

May 22, 1951

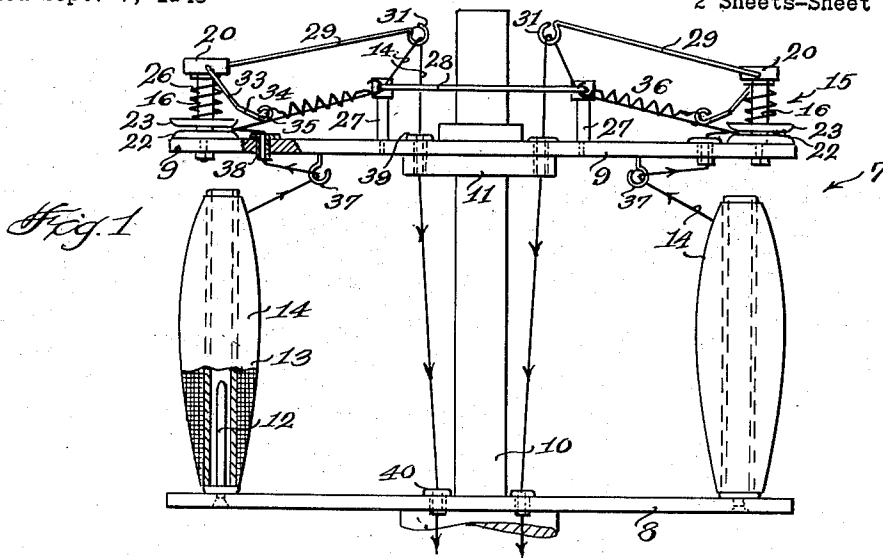
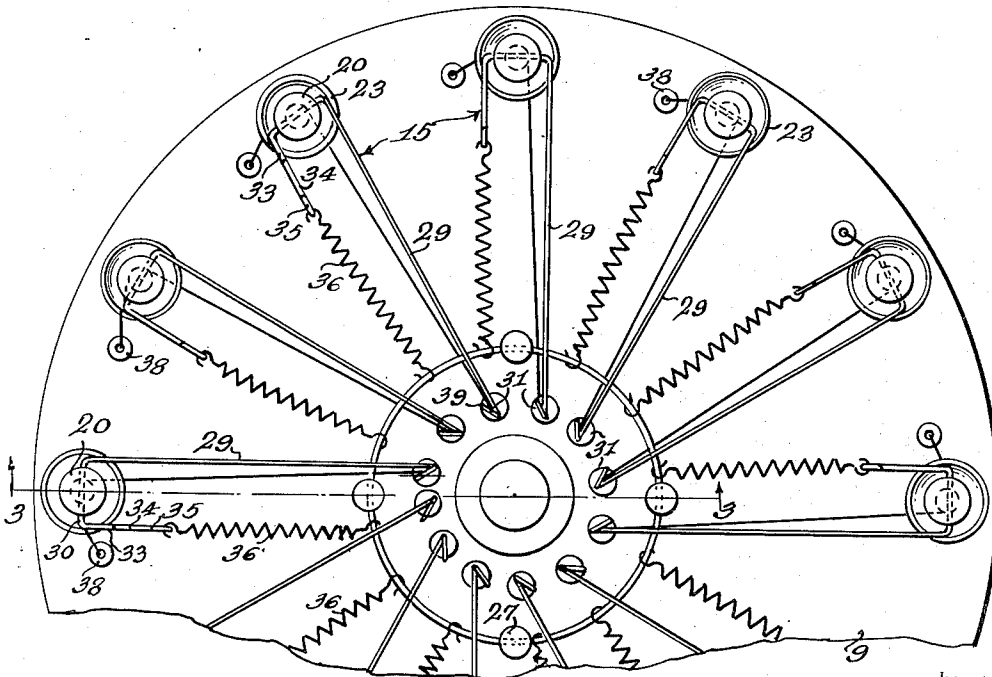
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2,554,286

