Jan. 13, 1942. O. H. PONS 2,269,550

YARN TENSIONING DEVICE

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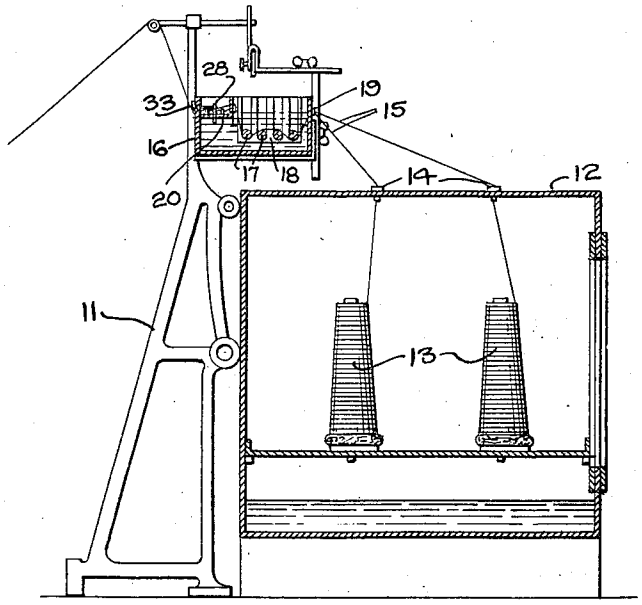


Fig. 1.

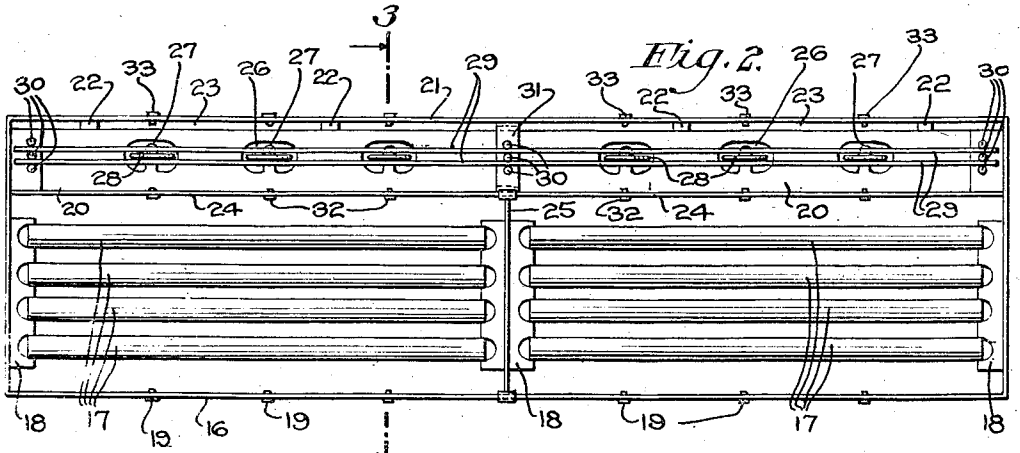


Fig. 2.

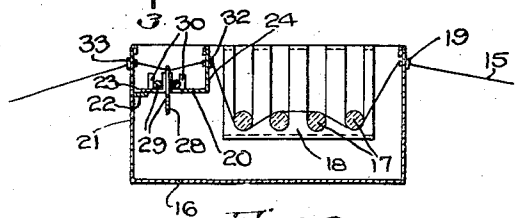


Fig. 3.

Inventor

ONESIME HENRY PONS

By Leon Edelson

Attorney.

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Fig. 4.

