

Oct. 17, 1950

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2,525,997

YARN CONDITIONING DEVICE

Filed March 23, 1948

2 Sheets-Sheet 1

Fig. 1.

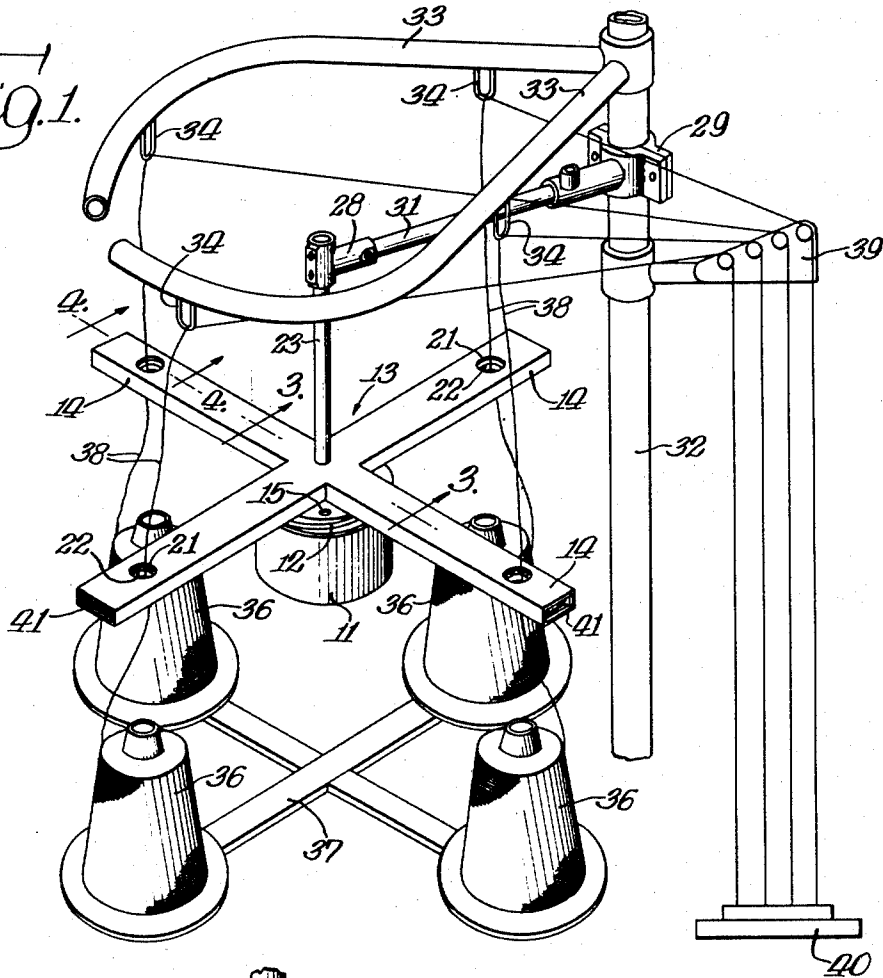
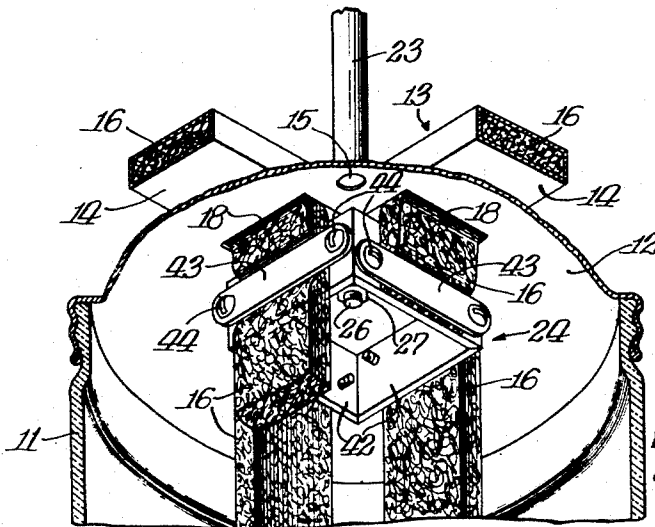


Fig. 2.



