Oct. 17, 1967 J. FORCA 3,347,064

THREAD GUIDE FOR KNITTING MACHINE

Filed Dec. 11, 1964 2 Sheets-Sheet 1

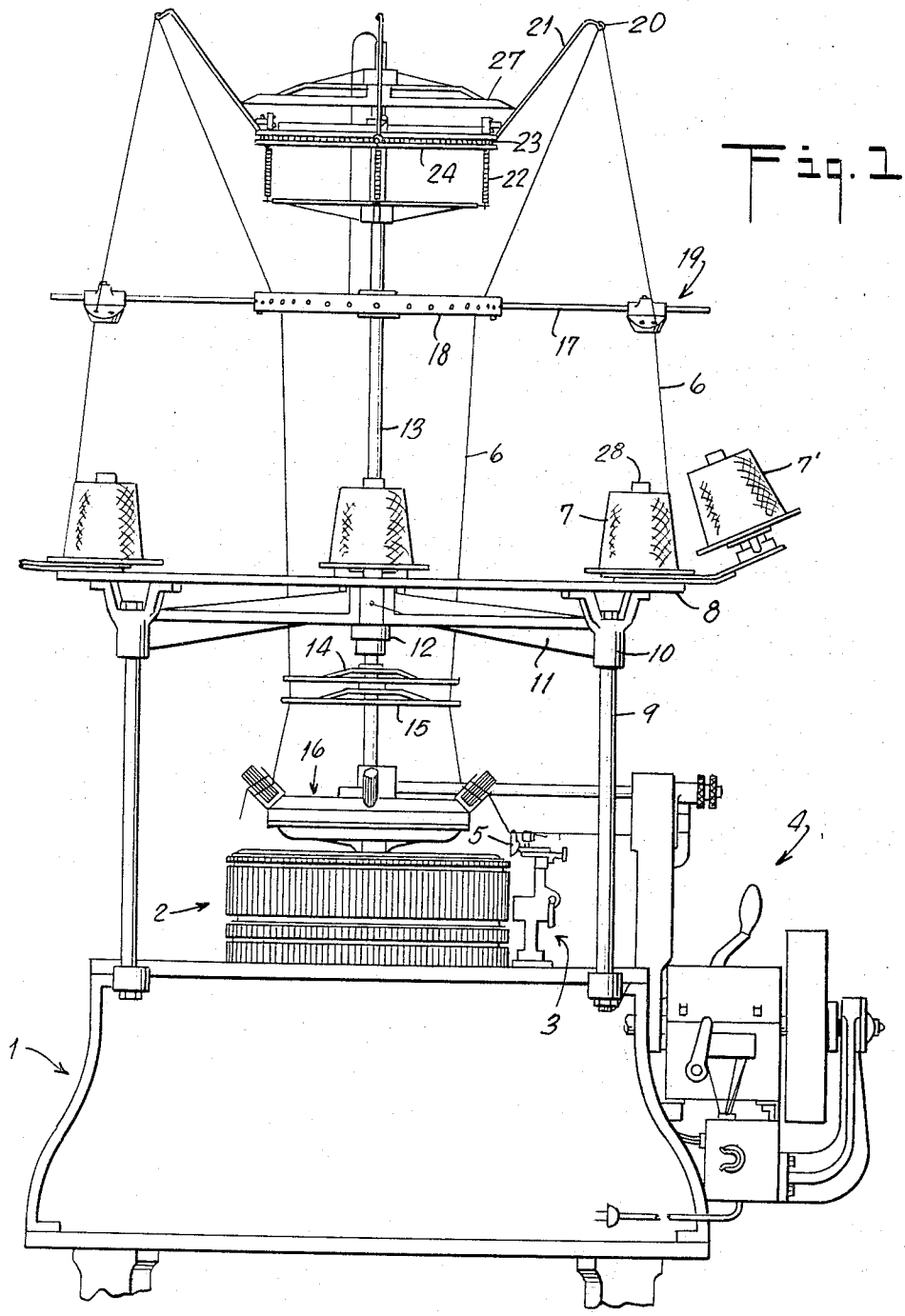


Fig. 1.

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Fig. 2.