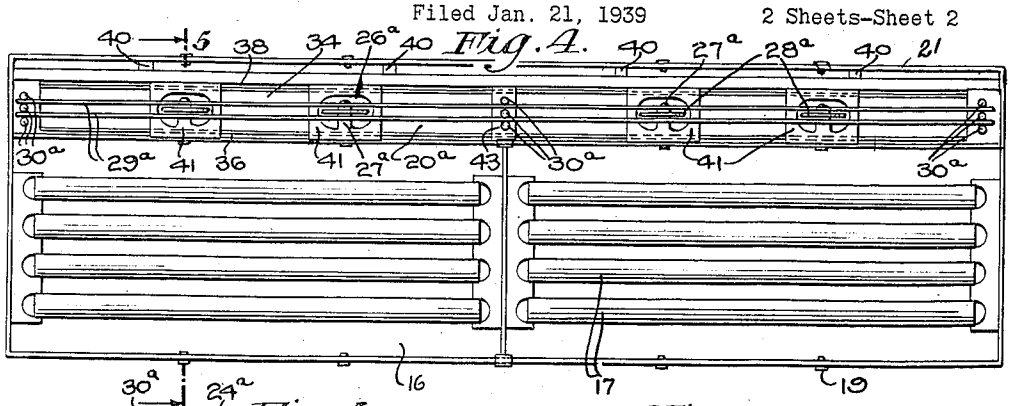


Fig. 5.

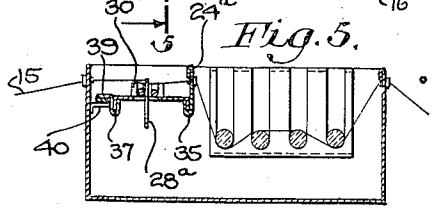


Fig. 7.

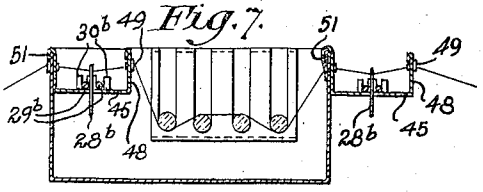


Fig. 6.

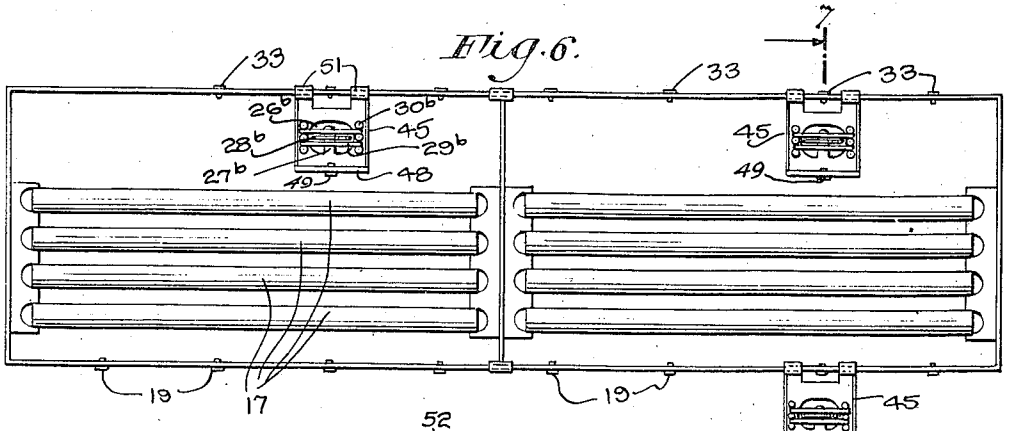


Fig. 8.

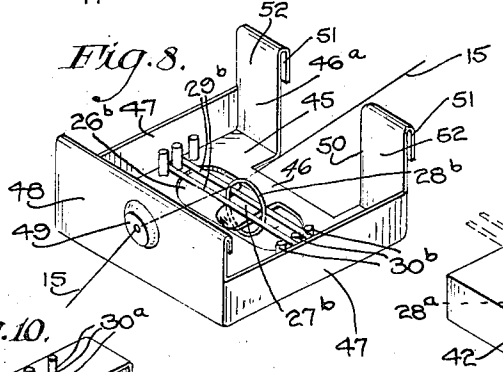


Fig. 9.

