand 25 will follow a straight path from the post 27 through the center of the groove in the guide roller 30.

As will be recognized there is a fluctuating demand for the strand 25 as the carrier moves along its sinusoidal pathway about the braiding point of the machine and to provide a constant tension on the strand as it passes to the braiding point, the bobbin 24 is alternately held against rotation and released to permit the strand to be withdrawn therefrom. For holding the bobbin 24 the lower end thereof is provided with spaced teeth 36 which are adapted to be engaged by the upper end of a detent or pawl 37 slidably mounted in a bore 40 in the base member 20 (FIG. 8). A compression spring 41 positioned in the bore 40 between the lower end of the pawl 37 and the base member 20 normally tends to bias the pawl into engagement with the teeth 36. Adjacent its upper end, pawl 37 is provided to provide a flat vertical face 42 and a horizontally extending shoulder 48 for receiving an end portion 46 of a lever 47 having an integral shaft portion 48 by means of which the lever is pivotally journaled in the base member 20 (FIG. 3). The end portion 46 of the lever 47 is adapted to engage the vertical face 42 to prevent rotation of the pawl 37 in the bore 40 and is also moved to engage the shoulder 48 to depress the pawl and disengage it from the teeth 36 of the bobbin 24, as hereinafter set forth.

For operating lever 47 to depress pawl 37 and release it from the teeth 36 of the bobbin 24, the lever 47 is provided with a tail portion 50 having a lower flat surface 51 which is adapted to be engaged by the head of a screw 52 threadably carried in the tension lever 32 (FIG. 7) during movement of the tension lever in the manner hereinafter disclosed. Tension lever 32 is mounted on a pin 55 one end of which is threadably carried in an ear 56 projecting upwardly from the base member 20 (FIGS. 2 and 3). The free end of the pin 55 is supported in an ear portion 57 of a bracket 60 which is secured by screws 61 to the base member 20, as shown in FIG. 6. The lever 32, which is positioned on the pin 55 adjacent the ear 56, is provided with a hub portion 62 and a sleeve portion 65 of a reduced diameter surrounding the pin 55 and acting to pivotally journal the lever thereon. Also mounted on pin 55 between the end of the sleeve portion 65 and the ear portion 57 is a flange member 66 having a hub portion 67. The hub portion 67 of the lever 32 and flange member 66, respectively, act to support or oppose coils of a tension spring 70, the end coil supported on the pin 55 being extended to lie in back of a stop member 71 on the lever, as indicated in FIGS. 2 and 7. The end coil of the spring 70 on the hub portion 67 is bent to engage in an aperture 72 in the flange member 66 (FIG. 6).

Normally the flange member 66 is held in an upright position by a pin 55 whereby the spring 70 acts to resist movement of the lever 32 in a clockwise direction and tends to bias the lever counterclockwise, as viewed in FIG. 1, to maintain the strand 25 under constant tension.

The flange member 66 is also adapted to be rotated on the pin 55 relative to the lever 32 to adjust the end coils of the spring 70 relative to each other to vary the resistance exerted by the spring on the lever. For this purpose the outer periphery of the flange member 66 is provided with transversely extending V-shaped teeth 75 which are adapted to be engaged by correspondingly shaped threads of a set screw 76 carried in a bore 77 formed in the bracket 60 (FIGS. 6 and 9). The screw 76 is normally restrained against movement in the bore 77 between an end wall 80 of the bore and a washer 81 which is provided with a cupped aperture 82 interfitting with a tapered end portion 85 of the screw. Pressure is applied to the washer 81 by a curved spring 86 and a flat plate 87 which is maintained in engagement with the spring plate 86 by a clamp member 90 (FIG. 9). When it is desired to adjust the resistance exerted by the spring 70 on the lever 32, the clamp 90 is released and the screw 76 is turned by means of a screw driver slot 91 in the screw to in turn rotate the flange member 66 relative to the lever. The clamp is then tightened to lock the screw 76 in its adjusted position between the wall 80 and the washer 81 as above mentioned, and the screw in turn holds the flange member 66 in its adjusted position.

As the carrier follows its sinusoidal path around the braiding point and the strand 25 is braided into the fabric, the length of strand between the braiding point and the fixed guide roller 30 is gradually reduced thereby tending to bias the lever counterclockwise (see FIG. 1). When this clockwise movement of the lever 32 is sufficient to engage flat surface 51 and operate lever 47 to disengage pawl 37 from a tooth of the bobbin, lever 32 immediately acts in the counterclockwise or take-up direction to permit partial rotation of the bobbin under tension of the strand. Counterclockwise movement of lever 32 in turn disengages it from the lever 47 thereby permitting the spring 41 to bias the pawl 37 into engagement with the next tooth 36 to stop the bobbin. This action reoccurs constantly throughout the braiding operation.