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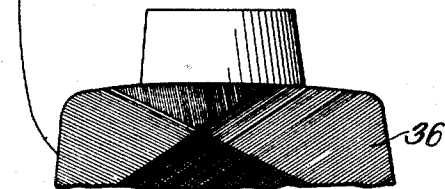
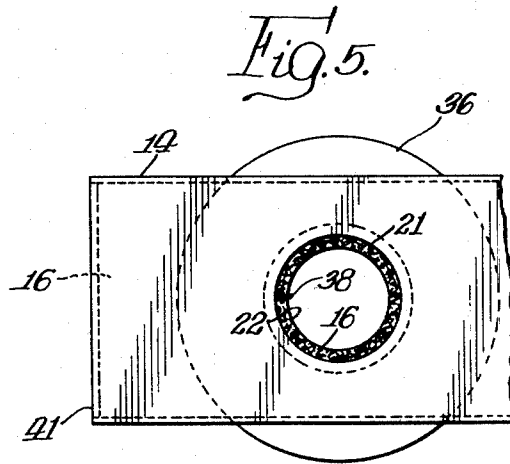
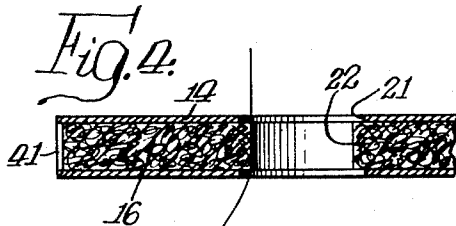
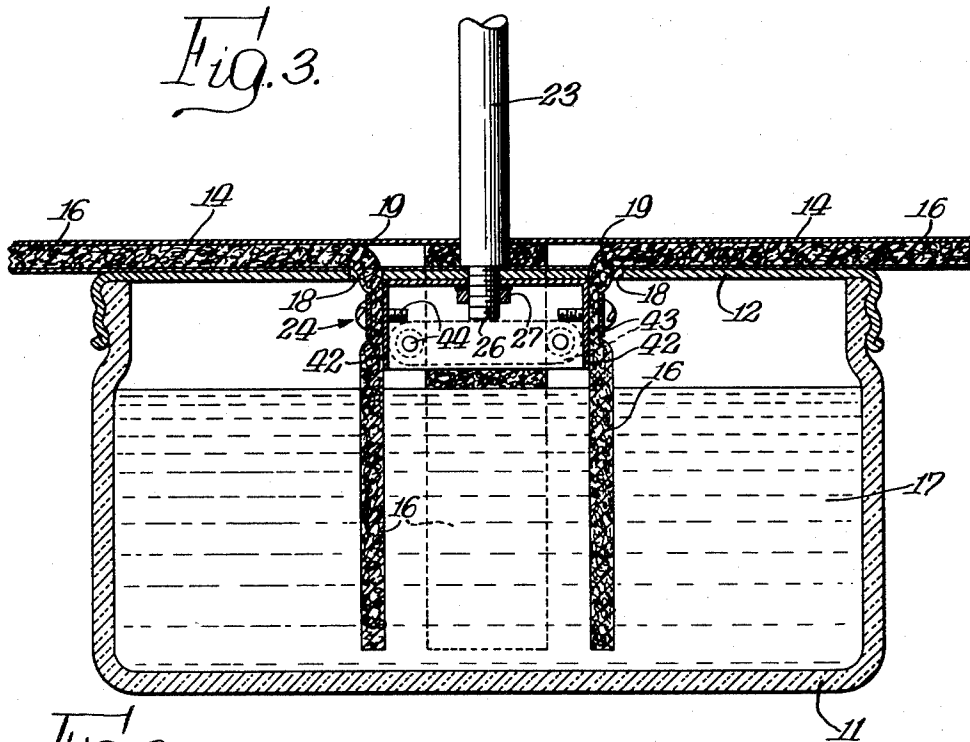
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YARN CONDITIONING DEVICE

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4 Claims. (Cl. 91—38)

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This invention relates to a device for conditioning yarn by the application of a fluid thereto and more particularly to a device for oiling yarn to improve its knitting qualities and its performance in a knitting machine.