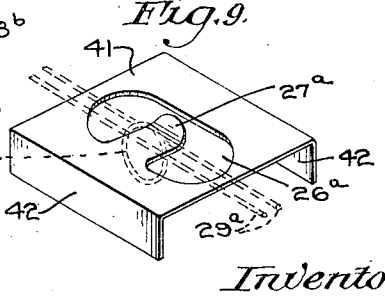
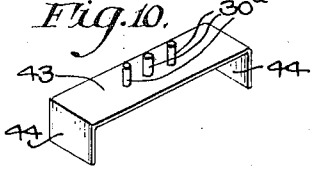


Fig. 10.



Inventor
ONESIME HENRY PONS
By Leon Edelson
Attorney.

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YARN TENSIONING DEVICE

Onesime Henry Pons, Valdese, N. C.

Application January 21, 1939, Serial No. 252,108

4 Claims. (Cl. 66—146)

This invention relates to the art of knitting machinery and more particularly to the art of yarn tension devices to be used on machines in the process of knitting to maintain the proper amount of knitting tension upon the yarn or yarns as they travel from the source of supply to the needles.

It is an object of this invention to provide positive yarn tension devices in which with respect to an allocated line of yarn travel or path, a yarn tensioning weight operatively related to the yarn is maintained against any substantial movement in the direction of the yarn path or travel while still permitting a certain limited movement of the yarn tensioning weight at substantially right angles to the yarn path or travel to supply tension to the yarn.

It is a further object of this invention to provide one or more positive yarn tension devices arranged in a straight line series within the wetting agent trough of a straight bar knitting machine. It is a still further object of this invention to provide one or more positive yarn tension devices adjustable lengthwise of the straight bar knitting machine.

Other objects and advantages of the invention will appear more fully herein.

The invention consists substantially in the combination, construction and relative arrangement of parts, all as will appear more fully hereinafter, as shown in the accompanying drawings and as finally pointed out in the appended claims.

In the accompanying drawings, wherein have been illustrated preferred embodiments of the present invention:

Figure 1 is a cross-sectional view of the upper rear frame of a straight bar full fashioned knitting machine with the first modification of the invention in place;

Figure 2 is a plan view of the wetting trough of Figure 1 with the first modification of the yarn tension device in place therein;

Figure 3 is a sectional view on line 3—3 of Figure 2 looking in the direction of the arrows;

Figure 4 is a plan view similar to Figure 2 showing a second modified form of the invention;

Figure 5 is a sectional view on line 5—5 of Figure 4 looking in the direction of the arrows;

Figure 6 is a plan view similar to Figure 2 showing a third modified form of the invention;

Figure 7 is a sectional view on lines 7—7 of Figure 6 looking in the direction of the arrows;

Figure 8 is a perspective view of the third modified form of the invention;

Figure 9 is a perspective view of a detail of the second modified form of the invention shown in Figure 4; and

Figure 10 is a perspective view of a detail of the second modified form of the invention shown in Figure 4.

Referring now to the drawings and more particularly to Figures 1, 2 and 3 thereof, in which the first modification of the invention is illustrated in position on a full fashioned knitting machine, the upper rear frame of the machine is designated by the reference numeral 11 on which is supported the usual yarn conditioning or humidifying chamber 12 in which one or more cones of yarn 13 are supported. The chamber 12 extends longitudinally of the machine to accommodate a plurality of yarn cones, the number varying according to the requirements of the product then being knitted.

The yarns from the cones pass upwardly from the chamber 12 passing through the porcelain guide eyes 14, and as shown at 15, pass to the usual open faced wetting trough or box 16, also extending longitudinally of the machine and supported by the frame 11 of the full fashioned knitting machine. The box 16 has two series of glass rods 17, here shown as numbering four in each series, supported for vertical movement in the supports 18 which have slots within which the rods 17 may move vertically. The rods 17 are supported by the brackets 18 adjacent to the bottom of the box 16 and may be completely immersed in any suitable liquid wetting agent contained in the box 16 as is shown in Figure 1.

