Nov. 19, 1929. W. T. BARRATT 1,736,387

TENSION DEVICE FOR KNITTING MACHINES

Filed Sept. 22, 1928 2 Sheets-Sheet 1

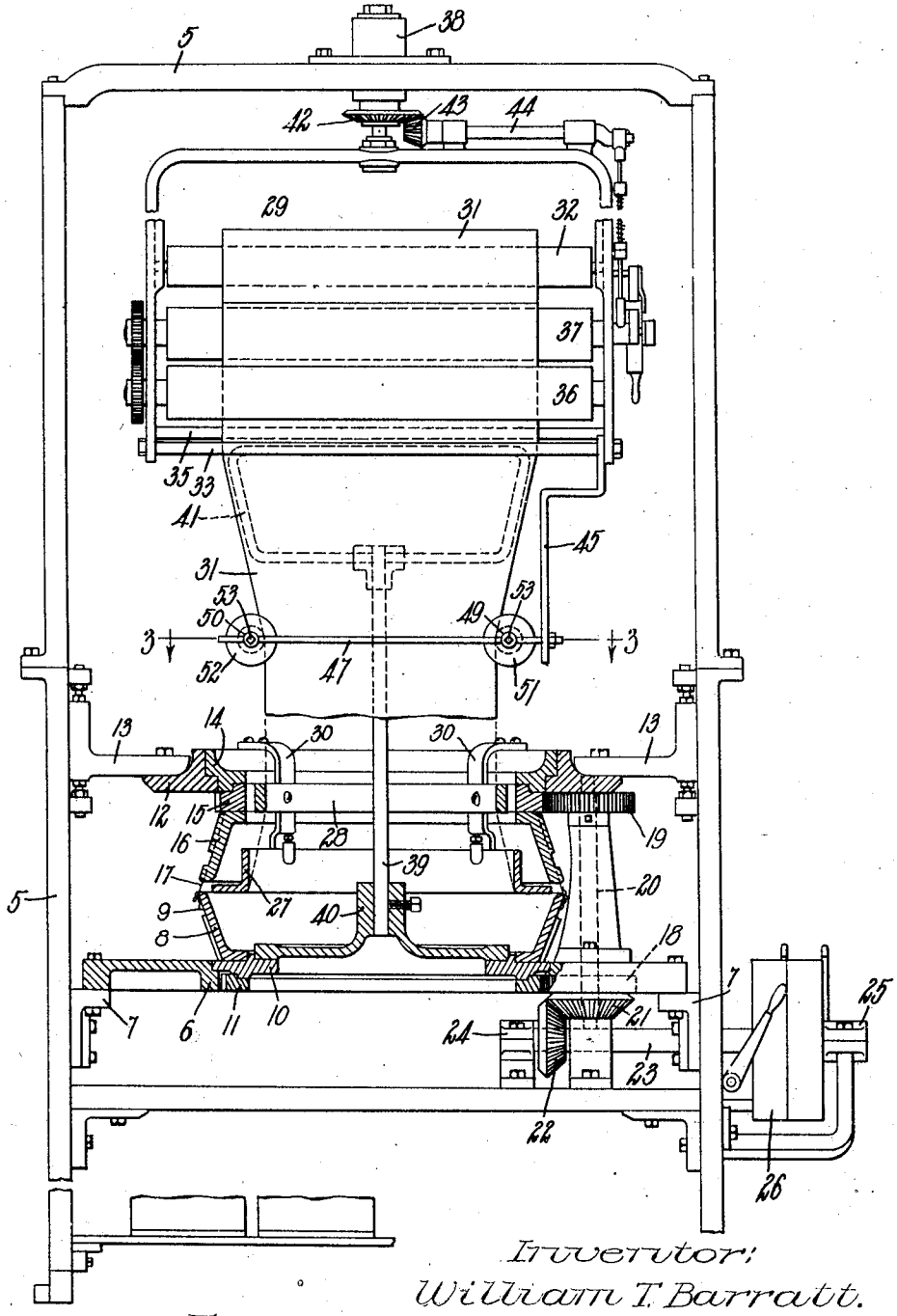


Fig. 1.

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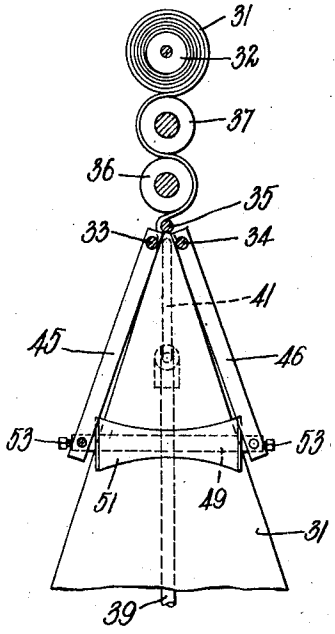


Fig. 2.