Upward movement of the bobbin 24 on its spindle 22 through the action of the pawl 37 on the teeth of the bobbin is prevented by a plate 92 which is mounted on the upper ends of the standard 21 and spindle 22 and lies above the upper end of the bobbin. Preferably, the plate 92 is in substantially abutting engagement with the upper end of the bobbin and is maintained in such position on the standard and spindle by a flat latch member 95 which is adapted to interfit in annular grooves 96, of substantially the same width as the thickness of said latch member, formed in the standard and spindle (FIGS. 1, 2 and 4). As indicated in FIG. 4, latch member 95 is mounted for movement about a pivot member 97 threadably carried in the plate 92, and the latch member is provided with oppositely facing open-ended slots 100 for receiving the annularly grooved portions of the standard and spindle. Plate 92 is also provided with apertures for receiving the upper ends of the guide posts 26 and 27 and an aperture for the guide eyelet 35 as shown in FIG. 4. When it is desired to remove the plate 92 from the standard and spindle and the guide posts, for the purpose of replacing an empty bobbin with a full bobbin, the latch member is rotated to disengage it from the annular grooves in the standard and spindle and the plate is then lifted from the various members. When the full bobbin is in place on the spindle the plate is again replaced on the standard and spindle and the guide posts and the latch member is then rotated about the pivot member 97 to reengage it with the grooves in the standard and spindle.

Of course the improvements specifically shown and described by which the above results are obtained can be changed and modified in various ways without departing...
from the invention herein disclosed and hereinafter claimed.

1 claim:

1. A braiding carrier having a vertical standard, a spindle, a bobbin rotatably mounted on said spindle, said bobbin having a strand coiled thereon, and means for guiding said strand along a path from said bobbin at a point at which said strand is to be braided into a fabric, including a first guide post adjacent said bobbin at one side of a center line passing through said standard and spindle, a second guide post adjacent said bobbin at the other side of the center line passing through said standard and spindle, and means for guiding said strand along said center line through said standard and spindle, a grooved guide roller mounted on said standard at said other side of said center line, said second guide post and guide roller being positioned relative to each other so as to guide said strand along a straight path coincident with the center of the groove in said first guide roller, a second guide roller, a movable lever on which said second guide roller is mounted, and a fixed guide eyelet through which said strand is guided from said second guide roller to the braiding point, and means for tensioning said strand in its path from said bobbin to said guide eyelet including detent means for engaging and holding said bobbin against rotation, and means operated by said lever for releasing said detent means from said bobbin, a member normally held in fixed adjusted position relative to said lever for preventing movement thereof to release said detent means from said bobbin, and means for adjusting the fixed position of said member relative to said lever to thereby adjust the resistance exerted by said spring on said lever.

2. A braiding carrier according to claim 1 wherein said first and second guide posts are so positioned at opposite sides of the center line passing through said standard and spindle as to guide said strand into contact with a portion of the coiled strand on said bobbin.

3. A braiding carrier according to claim 1 and including detent means for engaging and holding said bobbin against rotation, and means operated by said tension lever for releasing said detent means from said bobbin.

4. A braiding carrier having a vertical standard, a spindle, a bobbin rotatably mounted on said spindle, said bobbin having a multifilament strand coiled thereon with the individual filaments lying in parallel relation and means for guiding said strand along a path from said bobbin to a point at which said strand is to be braided into a fabric while maintaining said individual filaments in said parallel relation, including a first guide post adjacent said bobbin at one side of a center line passing through said standard and spindle, a second guide post adjacent said bobbin at the other side of the center line passing through said standard and spindle, said first guide roller mounted on said standard at said other side of said center line, said second guide post and guide roller being positioned relative to each other so as to guide said strand along a straight path coincident with the center of the groove in said second guide roller, a second guide roller, a movable lever on which said second guide roller is mounted, a fixed guide eyelet through which said strand is guided from said second guide roller to the braiding point, and means for tensioning said strand in its path from said bobbin to said guide eyelet including detent means for engaging and holding said bobbin against rotation, and means operated by said lever for releasing said detent means from said bobbin, and a fixed guide eyelet through which said strand is to be braided into a fabric, including a first guide post adjacent said bobbin at one side of a center line passing through said standard and spindle, a second guide post adjacent said bobbin at the other side of the center line passing through said standard and spindle, a first grooved guide roller mounted on said standard at said other side of said center line, said second guide post and said first guide roller being positioned relative to each other so as to guide said strand along a straight path coincident with the center of the groove in said first guide roller, a second guide roller, a movable lever on which said second guide roller is mounted, and a fixed guide eyelet through which said strand is guided from said second guide roller to the braiding point, and means for tensioning said strand in its path from said bobbin to said guide eyelet including detent means for engaging and holding said bobbin against rotation, and means operated by said lever for releasing said detent means from said bobbin, a torsion type coil spring having one end connected to and acting on said lever to resist movement thereof to release said detent means from said bobbin, a member normally held in fixed adjusted position relative to said lever for preventing movement thereof to release said detent means from said bobbin, and means for adjusting the fixed position of said member relative to said lever to thereby adjust the resistance exerted by said spring on said lever.