The yarns 15 passing through the porcelain guide eyes 19 in the box 16 over and under the rods 17, as shown in Figure 3, are thus caused to travel through the liquid bath on their way to the needles of the machine. The particular wetting agent used forms no part of the present invention and therefore need not be identified so far as the chemical composition thereof is concerned, however it is to be noted that the present yarn tension device is located closely adjacent to the point at which the yarn emerges from the bath. Thus, the yarn may pass through the tension device while still in a somewhat wet state and the tension device is so located with respect to the bath that excess liquid draining from the yarn in the tension device will drain back into the bath.

The tension device comprises the longitudinally extending box-like structure 20 of suitable metal, extending over the same length of the knitting machine as covered by the box 16, and supported in and by the box 16 at the upper edge and to one side thereof adjacent the wall 21 of the box 16. The base of the box 20 is fastened to and spaced at intervals along the wall 21, the space being shown at 23. The ends of the box 20 are secured to and supported by the ends of the box 16, and the side 24 of the box 20 may be additionally supported by the

member 25 which is the normal intermediate support of the rod supporting structures 18.

At spaced apart intervals along the length of the box 20, the intervals depending upon the number of yarns desired to be accommodated and here shown as six, there are provided the U-shaped cut outs 26 with the tongues 27, comprising the uncut portion extending between the walls of the U-shaped cut, extending crosswise of the box 20. Supported by the tongues 27 are the rings 28 of any suitable material, such as a plastic or a metal, and of a weight sufficient to give the proper amount of tension to the yarn 15, which passes through the ring, as will be described. It is to be noted that the rings 28, by virtue of the tongues 27 extending inside them, are prevented from moving any substantial distance in the lengthwise direction of the box 20. However, the walls of the U-shaped cut outs 26 are of sufficient width so that the rings 28 have plenty of room for play and are thus loosely retained on the tongues 27 and are capable of a certain amount of vertical movement limited by the size of the ring for a purpose to be described.

In order to retain the rings 28 on the tongues 27, the two longitudinal rods 29, 29 are provided to be positioned one on each side of the rings 28 and parallel thereto, the rods 29 being retained in this position by means of the three upstanding vertical pins 30, at each end and at the center of the box 20, the pins 30 at the center being in the nature of auxiliary means to retain the rods 29, 29 in their proper relation to the rings 28. The pins 30 at each end are supported by the base of the box 20, whereas the pins 30 at the center are supported by the strip 31 fastened to the wall 21 and the support 25 of the box 16, although it is obvious that the strip 31 may be supported by the box 20. In fact, the strip 31 may be entirely eliminated and the pins 30 at the center supported by the base of the box 20. It will be noted that the rods 29, 29 being on each side of the rings 28, prevent the movement of the rings 28 along the tongues 27, although sufficient room is provided between the rods and the rings 28 for the latter to move freely in a vertical direction between the rods 29, 29.

The yarns 15, upon leaving the chamber 12, pass to the box 16 where they enter by passing through the porcelain guide eyes 19, and then pass under and over the rods 17 and through the guide eyes 32 in the wall 24 of the box 20, thus passing through the yarn bath provided in the bottom of the box 16. The yarns upon entering the box 20 pass through the rings 28 and then pass out of the box through the guide eyes 33 and continue on to the needles of the knitting machine in the usual manner. It will be noted that the invention provides a tension for and upon the yarns at a point closely adjacent to the point at which they emerge from the yarn bath and while the yarns are in still a wet state. This has proven to be very advantageous in that the knitting action on the yarns has been improved and there is less trouble in feeding the yarns to the needles. The yarns are kept straight and are not allowed to become curled, the action of the rings 28 in part aiding in removing excess liquid from the yarns at a point where the liquid may drain back into the source thereof, namely the yarn bath.

It is to be noted that the level of the guide eyes 32 and 33 is above the level of the top of the rods 29, 29 and therefore since the yarns pass over the rods 29, 29 and through the rings 28, the rings can drop between and downwardly as required to the level of the rods 29, 29 to provide the tension on the yarns. The rings 28 are prevented from dropping below the level of the rods 29, 29 by virtue of the yarns passing through the same and over the rods and by virtue of the small amount of clearance between the rods 29, 29 and the rings 28.