It is desirable in many instances to precondition yarn prior to its use in knitting by applying a suitable conditioning fluid to the threads. For example, in knitting certain types of yarns, such as silk and rayon, improved results can be obtained if the yarn is subjected to an oiling treatment prior to the knitting operation. In other cases, the yarn may be pretreated with water or other liquids capable of imparting desirable properties to the yarn.

It has been found that oiling is particularly effective in the case of nylon yarn which ordinarily is produced in the form of twisted threads coated with a suitable sizing to prevent kinking. Difficulty has been experienced in the knitting of nylon yarn due to the tendency of the sizing to flake off of the yarn and to accumulate at the knitting needles or other critical points in the knitting mechanism thereby interfering with the proper operation of the knitting machine. Oiling of the nylon yarn eliminates or greatly minimizes this source of difficulty and results in a knitted article having more uniform stitches and better wearing ability. Accordingly, the yarn conditioning device of my invention finds particular application in the oiling of nylon yarn but it may also be used in conjunction with any type of yarn for which oiling or other treatment with a conditioning fluid is desirable or necessary prior to knitting.

Yarn conditioning or oiling devices have previously been proposed in which the thread to be treated is caused to travel downwardly under tension while bearing against the outer edge or surface of a wick or oiling pad. Inasmuch as the thread in such devices normally travels in a more or less fixed position in contact with the wick, it will be apparent that the wick or oiling pad is subject to severe wear and a groove or channel is rapidly cut therein. Obviously, if slubs, knots, or other obstructions appear in the moving thread, they will tend to snag or catch in the narrow grooved or worn portion of the wick often resulting in breakage of the thread and consequent operating delays. In addition, passage of the thread in such close frictional contact with the wick imposes additional tension or drag on the thread which in many cases interferes with or complicates the normal functioning of the conventional thread tensioning devices.

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These objectionable features can be overcome by providing a device in which a wick member having an extended thread-contacting surface is disposed adjacent a cone of yarn with said surface extending into the path of travel of the thread as it unwinds from the cone and is fed therefrom to the usual yarn guide. By thus disposing the wick member of the yarn conditioning device more or less in line with the axis of the cone, I am able to take advantage of the rotary unwinding motion of the thread to obtain continuous transverse movement thereof across the thread-contacting surface of the wick and thereby substantially avoid undue wear and cutting of the wick, as hereinafter described in detail.

A primary object of the present invention is to provide a yarn conditioning device which is inexpensive to manufacture, simple to assemble and operate, and is adapted to be installed adjacent a cone of yarn on a knitting machine for applying a conditioning fluid to the thread as it is fed from the cone.

A further object of the invention, is to provide a yarn conditioning device or yarn oiler for use in conjunction with a knitting machine in which the tendency of a moving thread to wear or cut into the wick member in contact therewith is substantially eliminated.

An additional object of the invention is to provide a device for continuously applying a yarn-conditioning fluid to a thread of yarn passing through a knitting machine and in which only a very slight and inconsequential additional drag or tension is imparted to the thread as a result of its contact with the device.

Another object of the invention is to provide a yarn conditioning or oiling device in the operation of which slubs, knots, or other occasional obstructions in a thread may pass freely through the device with little or no danger of snagging and breakage of the thread.

Still another object of the invention is to provide a device adapted to be disposed adjacent a cone of yarn, which device functions to facilitate unwinding and feeding of the thread from the cone by effecting a ballooning action of the thread and at the same time serves as a yarn conditioner by applying a suitable yarn-conditioning fluid to the thread.