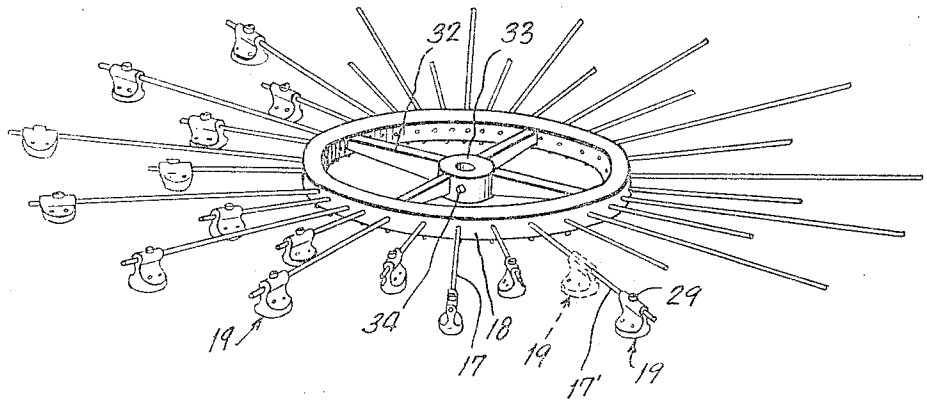


Fig. 3.

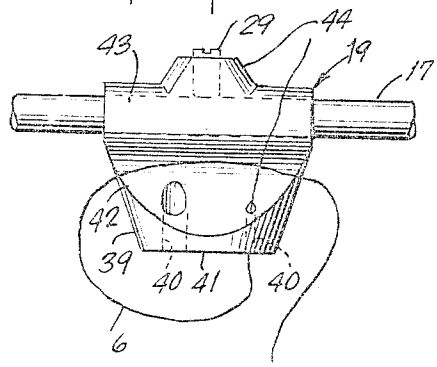


Fig. 4.

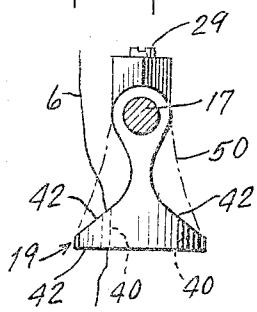


Fig. 5.

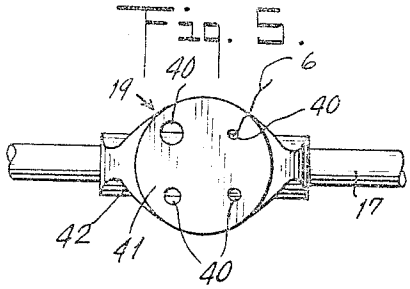
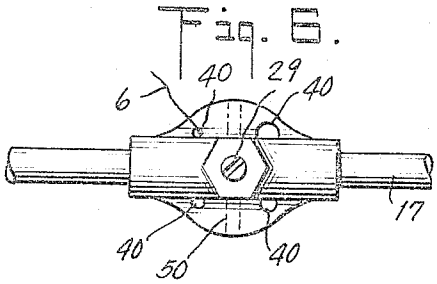


Fig. 6.



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THREAD GUIDE FOR KNITTING MACHINE

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ABSTRACT OF THE DISCLOSURE

The thread guide herein is to be located above a rotating bobbin in a knitting machine and is provided with a tapered circular body having a plane, circular bottom surface to be disposed toward the bobbin, and a top surface having an elliptical edge and disposed at an angle to the bottom surface, and a thread hole extending between the two surfaces.

This invention relates to thread guides for use in knitting machines and the like, and more particularly to improved thread guides having a novel geometric shape.

In the prior art there are many different thread guides which are used with knitting machines and the like to guide thread or yarn from rotating bobbins to the knitting frames. One prior art type of such thread guides comprises a wire bent at one of its ends to form one or more eyelets. The wire is held by a collar arrangement on a horizontal bar and disposed above the rotating or stationary bobbin stand. Another prior art thread guide comprises a flat spatula shaped member attached to a horizontal bar and having a plurality of holes therethrough. In each case the eyelets or holes are positioned above the bobbins by a horizontal holder which is connected to the bar. The holder is usually a part of the wire for the eyelet or part of the flat member which extends between the horizontal bar and the holes.

In each of these types of prior art thread guides there exists many disadvantages. In each case the thread guide must be located close to the bobbin. Since the bobbin tends to unwind its thread or yarn, there is a tendency for the yarn to rotate or spin. The horizontal holder between the threading holes and the horizontal bar of the prior art thread guides obstructs the circular motion or spinning of the threads being unwound from the bobbin. Consequently, the threads often whip up and loop around the thread guide with the result that such threads become knotted or twisted around the thread guide. This knotting or twisting necessitates the shut down of the entire knitting machine until the thread is unwound or untwisted.

One previous solution to this problem is to put the thread guide closer to the bobbin and cause the thread guide to follow the thread as it is unwound from the bobbin. This solution, however, is unsatisfactory because it requires sophisticated control mechanisms and is complicated. Other previous solutions have also been unsatisfactory.