Referring now to Figures 4, 5, 9 and 10, a second modification of the invention will be described. Whereas, the first modification of Figures 1, 2 and 3 provided a series of tensioning devices at fixed intervals along the machine, the second modification now to be described also provides a series of tensioning devices along the machine, not at fixed intervals however, but capable of being adjusted as required along the machine length for various positions of the yarn cones in the conditioning chamber.

The essential structural difference in the second modification of Figures 4, 5, 9 and 10 over the first modification of Figures 1, 2 and 3 is that whereas in the first modification the box or support 20 has a solid bottom except for the U-shaped cut outs, the support 20^a of the second modification has no bottom at all, this being eliminated from the support as shown at 34. The support 20^a is supported within the trough 16 by means similar to the supporting means of the first modification. The support 20^a has the wall member 24^a, the lower end of which is reversely bent, as at 35, Figure 5, to provide a groove extending along the entire length of the support, this groove being shown at 36, Figure 4, for a purpose to be described. The longitudinal side of the support 20^a opposite the wall 24^a is also reversely bent, as at 37, Figure 5, providing a second groove 38, Figure 4, on the other side of the support 20^a. The reversely bent member 37 is an extension of the flat side member 39 of the support 20^a, the tabs 40 supporting the side 39 of the support 20^a in a manner similar to the tabs 22 of the first modification. The two grooves 36 and 38 extend for the full length of the support 20^a and thus provide means within which individual tension devices, to be described, may be placed and moved to any point along the length of the machine.

The individual tension devices of the second modification will now be described. Referring to Figure 9, there is the rectangular shaped member 41 wide enough to extend across the support 20^a from groove to groove, Figure 4, with the depending side pieces 42, 42 which are adapted to be received within the grooves 36 and 38 and thus slide along the support 20^a. Cut out in the top of member 41 is the U-shaped opening 26^a similar to the opening 26 of the first modification. Shown in dotted lines in Figure 9 on the tongue 27^a is a ring 28^a similar to the ring 28, and at 29^a, 29^a are the rods similar to rods 29, 29 of the first modification.

In Figure 4 the rods 29^a, 29^a are shown in position and retained there by means of the pins 30^a, all in a manner similar to Figure 1. The auxiliary center support for the rods 29^a, 29^a is shown in perspective in Figure 10 and comprises the cross member 43 long enoough to fit across the support 20^a, from groove to groove, and having the depending side members 44, 44 which also are adapted to be received within the grooves 36 and 38 and thus slide along the box 20^a. Secured to the top of the member 43 are three upstanding pins 30^a which act in the manner described to retain the rods 29^a, 29^a in spaced

parallel condition on either side of the rings 28a. It is to be noted in this second modification that the tensioning action between the rings 28a and the rods 29a, 29a is identical with that of the first modification of Figures 1, 2 and 3, and that the essential difference is that whereas the ring and tongue were fixed in the support bottom in the first modification, the ring and tongue in the second modification are formed in the movable members 41 which may be moved lengthwise of the machine along the grooves 36 and 38.

Guide eyes are provided at a plurality of intervals along the wall 21 of the box 16 and along the wall 24a of the support 20a, so that wherever the movable tension unit 41 is positioned, there will be suitable guide eyes for the yarns in the fixed portions of the structure. The action of the tension device and the yarn in the second modification, and in the third modification to be described, is identical with that of the first modification, and therefore need not be again described. One or more movable rod supporting members 43 may be provided to accurately position the rods 29a, 29a and these members 43 may be moved along the grooves 36 and 38 to any desired position.

A third modification of the invention is shown in Figures 6, 7 and 8, in which individual tension devices 45 are each contained within a separate support, the support being adjustable lengthwise of the machine. This modification does not provide fixed tension supports similar to the supports 20 and 20a of the first and second modification respectively along the entire length of the machine section, but provides single removable tension support units which may be placed in position where needed, in cases where the long boxes are not necessary.