A still further object of the invention is to provide a yarn conditioning or oiling device in which means is provided for regulating the flow of yarn-conditioning fluid to the portion of the device in contact with the yarn.

Other objects and advantages of the invention

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will become evident in connection with the subsequent detailed description of the invention and the accompanying drawings in which:

Figure 1 is a perspective view showing one specific form of the yarn conditioning device of the present invention as mounted on a knitting machine above a plurality of yarn cores;

Fig. 2 is a fragmentary perspective view of the yarn conditioning device shown in Fig. 1 with portions of the device being broken away to show the details of the flow regulating mechanism;

Fig. 3 is a fragmentary vertical sectional view taken substantially along the line 3—3 of Fig. 1;

Fig. 4 is a fragmentary vertical sectional view taken along the line 4—4 of Fig. 1 and showing the manner in which a thread of yarn contacts the device; and

Fig. 5 is a plan view of the portion of the device shown in Fig. 4.

In general, the yarn conditioning device of my invention comprises a wick member adapted to be supplied with a yarn-conditioning fluid and having a thread-contacting surface adapted to extend into the path of movement of a thread as the latter unwinds from a cone of yarn disposed below the wick member and is fed upwardly therefrom to a yarn guide disposed above the wick member. As the thread unwinds and travels upwardly from the cone to the upper guide member disposed in substantial axial alignment therewith, it will be evident that the rotating unwinding movement of the thread in a plane transverse to the upward feeding thereof tends to define or generate a generally conical surface having the upper guide member as a vertex and the outer periphery of the cone as a base. By extending the thread-contacting surface of the wick member of my device into this conical space to engage at all times the upwardly moving thread, it will be seen that the rotary movement of the thread provides, at its point of contact with the wick member, a continuous transverse wiping movement over the wick member thereby avoiding excessive wear or cutting at any one point on the wick.

In its more specific aspects, the yarn conditioning device of my invention comprises a plurality of elongated radially extending wick members having supporting means coextensive therewith and a suitable container or other means for supplying a yarn-conditioning fluid to the several wick members. Each of the wick members and its support are preferably provided with aligned apertures adjacent the outer ends thereof to permit the passage of threads upwardly therethrough. In this form of the device, the thread-contacting surface of the wick consists of the inner periphery of the aperture therein, and the transverse movement of the thread at its point of contact with the wick is in a more or less circular path corresponding to the shape of the aperture. However, thread-contacting surfaces of different shapes may be employed, such as a straight or slightly curved surface in which event the transverse rotary movement of the thread during its upward travel is transformed, at its point of contact with the wick, into a reciprocating transverse movement back and forth across the thread-contacting surface of the wick.

Referring now to the drawings, one specific embodiment of my invention is shown, merely for purposes of illustration, as having four wick members engaging four separate threads of yarn. A container 11 having a removable cover 12 is

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provided for holding a supply of yarn-conditioning fluid. To the upper face of the cover 12 is secured a wick housing indicated generally at 13 and having, in the present instance, four symmetrically disposed elongated arms 14 extending radially from the container 11 and its cover 12, each of these arms 14 being hollow and having a rectangular cross-section. A vent hole 15 is provided in the cover 12 for filling the container 11 and to permit access of air to the inside of the container 11.

As best seen in Fig. 3, a plurality of elongated flat wicks 16 extend from beneath the surface of a quantity of yarn-conditioning fluid 17 in the container 11 through suitable openings 18 in the cover 12 and through corresponding openings 19 in the central portion of the housing 13 into the hollow arms 14, the latter thereby functioning to substantially enclose the wicks 16 and to support the same in extended position. Adjacent the outer end portions (Fig. 4) of each of the arms 14 are superimposed or aligned apertures 21 and 22 in the arms 14 and the wick 16, respectively. As shown in exaggerated form in Fig. 4 for the sake of clarity, the diameter or size of the opening 22 in the wick member 16 is less than the diameter of the corresponding opening 21 in the arm 14. Accordingly, as seen in Fig. 5, an exposed annular portion of the wick 16 extends inwardly from the aperture 21 in the arm 14 for contacting a thread of yarn and for preventing contact of the thread with the arm 14.