Accordingly, it is the purpose of this invention to solve the above problem and to eliminate the disadvantages of the prior art types of thread guides.

A more particular object of the invention is to eliminate the twisting or knotting, in or about a thread guide, of threads being unwound from a rotating or stationary bobbin stand.

A further object of the invention is to provide a thread guide which is economical, simple and requires no complex equipment to operate.

The foregoing and other objects of this invention are attained in one specific embodiment of this invention, which briefly comprises a thread guide movably disposed on a horizontal rod above a rotating bobbin in a knitting machine. The thread guide comprises a tapered curved

body having at least a first planar surface defined by a closed curved edge and at least a second smooth surface defined by a curved edge. At least one hole is provided in the body through which the thread from the bobbin can be inserted. The hole can be circular in shape with an axis which is perpendicular to at least one of the surfaces.

In a preferred embodiment of this invention the first surface is defined by a circle and is positioned in opposed relation to the rotating bobbin to form the bottom surface of the guide. The second surface is defined by an elliptical edge and forms the top surface of the guide disposed at a non-parallel angle to the bottom surface. The hole is disposed to have its axis perpendicular to the bottom surface and to receive thread through its bottom end and release the thread through its top end.

The tapered body having first and second surfaces defined by curved edges prevent the guide being snagged by the thread as it is unwound from the bobbin. As the thread is unwound from the bobbin, the circular motion of the bobbin imparts a circular motion to the thread. Thus, looking at an elevational view of the extreme oscillatory positions of the thread unwinding from the bobbin to the thread guide, one would see a triangular outline of a cone. This motion imparted to the thread below the guide causes it to whip up above the guide before passing therethrough and tends to loop around the guide and thereby become snagged thereon.

In the thread guide of the prior art such as, for example, the eyelet and wire arrangement, the circular motion would cause the thread to loop around and to be entangled in the protruding horizontal part of the wire to which the eyelet is attached. In the other type of prior art thread guide, the flat spatula member, not being of closed circular shape and being held by a protruding element, would also interfere with the twisting motion of the thread. Hence, the thread would also become entangled in the protruding horizontal portion of the member.

On the other hand, in this invention, there is a circular and planar bottom surface which is positioned directly above or in the vicinity of the rotating bobbin. Thus, the oscillating thread is not obstructed by any protrusion and hence the likelihood of the thread becoming entangled or knotted on the guide is substantially reduced. Moreover, the body being of round tapered configuration and the other top surface also being defined by a curved edge causes any looped portion of the thread to readily slide off the guide and thereby prevents the thread from becoming entangled.

Of course, more than one hole can be provided in the body, and more than one top surface can be provided. For example, in one embodiment, a third surface defined by an elliptical edge is provided at a non-parallel angle to the bottom surface and opposite the second surface which is also on the top. The body can also define two pairs of holes each perpendicular to the bottom surface. One of the pairs of holes have its top ends defined by one top surface and the other pair has its top ends defined by the other top surface. In this manner, the thread guide can carry more than one thread at one time from one or more bobbins.

In this latter embodiment a further improvement can be made by attaching a rib structure to each top surface between the two holes. The rib structure's unattached edge can advantageously be curved to facilitate the threads sliding off the guide and thereby preventing them from getting snagged thereon. Also such ribs will keep the threads from each of the two pairs of holes separated and not permit them to become entangled with each other.

An essential feature of this invention therefore is the provision of a thread guide comprising a tapered body having a first surface defined by a closed curved edge and

a second surface defined by a curved edge and at least one hole through the body defined at its end by the first and second surfaces and having its axis perpendicular to one of the surfaces.

It is another feature of this invention that one of the surfaces be circular in shape and form the bottom surface and the other surface be located on top of the frusto-conical body and be elliptical in shape and disposed at a non-parallel angle to the bottom surface and form the top surface, and that the hole be perpendicular to the bottom surface.

Another feature of this invention is a third top surface defined by an elliptical edge and disposed at a non-parallel angle to the first bottom surface and opposite the second top surface.

A further feature of this invention is the provision of two pairs of holes, one pair having one end defined on the second top surface and the other pair having one end defined on the third top surface.

A still further feature of this invention is a structure attached to each of the second and third surfaces between the two holes therein and having its unattached edge a curved surface.

A complete understanding of this invention and of these and various other objects and features thereof may be obtained from the following detailed description and the accompanying drawing, in which

FIG. 1 depicts an elevational view of a known type of knitting machine embodying the invention;

FIG. 2 is a perspective view of the spider arrangement in such machine on which the thread guides of the instant invention are mounted;

FIG. 3 is a side elevational view of a thread guide embodying this invention;

FIG. 4 depicts an end view of the guide shown in FIG. 3 with dotted lines defining and alternative ribbing arrangement therefor;

FIG. 5 depicts a bottom view of the thread guide; and

FIG. 6 is a top plan view of the thread guide, with dotted lines defining an alternative ribbing arrangement therefor.