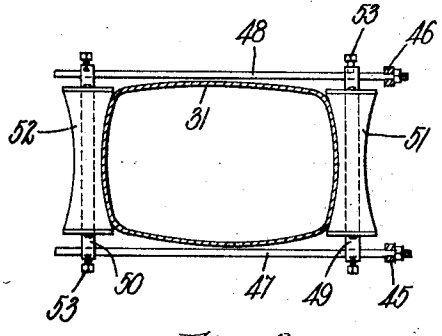


Fig. 3.

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# UNITED STATES PATENT OFFICE

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## TENSION DEVICE FOR KNITTING MACHINES

Application filed September 22, 1928. Serial No. 307,638.

This invention relates to a tension device for knitting machines.

In certain types of circular knitting machines the fabric as it is knit passes from the needles to a take-up mechanism which is provided for the purpose of simultaneously winding up the fabric and maintaining a tension thereon during the knitting operation. In this type of mechanism the fabric, which is tubular in form, passes from the needles upwardly through the interior of a secondary or upper needle cylinder to a pair of take-up rolls located above said upper needle cylinder, and as the distance from the needles to the point where the take-up rolls engage and flatten the fabric tube varies, it is evident that the tension upon the fabric is not uniform; that is, the distance from the needle cylinder to the take-up rolls midway between their ends is greater than the distance from the needle cylinder to the take-up rolls adjacent their ends, and therefore, that portion of the fabric which extends from the needle cylinders to the flattened portion thereof, midway between the ends of the flattened portion of the fabric tube, is greater than the distance from the needle cylinder to the end portions of the fabric tube at the take-up rolls. Consequently, the tension on that portion of the tube midway between the ends of the take-up rolls will be greater than the tension on those portions of the flattened tube which constitute the end portions thereof at the take-up rolls. Ordinarily the thread that is employed is of such a size and the stitch that is formed is of such a character that the fabric will stretch readily and the variation in the tension does not visibly affect the quality or appearance of the fabric. When, however, a fine silk thread is employed the resulting fabric is proportionately fine and the fabric will not stretch to any great extent longitudinally thereof, with the result that the variation in the tension visibly affects the quality and appearance of the fabric.

The object of this invention is to provide a tension device for the type of knitting machine and take-up mechanism mentioned, the device being so constructed that the distance from the needles to the point where the take-up rolls engage the fabric will be approximately the same around the entire surface of the tubular piece of fabric.

The invention consists in a tension device for circular knitting machines as set forth in the following specification and particularly as pointed out in the claims thereof.

Referring to the drawings:

Figure 1 is a front elevation of a circular knitting machine, a portion thereof being broken away and illustrated in section, a tension device embodying my invention being mounted thereon.

Fig. 2 is a detail side elevation of the tension device.

Fig. 3 is a horizontal sectional view as taken on the line 3—3 of Fig. 1.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings, 5 is the frame of the knitting machine and 6 is a lower bed plate which is secured to the frame 5 by brackets 7. Rotatably mounted upon the bed plate 6 is a primary needle cylinder 8 upon which primary needles 9 are mounted in a well-known manner. A running ring 10 is fastened to the primary cylinder 8 and an annular gear 11 is fastened to the ring 10. The primary cylinder 8, ring 10 and gear 11 are all fastened rigidly together to rotate as one piece.

Located a suitable distance above the lower bed plate 6 is an upper bed plate 12 which is adjustably secured to the frame 5 by means of brackets 13. A ring 14 mounted to rotate in the upper bed plate 12 and an annular gear 15 and secondary needle cylinder 16 are rigidly secured to the ring 14 and rotate in unison therewith. Secondary needles 17 are mounted upon the cylinder 16 in a well-known manner.

The primary cylinder 8 and secondary cylinder 16 are rotated in unison by gears 18 and 19 respectively which are rigidly fastened to a vertical shaft 20. A bevel gear 21 is rigidly fastened to the shaft 20 and said gear and shaft are driven by a bevel gear 22 which is rigidly fastened to a main driving shaft 23 journalled in bearings 24 and 25 fastened to the frame 5. The driving shaft 23 is driven by a pulley 26.