YARN CONTROLLING AND TENSIONING MECHANISM

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2 Sheets-Sheet 1



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Fig. 2

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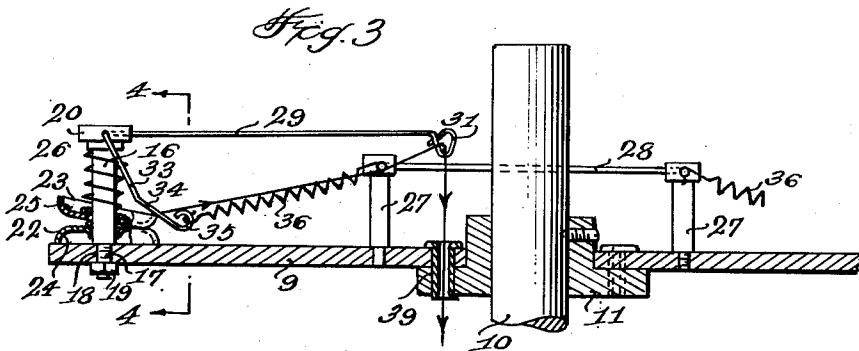
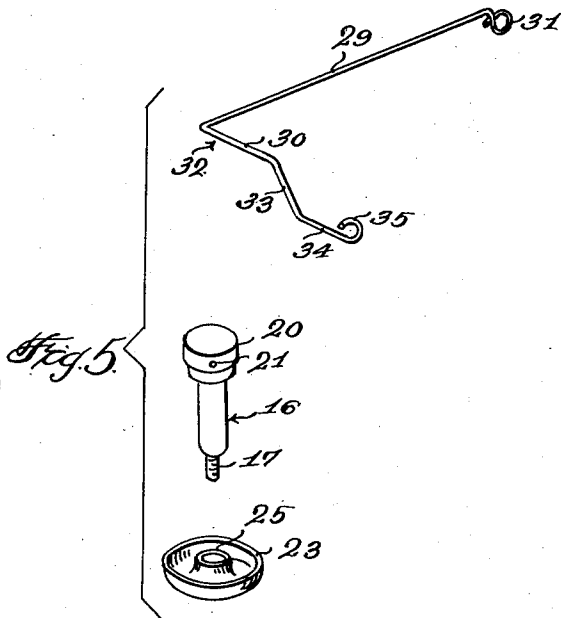
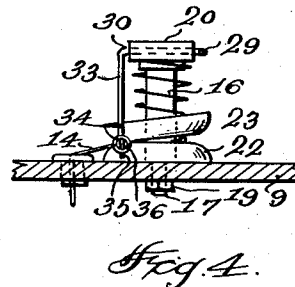
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YARN CONTROLLING AND TENSIONING MECHANISM

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8 Claims. (Cl. 242—150)

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This invention relates to an automatic yarn or thread controlling and tensioning mechanism particularly adapted for use with knitting machines of the rotary type employed for knitting hosiery and which is interposed between the source of supply of the yarn or thread and the position where the thread is engaged by the knitting needles for maintaining a substantially uniform tension on the yarn or thread and to compensate for pull exerted on the thread after it is engaged by a knitting needle which is moving in a circular path.

More particularly, it is a primary object of the present invention to provide a yarn controlling and tensioning mechanism having automatically operated means for releasing gripping elements between which the thread passes and by which it is frictionally engaged to prevent an excess pull being exerted thereon and which might possibly break the thread to thereby provide a control and tensioning device which is adjustable for yarns and threads of different strengths and which will positively prevent an excess pressure from being applied to the yarn sufficient to cause a breakage thereof thus affording a mechanism which will function without possibility of breaking of the thread of yarn, which is common with other mechanisms for controlling the thread and which necessitates the stopping of the knitting machine until the break can be repaired.

Still a further object of the invention is to provide a yarn controlling and tensioning device of extremely simple construction capable of being economically manufactured and sold and which will be very durable and efficient in operation and which is readily capable of being adjusted to adapt it for use with yarns of different strengths.

Various other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, illustrating a preferred embodiment thereof, and wherein:

Figure 1 is a side elevational view of the yarn controlling and tensioning mechanism;

Figure 2 is an enlarged top plan view thereof;

Figure 3 is a diametrical sectional view taken substantially along a plane as indicated by the line 3—3 of Figure 2;

Figure 4 is a sectional view taken substantially along a plane as indicated by the line 4—4 of Figure 3, and

Figure 5 is an exploded perspective view of certain of the parts of the mechanism.