7. A braiding carrier having a vertical standard, a spindle, a bobbin rotatably mounted on said spindle, said bobbin having a multifilament strand coiled thereon with the individual filaments lying in parallel relation, and means for guiding said strand along a path from said bobbin to a point at which said strand is to be braided into a fabric while maintaining said individual filaments in parallel relation, including a first guide post adjacent said bobbin at one side of a center line passing through said standard and spindle, a second guide post adjacent said bobbin at the other side of the center line passing through said standard and spindle, a grooved guide roller mounted on said standard at said other side of said center line, said second guide post and guide roller being positioned relative to each other so as to guide said strand along a straight path coincident with the center of the groove in said guide roller, a second guide roller, a movable mounted tension lever on which said second guide roller is mounted, said plate member being removably mounted on said standard and spindle and said first and second guide posts to overlie the upper end of said bobbin.

8. A braiding carrier according to claim 7 and including means for releasably maintaining said plate member in predetermined position on said vertical standard, spindle and first and second guide members.

9. A braiding carrier having a vertical standard, a spindle, a bobbin rotatably mounted on said spindle, said bobbin having a multifilament strand coiled thereon with the individual filaments lying in parallel relation, and means for guiding said strand along a path from said bobbin to a point at which said strand is to be braided into a fabric while maintaining said individual filaments in parallel relation, including a first guide post adjacent said bobbin at one side of a center line passing through said standard and spindle, a second guide post adjacent said bobbin at the other side of the center line passing through said standard and spindle, said first guide roller mounted on said standard at said other side of said center line, said second guide post and guide roller being positioned relative to each other so as to guide said strand along a straight path coincident with the center of the groove in said guide roller, a second guide roller, a movable tension lever on which said second guide roller is mounted, a fixed guide eyelet through which said strand is guided from said second guide roller to the braiding point, and a plate member in which said guide eyelet is mounted, said plate member being removably mounted on said standard and spindle and said first and second guide posts to overlie the upper end of said bobbin.
means for releasably maintaining said plate member in predetermined position on said standard and spindle and said first and second guide posts including a latch member which is adapted to engage an annular groove in said standard and spindle, respectively, and means for pivotally mounting said latch member on said plate member for movement to disengage said annular grooves.

10. A braiding carrier having a vertical standard, a spindle, a bobbin rotatably mounted on said spindle, said bobbin having a strand coiled thereon, means for guiding said strand along a path from said bobbin to a point at which said strand is to be braided into a fabric, and means for tensioning said strand in its path from said bobbin to the braiding point including detent means for engaging and holding said bobbin against rotation, a lever adapted to engage said strand in said path, said lever being moved by said strand to release said detent means from said bobbin, a torsion spring having one end connected to and acting on said lever to resist movement thereof to release said detent means from said bobbin, a rotative member normally held in fixed adjusted position relative to said lever, means for anchoring the other end of said spring to said rotative member, and means for rotating said member relative to said lever to thereby adjust the resistance exerted by said spring on said lever.

11. A braiding carrier having a standard, a spindle for supporting a bobbin rotatably mounted thereon, said bobbin having a strand coiled thereon, and means for guiding said strand along a path from said bobbin to a point at which said strand is to be braided into fabric, including a first guide post positioned to lie adjacent said bobbin at one side of a center line passing through said standard and spindle, a second guide post positioned to lie adjacent said bobbin at the other side of the center line through said standard and spindle, and a grooved guide roller mounted on said standard at said other side of said center line, said second guide post and guide roller being positioned relative to each other so as to guide said strand along a straight path coincident with the center of the groove in said guide roller.

12. A braiding carrier according to claim 11 wherein said first and second guide posts are so positioned at opposite sides of the center line through said standard and spindle as to guide said strand into contact with a short arc of the coiled strand on said bobbin.

13. A braiding carrier having a standard, a spindle on which a bobbin is adapted to be rotatably mounted, means for guiding a strand from said bobbin along a path to a point at which said strand is to be braided into fabric, means for tensioning said strand in its path from said bobbin to the braiding point including detent means for engaging and holding said bobbin against rotation, a lever adapted to engage said strand in said path, a pin, means mounting said lever for rocking movement on said pin, a torsion spring surrounding said pin, means causing the spring at a first end thereof to act on said lever to resist movement thereof tending to release said detent means from said bobbin, a rotative member mounted on said pin adjacent a second end of said spring, means for anchoring the second end of said spring to said rotative member, and means for rotating said rotative member relative to said lever to thereby adjust the resistance exerted by said spring on said lever.

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