The fabric, as it is knit, passes from the needles 9 and 17 through a guide ring 27 and from thence upwardly through a ring 28 to a take-up mechanism 29 which is mounted to rotate about a vertical axis upon a cross member forming a portion of the frame 5. The rings 27 and 28 are rigidly secured to brackets 30 in turn rigidly secured to the upper bed plate 12.

The take-up mechanism 29 may be of any suitable construction well known to those skilled in the art. In the present case fabric 31 is wound upon a roll 32, said fabric first passing between rods 33, 34 and 35 and then between take-up rolls 36 and 37. The entire take-up mechanism is rotated upon its axis within a bearing 38 by means of a take-up drive shaft 39 which is rigidly secured to a member 40 in turn rigidly secured to the primary needle cylinder 8. A cloth spreader 41 is rigidly mounted at the upper end of the shaft 39 and projects between the rods 33 and 34 in such a manner that when the primary needle cylinder 8 rotates, the entire take-up mechanism will be rotated in unison therewith. The tension rolls 36 and 37 are rotated slowly in a well-known manner by means of a stationary gear 42 which meshes with a pinion 43 fastened to a shaft 44 and when the take-up mechanism is rotated by the movement imparted thereto by the primary cylinder 8, the shaft 44 upon being rotated will actuate a mechanism which is operatively connected to said tension rolls, thereby rotating the same together with the fabric roll 32 to wind the fabric upon said fabric roll.

All of the mechanism hereinbefore described is old and well known in the art and the present invention resides in mounting between the primary and secondary needle cylinders and the take-up mechanism 29 a tension device which will so engage the fabric 31 as it passes from the needles to the take-up mechanism that the tension will be substantially the same around the entire circumference of the fabric. This mechanism is as follows:—Mounted upon the rods 33 and 34 and extending downwardly therefrom are brackets 45 and 46 respectively. Rods 47 and 48 are rigidly secured to the brackets 45 and 46 respectively and extend in a horizontal direction from said brackets upon opposite sides of the fabric 31. Adjustably mounted upon the rods 47 and 48 are shafts 49 and 50 upon which rolls 51 and 52 respectively are rotatably mounted. The shafts 49 and 50 are secured to the rods 47 and 48 by set screws 53. The rolls 51 and 52 are located upon opposite sides of the fabric 31, adjacent to the portion of the fabric that is creased as the fabric passes between the take-up rolls 36 and 37 and said rolls may be adjusted toward and away from each other upon the rods 47 and 48 in such a manner that the tension upon the fabric 31 will be substantially the same around the entire surface of the fabric.

The peripheries of the rolls 31 and 32 are preferably concave as illustrated in the drawings, but if it is so desired, said rolls may be cylindrical in form. In either event the result will be substantially the same.

In the knitting machine hereinbefore described, the distance from the take-up roll 36 to the needles or to the guide ring 28 is greater when measured from the take-up roll 36 midway between its ends to the needles than between the end portions of the take-up roll 36 to the ring 28 or to the needles, therefore if the tension on the fabric is correct on that portion extending midway between the ends of the take-up roll 36 to the guide ring 28 or to the needles, the portions of the tube extending upwardly from the needles to the end portions of the roll 36 will be slack, and it is the object of this invention to take up such slack so that the tension will be approximately the same throughout the entire circumference or perimeter of the fabric tube.

It will be evident that by means of the rolls 51 and 52 the slack in the fabric tube referred to can be taken up. The rolls 51 and 52 may be so adjusted with reference to the fabric tube as to determine the transverse contour or perimeter of the tube between the needle cylinder and the take-up rolls. Also the length of the fabric tube from the needle cylinder to the take-up rolls at certain portions thereof, namely those portions which are in contact with said rolls 51 and 52, may be regulated and consequently the tension on that portion of the fabric tube may be regulated. It will also be evident that the direction of feed of those portions of the fabric tube which are in contact with said rolls from the needle cylinder to the take-up rolls may be determined.

I claim:

1. A tension device for a tube of knitted fabric comprising, in combination, a support adapted to be attached to a knitting machine, and a plurality of rolls rotatably mounted upon said support and engaging the fabric tube to decrease the distance between the opposite sides thereof and equalize the tension thereon.

2. In a circular knitting machine, the combination with a needle cylinder and needles thereon of a take-up mechanism for the knitted fabric, whereby the fabric tube is flattened, and rolls having concave peripheries engaging the oppositely disposed sides of the fabric tube which embody the end portions of the flattened tube at said take-up mechanism whereby the tension thereon may be regulated.