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Referring more specifically to the drawings, the yarn tensioning and controlling mechanism in its entirety is designated generally 7 and is adapted to be mounted above a knitting machine as illustrated in my copending U. S. patent application Serial No. 44,041, filed August 13, 1948, now Patent No. 2,523,460, September 26, 1950 and includes a lower bobbin supporting plate 8 and an upper tensioning and controlling mechanism supporting plate 9. The plates 8 and 9 are mounted one above the other for rotary movement as a unit on a spindle 10 which may be rotatably supported and driven in any suitable manner such as illustrated in my aforementioned co-pending application; the lower plate 8 being secured to the spindle 10 in any suitable manner and the upper plate 9 being secured to a collar 11 which is fixed to an upper portion of the spindle 10.

The lower supporting or bobbin carrier plate 8 is provided with a plurality of spaced upstanding spindles 12 each adapted to rotatably and detachably support a bobbin 13 on which yarn or thread 14 is wound in a conventional manner.

The upper control mechanism supporting plate 9 mounts a plurality of yarn controlling and tensioning mechanisms, comprising corresponding units each designated generally 15 and which project upwardly therefrom and are disposed in circumferentially spaced relationship therearound. The upper supporting plate 9 is provided with an automatic yarn controlling and tensioning unit 15 to function with each of the bobbins 13 and as said units 15 are each of identical construction, a description of one of said units will suffice for all since each unit 15 functions completely independently of each of the other units.

As seen in Figure 2, the units 15 extend generally in a direction radially of the upper plate 9 and each includes a post or standard 16 which is detachably supported on and rises from the plate 9 adjacent the periphery thereof and which is provided with a restricted threaded stem 17 at its shank end, as seen in Figure 3, which extends through an opening 18 in the plate 9 and to the lower end of which is attached a nut 19 for detachably securing the post 16 to the plate 9. The post 16 is provided with an enlarged head 20 at its upper end having a diametrical bore 21 extending therethrough for a purpose which will hereinafter become apparent. Each post 16 supports a pair of yarn gripping elements including a lower disk-like element 22 and an upper disk-like element 23, each of which is dished. The elements 22 and 23 are provided with central in-

wardly flanged openings 24 and 25, respectively for engaging the post 16 upon which the gripping elements 22 and 23 are slidably disposed. The lower gripping element 22 is disposed in an inverted position and with its outer downwardly turned edge normally resting on a portion of the upper surface of the plate 9 and the upper gripping element 23 is disposed with its outer annular flange extending upwardly, so that the substantially flat intermediate portions of the gripping elements 22 and 23 are normally disposed in abutting engagement. As illustrated in Figure 3, the flanged opening 25 of the upper gripping element 23 is somewhat larger in diameter than the post 16 to permit said upper gripping element to be rocked relatively thereto, as seen in Figure 3, for a purpose which will hereinafter become apparent. The post 16 carries an expansion coiled spring 26 thereon between its head 20 and the upper gripping element 23 for normally retaining said gripping elements in substantially parallel relationship, as illustrated in Figure 1.

The upper plate 9 is provided with a series of upstanding posts 27 arranged in a circle around the inner portion thereof which support a yarn guiding ring 28 above the plate 9 and concentrically around the spindle 10; said ring extending through the heads of the posts 27. The yarn guiding ring 28 is common to and functions with each of the units 15.

Each of the units 15 includes a lever 29 forming a part of a relatively heavy gauge strand wire which strand has a shaft portion 30 projecting at substantially a right angle from one end of the lever 29 and which is journaled in the bore 21 of the post 16 of its unit 15 for mounting the lever 29 for vertical swinging movement toward and away from the plate 9. The lever 29 extends inwardly toward the upper end of the spindle 10 and over the guide ring 28 and its inner, free end is bent to provide a downwardly projecting yarn guiding eye 31. The strand of wire, designated generally 32 and including the portions 29, 30 and 31 also includes portions 33 and 34 constituting the opposite end of said strand and which are disposed at obtuse angles to another. The portion 33, which extends from the opposite end of the shaft portion 30 extends downwardly therefrom at an oblique angle, as seen in Figures 1 and 3 and the portion 34 projects downwardly and inwardly from the lower end of the portion 33 and terminating in an eye 35 to which is secured one end of a contractile coiled spring 36 which extends inwardly and upwardly therefrom and the opposite end of which is secured to a portion of the guide ring 28.