The perspective view of Figure 8 shows the tension support unit, designated generally by the numeral 45, and comprising a box having a base 46 in which a U-shaped cut out 26b is provided, similar to the cut outs 26 and 26a of the other modifications and having the tongue member 27b upon which the ring 28b is supported in a position to take the yarn 15. The tongue 27b prevents the ring 28b from moving any substantial distance at right angles to the yarn 15 and it also supports the ring 28b in the absence of a yarn. Provided on the base 46 are the two series (three in each series) of upstanding pins 30b, each series placed beyond the opening 26b and parallel to the side members 47, 47 of the support 45. The pins 30b act to retain the short rods 29b, 29b in parallel position, one on each side of the ring 28b, for the purpose of preventing movement of the ring 28b in the direction of the yarn movement. The rods 29b, 29b also limit the movement of the ring 28b downwardly when a yarn, such as 15, passes through the ring 28b and is in a slack condition. The front wall of the support 45 is shown at 48 having the porcelain yarn guide eye 49 through which the yarn, such as 15, is threaded. The opposite wall 46a of the box 45 is cut out, as at 50, to allow the box to be placed in position on the wall 21 of the trough 16 by means of the inverted U-shaped members 51, 51 of the separated side members 52, 52 of the box 45. A plurality of yarn guide eyes 33 and 19 are provided in the trough 16 and the yarns are threaded through a guide eye 19, through a guide eye 49 on a support unit 45 and then through a guide eye 33 and on to the needles of the machine. Since the tension support unit 45 is a separate readily movable unit easily secured in position upon any upstanding wall or similar member, it is obvious that the units 45 may be placed on the machine wherever it is desired to place tension upon a traveling yarn, and this need not necessarily be only on the yarn as it emerges from the yarn bath, but may be at other places as well, either alone or in conjunction with such use near the yarn bath. For example, as shown in Figures 6 and 7 units 45 are placed on the trough 16 so that the yarn passes through a unit 45 prior to entering the yarn bath and is tensioned thereby and is also tensioned by a second unit 45 placed to receive the yarn after it emerges from the yarn bath.

What is claimed as new and useful is:

1. In a tension device for a full fashioned knitting machine, a yarn conditioning trough, a tensioning unit associated with said trough and providing with the latter a pair of laterally spaced upstanding walls, a plurality of yarn guide eyes in each of said upstanding walls adapted to guide one or more yarns entering and leaving said tensioning unit in paths extending from wall to wall of said unit, said unit having one or more U-shaped openings in the base thereof providing one or more tongues extending into said base openings, individual ring members loosely mounted on each tongue, each of said yarns passing through a ring in said path, and means to retain each ring from movement in the direction of the yarn.

2. In a tension device for a full fashioned knitting machine, a yarn conditioning trough, a tensioning unit associated with said trough and providing with the latter a pair of laterally spaced upstanding walls, a plurality of yarn guide eyes in each of said upstanding walls adapted to guide one or more yarns entering and leaving said tensioning unit in paths extending from wall to wall of said unit, said unit having one or more U-shaped openings in the base thereof providing one or more tongues extending into said base openings, individual ring members loosely mounted on each tongue, each of said yarns passing through a ring in said path, and a pair of longitudinally extending rods parallel to each other and to said walls, one rod being disposed on each side of said ring members to retain said ring members from movement in the direction of the yarn.

3. As an attachment for a yarn conditioning trough, a yarn tensioning device comprising a base member perforated to provide a freely extending tongue disposed substantially in the plane of said base member, a yarn tensioning ring loosely supported upon said tongue and adapted to impose tension upon a yarn passing through said ring at an elevation above the plane of said base member, and means associated with said base member for restraining movement of said yarn tensioning ring in a direction lengthwise of said yarn while permitting limited movement in a direction laterally of said yarn.

4. As an attachment for a yarn conditioning trough, a yarn tensioning device of the character defined in claim 3 wherein the means for limiting the movement of said yarn tensioning ring consists of a pair of parallel rods disposed respectively upon each side of said ring and extending substantially at right angles to the length of the yarn projected through said ring, said rods being supported in closely adjacent relation immediately above said base member.

ONESIME HENRY PONS.