Referring to FIG. 1, a typical multi-feed knitting machine, such as disclosed in United States Patent No. 2,215,220, is illustrated with frame **1**, rotary needle cylinder **2**, a cam assembly generally indicated at **3** and a power receiving and driving mechanism generally shown at **4**. It is not essential that the machine be of the rotary cylinder type. A plurality of the cam assemblies **3** are substantially equally spaced about the machine. Yarn or thread guides **5** associated with each cam assembly feed a plurality of yarns or threads; for example, thread **6** is fed to the needles from cone **7** which is disposed on bobbin **28**. A number of these yarn or thread supplies or cones are spaced about platform **8** which is supported at the upper ends of uprights **9** on bracket elements **10**. The elements **10** have inwardly projecting spokes **11** supporting a central bearing **12** in which column **13** is rigidly secured.

As many of these supplies **7** are used as are necessary. Duplicate supplies **7'** may be positioned adjacent each of the original supplies **7** for immediate replacement of an exhausted original supply without loss of operating time. Each of the cones **7'**, as is known in machines of the type shown in said Patent 2,215,220, is adjustably pivoted to swing in a plane radial to the center line of the cone so that the yarn will be drawn from the top thereof at the proper angle. Cones which have run out may be replaced by fresh supplies while the machine is in operation.

Each yarn or thread **6** is guided downwardly through suitable porcelain or other yarn guiding apertures in spiders **14** and **15**, and then may be taken directly to the yarn guides **5** adjacent the needles, or preferably, may be positively supplied to the knitting instrumentalities of the machine by yarn furnishing means such as has been

generally illustrated herein at **16**. This type of yarn feeding device is well known.

As the yarn is led from the supply cone **7**, it first passes through the thread guide **19** of this invention which is shown in greater detail in FIGS. 2, 3, 4, 5 and 6, and which will be more particularly described herebelow. A ring **18** is fixed to the column **13** and supports a plurality of horizontal bars **17** which hold the thread guides **19**.

From the thread guide **19**, a thread or yarn **6** is fed up through eyelet **20** which is attached to yarn sweep **21**. The yarn sweep **21** functions to release strain upon the yarn **6** as it is drawn by the furnishing means **16** and in combination with associated means **22** through **27** function to stop the entire machine whenever strain or tension upon the yarn exceeds certain safe limits. This type of safety mechanism and its purposes are known in the art and operate as follows:

The yarn sweep **21** is pivoted upon a supporting ring or disc **24** and is attached to springs **22** whose tension absorb shock and relieve tension of the yarn which would otherwise be transmitted directly through to the knitting instrumentalities. The lower end of each spring **22** is attached to a hook projecting from a spider, the hub of which is vertically slidable upon the column **13**. This hub is clamped in position upon the column by a set screw (not shown). By moving the spider up or down the column it is possible to vary the tension which a spring **22** will exert against the sweep **21**.

Whenever tension on the yarn or thread passes a safe limit, the sweep **21** will be drawn downwardly and will actuate a switch mechanism **23** which is connected to electrical circuits (not shown) to control the stopping of the entire machine in a known manner.

An element **27** having somewhat the form of an inverted cone is permanently attached to the upper end of the column **13** and serves to stop each of the sweeps **21** at their extreme upward swing.

Turning now to FIG. 2 which depicts the spider arrangement **17** and **18** and thread guides **19** of FIG. 1, there is shown a ring **18** held together by radial arms **32** and inner hub **33**. Inner hub **33** is movably fixed about the column **13** by screw **34**. To the ring **18** is attached a plurality of the rigid horizontal bars or guides **17**. The horizontal bars **17** can be circular rods and be of varying lengths as shown in FIG. 2. Thread guides **19**, to which this invention is more particularly related, are depicted as being movably attached to the guides or rods **17** and can be located anywhere along the length of the rods **17** to be in a suitable position to receive the threads or yarn from the bobbins or supplies. Thus as shown on bar **17'** for example, the guide **19** can be readily slid from the full line position thereof to the dotted line position thereof thereby effecting a substantial saving in the use of labor in such simple change of position.