The yarn 14 of each bobbin 13 extends through an eye 37 which depends from the supporting plate 9 and thence through an eyelet 38 which extends through the supporting plate 9. From the eyelet 38, the yarn 14 extends outwardly around the post 16 of the tensioning unit 15 by which it is controlled and between the disks 22 and 23 thereof and thence inwardly and under a portion of the guide ring 28 from where the yarn extends upwardly and through the eye 31 of the lever 29 of said tensioning unit 15. From the eye 31, the yarn extends downwardly through an eyelet 39 in the supporting plate 9 and in a portion of the collar 11 and thence downwardly through an eyelet 40 in the lower supporting plate 8 from where the yarn extends on downwardly to a knitting machine, located therebelow, not shown. As best seen in Figure 2, the eyelet 38 of each unit 15 is spaced from the post of said unit

in a counterclockwise direction so that the yarn 14 in passing from the eyelet 38 around the post 16 and between the disks 22 and 23 extends in a direction generally circumferentially of the plate 9. It will be readily apparent that the yarn is frictionally gripped between the gripping elements 22 and 23 by the pressure of the spring 26 so that a considerable pull is required to be exerted thereon to cause the yarn to be fed off of the bobbin 13 and through the tensioning unit 15, as previously described. The eyelet end 31 of the lever 29 is urged upwardly by the pull exerted by the spring 36 on the portions 33 and 34 which tend to cause said portions and the lever 29 to swing upwardly on their pivot on the post 16. In the event that a sudden pull is exerted from the knitting machine on the yarn 14 the lever 29 and portions 33 and 34 will swing downwardly against the action of the spring 36 to permit the yarn to move toward the machine and the normal pressure or pull on the yarn will normally hold the lever 29 in a partially lowered position, as illustrated in Figure 1, so that when the pull on the yarn from the knitting machine diminishes the spring 36 will cause the lever 29 to swing upwardly to maintain the tension on the yarn and to prevent slack. In the event that too great a pull is exerted on the yarn 14 and which would otherwise possibly cause a breakage of the yarn due to the fact that it could not be fed between the gripping elements 22 and 23 at sufficient speed to accommodate this excess pull, the lever 29 will be swung downwardly below its position of Figure 1 by this excess pull and against the action of the spring 36 thereby causing the portion 34 to move into engagement with a portion of the outer upturned edge of the upper gripping element 23, as illustrated in Figures 3 and 4 and between the circumferential portion of said gripping element 23 where the yarn enters and leaves the gripping element so as to rock the gripping element 23 on a portion of the gripping element 22 as a fulcrum and against the action of the spring 26 and between the portions of said elements 22 and 23 which are engaged by the yarn 14 to thereby momentarily release the gripping engagement of the unit 15 with the yarn 14 so that the yarn can pass freely therethrough without being retarded. As the tension on the yarn 14 is thus minimized by this free feeding thereof, the spring 36 will react to swing the lever 29 and portions 33 and 34 upwardly to cause the portion 34 to move out of engagement with the periphery of the gripping element 23 so that the spring 26 can return said gripping element to its normal position of Figure 1 to again combine with the gripping element 22 for frictionally engaging the yarn.

From the foregoing it will be readily apparent that a novel means of extremely simple construction has been provided and whereby the gripping engagement with the yarn may be momentarily removed in response to an excess pull on the yarn to afford a means to positively prevent an excess pull on the yarn and which would cause breakage. By varying the size of either the spring 26 or 36, the amount of pull required to permit the yarn to pass between the gripping elements or to permit the yarn to be released by the gripping elements, respectively, may be varied to adapt the unit 15 to yarns or threads of different strengths.

It will be readily apparent that each of the gripping units 15 will function independently of each of the other units and that any number of

such units may be provided each to function with a bobbin containing yarn for feeding the yarn or thread from the device 7 to a knitting machine, not shown and under control so that substantially a uniform tension will be maintained on the yarn at all times and as it is fed to the machine.