An upright mounting rod 23 extends centrally through the housing 13, the cover 12, and a flow regulating device indicated generally at 24 in Fig. 2 and hereinafter described in detail, and is secured by means of a threaded end portion 26 and a nut 27. The device is thus readily dismantled or assembled for mounting by the manipulation of only a single fastening means. The rod 23 may be supported in any suitable manner and in the present case is shown as being adjustably secured, by means of a pair of clamp members 28 and 29 and an extension rod 31, to an upright supporting rod 32 of a knitting machine (Fig. 1).

The knitting machine shown herein comprises a plurality of guide arm 33 extending outwardly from the supporting rod 32 and having a suitable number of depending U-shaped yarn guides 34. A plurality of cones of yarn 36 are supported on a frame 37 substantially in axial alignment below the yarn guides 34. The yarn conditioning device of the present invention is interposed between the cones 36 and the guides 34 with the arms 14 being oriented to bring the apertures 21 and 22 substantially in axial alignment with the cones and guides. Threads of yarn indicated at 38 are fed upwardly from the cones 36 through the apertures 21 and 22, through the yarn guides 34, and thence downwardly over another set of yarn guides 39 to the cylinder or knitting head of a conventional knitting machine shown diagrammatically at 40.

As a thread 38 unwinds in a rotating manner from a cone 36 and is fed upwardly toward a yarn guide 34, the path of movement of unwinding thread tends to define a generally conical surface or space having the guide 34 as a vertex and the outer periphery of the cone 36 as a base. The diameter or size of the aperture 22 in the wick member 16 is many times greater than the diameter of the thread 38 passing therethrough, with the result that as the thread unwinds in rotating fashion from the cone 36 its point of contact with

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the wick moves around the inner periphery of the aperture 22 transversely to the direction of travel of the thread toward the yarn guide 34. As a result of this rotary wiping action of the thread 38 over the contact surface of the wick, the thread becomes coated with a film of yarn-conditioning fluid and, at the same time, there is little or no tendency for the movement of the thread to wear away or cut into the wick since it does not remain in contact with any single portion of the wick surface for any appreciable length of time.

In addition to the great reduction or substantial elimination of wick wear resulting from the use of the above described device, this form of the invention also eliminates any possible difficulties arising due to the presence of slubs, knots, or other protuberances which are found from time to time in yarn. In yarn-conditioning devices in which frictional pressure of the moving thread causes cutting and groove formation in the wick, these slubs will often snag or catch in the grooves, as previously mentioned, causing breakage of the thread. Obviously, with little or no tendency for grooving of the wick and with the enlarged apertures in the wick, no difficulty is experienced in my device from slubs in the yarn. It will also be apparent that by obviating the tendency toward grooving or cutting of the wick, my device imposes only an inconsequential degree, if any, of extra drag or tension on the thread. Accordingly, the conventional thread tensioning devices are permitted to function in a normal manner.

The specific form of my device illustrated in the drawings also serves another highly advantageous purpose. It has been more or less common practice on knitting machines to provide yarn guiding devices, referred to as ballooners, above the cones for the purpose of imparting a ballooning or distending action to that portion of the thread between the cone and the ballooner. By feeding the thread through a restricting aperture at a point somewhat above the top of the cone and thereby limiting the relative diameter of the transverse rotary movement of the thread during its unwinding from the cone, the slight momentum imparted to the unwinding thread causes it to distend or balloon away from the cone proper thereby avoiding snagging and undue rubbing contact between the various unwinding layers of thread and generally facilitating the unwinding operation. Inasmuch as the apertures 22 in my device are smaller in size relative to the diameters of the cones 36, it will be seen that the device serves not only to condition the yarn during the feeding thereof to the knitting mechanism but also functions in the same manner as the ballooners to cause the threads 38 to distend from the cones 36 (Figs. 1 and 4) thereby eliminating the necessity of employing separate ballooners.