3. A circular knitting machine having, in combination, a needle cylinder and needles, a take-up device, whereby the fabric tube is

flattened, and means contacting with oppositely disposed portions of the outer face of a tube of fabric extending from said cylinder to the take-up, and which oppositely disposed portions embody the end portions of the flattened tube at said take-up device, whereby the transverse contour of said tube between the cylinder and take-up may be determined.

4. A circular knitting machine having, in combination, a needle cylinder and needles, a pair of take-up rolls, whereby the fabric tube is flattened and means contacting with oppositely disposed portions of the outer face of a tube of fabric extending from said cylinder to the take-up rolls, which portions embody the end portions of the flattened tube at said take-up rolls, whereby the perimeter of said tube between the cylinder and take-up rolls may be determined.

5. A circular knitting machine having, in combination, a needle cylinder and needles, a pair of take-up rolls, whereby the fabric tube is flattened and means contacting with oppositely disposed portions of the outer face of a tube of fabric extending from said cylinder to the take-up rolls, which portions embody the end portions of the flattened tube at said take-up rolls, whereby the length from said cylinder to the take-up rolls of those portions of said tube which are in contact with said means may be regulated.

6. A circular knitting machine having, in combination, a needle cylinder and needles, a pair of take-up rolls, whereby the fabric tube is flattened and means contacting with oppositely disposed portions of the outer face of a tube of fabric extending from said cylinder to the take-up rolls, which oppositely disposed portions embody the end portions of the flattened tube at said take-up rolls, whereby the tension on that portion of the fabric which is in contact with said means may be regulated.

7. A circular knitting machine having, in combination, a needle cylinder and needles, a pair of take-up rolls, whereby the fabric tube is flattened and means contacting with oppositely disposed portions of the outer face of a tube of fabric extending from said cylinder to the take-up rolls, which portions embody the end portions of the flattened tube at said take-up rolls, whereby the direction of feed from said cylinder to the take-up rolls of those portions of the fabric which are in contact with said means may be determined.

8. A circular knitting machine having, in combination, a needle cylinder and needles thereon, a take-up mechanism for the knitted fabric, and a plurality of rolls extending transversely of the take-up mechanism and positioned between the needles and take-up mechanism and engaging the fabric tube to force the opposite sides thereof toward each other, whereby the tension thereon may be determined.

9. A circular knitting machine having, in combination, a needle cylinder and needles, a take-up mechanism for the knitted fabric, a support positioned adjacent to the fabric and between the needles, and the take-up mechanism, and rolls extending transversely of the take-up mechanism adjustably mounted upon said support and engaging oppositely disposed sides of the fabric tube, whereby the tension thereon may be equalized.

10. A circular knitting machine having, in combination, a needle cylinder and needles, a take-up mechanism for the knitted fabric tube embodying therein a pair of take-up rolls, a support rotatable in unison with said take-up mechanism and positioned between the take-up mechanism and the needle cylinder, and a plurality of rolls mounted upon said support and extending transversely of the take-up mechanism and engaging oppositely disposed faces of the fabric tube, whereby the tension thereon may be regulated.

11. In a circular knitting machine the combination with a needle cylinder and needles thereon of a take-up mechanism for the knitted fabric, whereby the fabric tube is flattened, and means interposed between the needles and take-up mechanism to engage the oppositely disposed portions of the outer face of the fabric tube which embody the end portions of the flattened tube at said take-up mechanism, whereby the tension on said portions may be determined.

12. In a circular knitting machine the combination with a needle cylinder and needles thereon of a take-up mechanism for the knitted fabric, whereby the fabric tube is flattened, and a plurality of rolls positioned between the needles and take-up mechanism and engaging the fabric tube to force the opposite sides thereof, which embody the end portions of the flattened tube at said take-up mechanism, toward each other, whereby the tension on said portions may be determined.

13. In a circular knitting machine the combination with a needle cylinder and needles thereon of a take-up mechanism for the knitted fabric, whereby the fabric tube is flattened, a support positioned adjacent to the fabric, and rolls adjustably mounted upon said support and engaging oppositely disposed sides of the fabric tube, which embody the end portions of the flattened tube at said take-up mechanism, to equalize the tension thereon.

14. In a circular knitting machine the combination with a needle cylinder and needles thereon of a take-up mechanism for the knitted fabric, whereby the fabric tube is flattened, a support rotatable in unison with

said take-up mechanism, and a plurality of rolls mounted upon said support and engaging oppositely disposed portions of the outer face of the fabric tube, which portions embody the end portions of the flattened tube at said take-up mechanism, whereby the tension on said portions may be regulated.

In testimony whereof I have hereunto set my hand.

WILLIAM T. BARRATT.