Various modifications and changes are contemplated and may obviously be resorted to, without departing from the spirit or scope of the invention as hereinafter defined by the appended claims.

I claim as my invention:

1. A yarn tensioning and controlling device comprising a post around a portion of which yarn is adapted to be passed, a pair of gripping elements mounted on said post and between which the yarn passes to be gripped thereby, spring means bearing on one of said gripping elements and urging it into engagement with the other gripping element for yieldably gripping the yarn therebetween, said gripping element being mounted for sliding and oscillating movement on the post, a swingably mounted tensioning member supported on said post over which the yarn is adapted to pass from the post, resilient means urging said tensioning member to swing upwardly for exerting a tensioning pull on the yarn, and an arm mounted to swing in unison with said tensioning member and disposed for movement into engagement with said aforementioned gripping element when the tensioning member is drawn downwardly by an excessive pull on the yarn for rocking said aforementioned gripping element on the other gripping element as a fulcrum to displace the first mentioned gripping element out of engagement with the yarn.

2. A yarn tensioning device as in claim 1, said tensioning member comprising a lever swingably supported on the post and having a free end provided with an eye through which the yarn extends and from which the yarn passes in a downward direction, and yarn guide means disposed between the post and the eye of said lever and beneath said lever under which the yarn passes from the post to the lever eye.

3. A yarn tensioning means as in claim 1, a support from which said post rises and on which the last mentioned, lower yarn gripping element is supported, said first mentioned, upper gripping element being substantially dish shaped and having a central opening for loosely engaging the post, and said arm having a portion disposed to bear upon a part of the upturned flanged edge of said upper gripping element when the yarn tensioning member is swung downwardly.

4. A yarn tensioning and controlling mechanism adapted to be interposed between a source of yarn supply and a machine to which the yarn is being fed, comprising a fixed gripping member and a movable gripping member between which the yarn is adapted to pass, a support for said gripping members and on which the movable gripping member is slidably and swingably supported, spring means urging said movable gripping member toward the fixed gripping member for frictionally gripping the yarn therebetween, a tensioning member swingably mounted on said support, resilient means urging the tensioning member in a direction away from that in which the yarn is fed from the tensioning mechanism and over which the yarn is adapted to pass from the gripping members for tension-

ing the yarn being fed from said mechanism, and an element mounted to swing on the support in unison with said tensioning member and disposed for movement into engagement with a portion of the movable gripping member when the tensioning member is swung on its pivot and against the action of said resilient means by an excessive pull on the yarn for rocking the movable gripping member on a portion of the fixed gripping member for displacing said movable gripping member out of engagement with the yarn.

5. A yarn tensioning and controlling mechanism as in claim 4, and guide means for guiding the yarn in its passage into and out of engagement with said gripping members to cause the yarn to be engaged only by portions of the gripping members spaced from the portions thereof on which the movable gripping member is fulcrumed.

6. A yarn tensioning and controlling mechanism as in claim 4, a strand of wire having an intermediate portion journaled in said support and an end portion disposed at an angle to said intermediate portion for swinging movement relatively to the support and forming said tensioning member, the other end of the wire being disposed at an angle to said intermediate portion and to the first mentioned end and forming the element for engagement with the movable gripping member for causing said gripping member to be rocked on the fixed gripping member.

7. A yarn tensioning and controlling mechanism as in claim 4, a strand of wire having an intermediate portion journaled in said support and an end portion disposed at an angle to said intermediate portion for swinging movement relatively to the support and forming said tensioning member, the other end of the wire being disposed at an angle to said intermediate portion and to the first mentioned end and forming the element for engagement with the movable gripping member for causing said gripping member to be rocked on the fixed gripping member, and said resilient means having one end secured to the last mentioned end of said strand for urging said last mentioned end of the strand to swing on the support of the pivot in a direction away from the gripping members.

8. A yarn tensioning and controlling mechanism as in claim 4, and yarn guide means for guiding the yarn in its movement toward the gripping members and in its movement from the gripping members and toward said tensioning member for causing the yarn to be engaged only by portions of said gripping members and spaced from the portions thereof on which the movable gripping member fulcrums.

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