Referring now to FIGS. 3, 4, 5 and 6, there is shown a thread guide **19** which is adjustably fixed to rod **17** by a set screw **29**. The thread guide can be made of any suitable material, such as plastic or metal. The body **39** of the thread guide has a frusto-conical configuration and its curved endless side surface converges downwardly toward a bottom surface **41**. As seen in FIG. 5, the bottom surface **41** has a closed circular edge and two pairs of holes **40** therethrough. The holes can be of any suitable dimensions. In FIGS. 3 and 4, it can be seen that there are two top surfaces **42**, **42** each of which are of concave configuration in the vertical direction and which have elliptically shaped lower edges. The lower portions of the two surfaces **42** are disposed at non-parallel angles to the bottom surface **41** and at converging angles to each other. The upper portions of the concaved surfaces **42** curve smoothly into a horizontally disposed cylindrically-shaped portion **43** which extends across the width of the upper portion of the body **39** of the guide and through which is provided a passageway for the rod **17**. Integral with the cylindrical portion **43** is a raised protuberance **44** of

tapered configuration for receiving the set screw 29. The holes 40 are straight, circular holes and have their vertical axes perpendicular to the bottom surface 41. Through the holes one or more threads or yarns 6 can be threaded as shown in FIG. 3 of the drawings.

As depicted in FIGS. 1 and 2, the thread guides 19 are disposed to have their circular bottom surface 41 (see FIG. 3) disposed in opposed relation to the thread source or bobbin. In this manner, whatever oscillating motions are imparted to the thread by an unwinding bobbin will not be obstructed by the thread guide 19 to cause entanglement or twisting of the thread. Although the circular bottom surface 41 (see FIG. 3) can be disposed in another position, it is preferable that it face toward the unwinding bobbin for best advantage.

The geometric shape of the body 39 of the thread guide 19 can be considered as a truncated cone having a small lower circular base (bottom surface 41) and an upper large base, but cut by two non-parallel intersecting planes to form two top surfaces 42 of elliptical shape, and having a gripping portion formed smoothly above the intersection of the cutting planes of such surfaces. As a result of this configuration when the thread whips upwardly in loops 6 on either side of the guide, as indicated in FIG. 3, it will merely slide off the guide under the weight of the thread for the guide provides no surfaces or projections on which the loop of thread may snag.

In another embodiment of the invention, rib structures 50 can be formed on the upper surfaces 42, 42 of the body and located between the holes, such as depicted in FIGS. 4 and 6 by dotted lines. The ribs extend from the upper cylindrical portion of the guide to the bottom edges of the surfaces 42, 42 and the outer free edges of such ribs, as depicted, preferably are curved concavely though on a larger radius than the surfaces 42. The provision of the ribs 50 enhance the ability of the guide 19 to discard any loops of thread that might whip up over the same. The ribs 50 also assist in keeping separate the threads from the different holes on the same thread guide. For example, a thread 6 through hole 40 in a northwest quadrant of FIG. 6, is prevented from becoming entangled with a thread (not shown) through hole 40 in the northeast quadrant. Of course, the ribbing 50 can be an integral part of the guide or be formed by welding a separate attachment or be attached by screws.

While the specific embodiments of this invention have been shown and described, it will be considered that they are only illustrative and that various modifications may be made therein without departing from the scope and spirit of the invention.

What is claimed is:

1. A thread guide to be located in spaced relation to a bobbin, comprising a body having a curved endless side surface and having a bottom surface defined by a closed curved edge to be disposed toward the bobbin, and a top surface defined by a curved edge whose central portion approaches said bottom surface, said body having at least one hole therein extending from said bottom surface to said top surface and through which the bobbin thread is to feed.

2. A thread guide according to claim 1, wherein said curved edge of said bottom surface is circular, said curved edge of said top surface is elliptical, said top surface is disposed at a non-parallel angle to said bottom surface, and said hole has an axis which is perpendicular to said bottom surface.

3. A thread guide according to claim 1, wherein said body has two holes, and a rib structure is attached to said top surface between said two holes and has its unattached edge defined in the shape of a curve.

4. In a knitting machine having a rotatable bobbin containing a thread, and a horizontal bar located above said bobbin, a thread guide slidably mounted on said bar and comprising a bottom surface defined by a circular edge and a pair of oppositely disposed top surfaces having curved edges whose central portions approach said bottom surface, and said thread guide having a plurality of holes extending from said bottom surface to said top surfaces for taking up said thread from said bobbin, said thread guide being adjustably disposable on said horizontal bar such that said bottom surface is substantially opposed to the end of said bobbin.

5. The invention defined in claim 4, wherein said plurality of holes are of even number, said top surfaces have elliptical edges, a pair of rib structures respectively attached to said top surfaces between pairs of said holes.

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MERVIN STEIN, *Primary Examiner.*