The arms 14 of the housing structure 13 are provided with open end portions 41 in order to permit ready access to the wick members 16. In the event that after long continued use the aperture 22 in a wick begins to wear or fray, or if a different aperture size is desired for any reason, the wick 16 may be pulled outwardly through the open end portion 41 of the arm 14 and a new opening may be punched or cut in the wick within the opening 21 in the arm 14.

Another important feature of my invention is the provision of a flow regulating mechanism 24 (Fig. 2), hereinbefore referred to, whereby the rate of flow of yarn-conditioning fluid from the

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container 11 through the wick members 16 may be controlled. As seen in Figs. 2 and 3, a box-like structure having depending side walls 42 is secured to the under side of the cover 12. Disposed on the outer face of each of the walls 42 is a crossbar or clamp 43 adjustably secured thereto by means of a pair of screws 44. The clamps 43 on adjacent walls 42 are disposed in vertically offset relationship to avoid interference between the inwardly extending screws 44. The wick members 16 extend upwardly from the supply of yarn-conditioning fluid 17 between the walls 42 and the transverse clamps 43. By adjusting the screws 44, the relative transverse compression of the wick members 16 may be easily regulated thereby providing a convenient method of controlling the capillary action of the wicks and consequently the fluid flow therethrough. If during the operation of a knitting machine, it is noted that one of the threads is not receiving its proper supply of oil or other yarn-conditioning fluid, the clamping action of the appropriate bar 43 may be quickly and conveniently regulated to provide the required flow of fluid.

Although my invention has been described primarily in connection with only one specific form of the device, it is intended that various modifications and equivalent structures be included within the scope of the invention as defined in the appended claims.

I claim:

1. A yarn conditioner comprising a fluid container, a cover for said container, a plurality of hollow elongated wick housings generally rectangular in cross section and secured at their inner ends to the outer face of said cover and extending radially therefrom, said hollow housings being in communication with the interior of said container by means of openings in said housings in registry with corresponding openings in said cover, and elongated flat wicks extending from within said container through said openings into said housings and substantially enclosed by the latter, said wicks and said housings having transverse aligned thread apertures adjacent their outer ends to permit the passage of threads therethrough in a direction generally parallel to the axes of said apertures.

2. A yarn conditioner comprising a fluid container, a cover for said container, a wick housing secured flatwise to the outer face of said cover and having a plurality of hollow arms extending radially from said cover, and separate elongated wicks extending from said container into said arms and substantially enclosed by the latter, each of said arms and its wick having aligned apertures therethrough adjacent their outer ends adapted to permit the passage of a thread therethrough in contact with the peripheral edge formed by the aperture in the wick.

3. A yarn conditioning device comprising a fluid container, a cover removably fastened to said container, a plurality of elongated hollow wick housings extending radially from said cover, elongated wicks extending from within said container into said housings and substantially enclosed by the latter, each of said housings and its associated wick having aligned apertures therethrough adjacent their outer ends adapted to permit the passage of a thread therethrough in contact with the peripheral edge formed by the aperture in the wick, and a supporting member for mounting the device on a knitting machine, said supporting member having said hous-

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ings and said cover secured thereto in assembled relation.

4. A yarn conditioner comprising a fluid container, a detachable cover for said container, wick housing structure superimposed on the outer face of said cover and having a plurality of hollow wick-enclosing arms extending radially from said cover, a plurality of elongated wicks extending from within said container through said cover and into said arms, said wicks being supported and substantially enclosed by said arms, said arms and said wicks having aligned openings adjacent their outer end portions to permit the passage of threads therethrough, supporting means for mounting the device on a knitting machine including an elongated rod extend-

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ing through said housing structure and said cover, and retaining means at the inner end of said rod for securing said housing structure and said cover in assembled relation thereon.

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