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YARN FEEDING SYSTEM FOR CIRCULAR MULTIFEED KNITTING MACHINES

Filed June 8, 1965

FIG. 1.

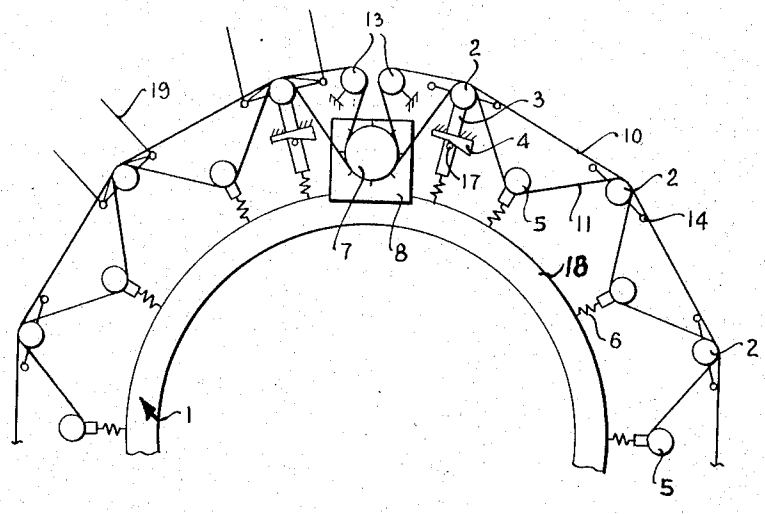


FIG. 2.

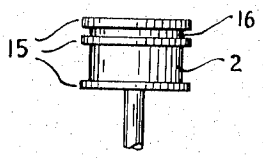
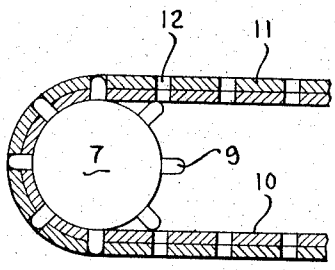


FIG. 3.



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YARN FEEDING SYSTEM FOR CIRCULAR MULTIFEED KNITTING MACHINES

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ABSTRACT OF THE DISCLOSURE

A yarn feeding system for feeding a plurality of yarns to a plurality of outputs. Guide rollers are mounted on a frame. A pair of adjacent feed belts is positioned on the guide rollers around the frame. Yarn guides are arranged for supplying yarn to and from a position between the adjacent feed belts at the guide rollers. Drive means drive the belts in a predetermined direction to thereby transport the yarn to a predetermined number of outputs.

The present invention relates to a yarn feeding system for circular multifieed knitting machines. More particularly, the invention relates to a yarn feeding system for circular multifeed knitting machines, which yarn feeding system provides either constant or slippage feeding of yarn.

Known constant yarn feeding systems include an endless belt positioned on rollers on the circumference or peripheral area of the machine. The belt is driven by the machine. Yarns are guided by guides between the belt and the rollers. The yarns are fed into the knitting machinery by the force of pressure between the rollers and the belt. Such known systems operate properly when yarns of high quality are fed. However, the rollers may become relatively angularly displaced relative to the belt due to the inertial mass of the rollers during starting and stopping of the machine. This is likely to damage or break the yarn, especially when the yarn is of lower quality. If the yarn breaks, it winds itself around the rollers and is very difficult to remove. This creates a considerable delay in operation of the knitting machine.

In another known yarn feeding system, the belt is replaced by a disc having a large diameter. The disc is driven by the machine and the rollers are yieldably or elastically pressed against the disc. The yarn is fed to the knitting machinery by the force of pressure between the disc and the rollers. In this system, as in the other, the rollers may become relatively angularly displaced relative to the disc due to the inertial mass of the rollers during the starting and stopping of the machine. This is likely to damage or break the yarn, especially when the yarn is of lower quality, and the broken yarn winds itself around the rollers with the attendant difficulties.

Another difficulty inherent in these systems is that the elastic covers of the rollers are ridged or grooved by the yarn and by friction. The ridges or grooves in the roller covers change the quantity of the yarns fed to the knitting machine and varies the constant feeding characteristic of the system. Furthermore, rapid wear of the rollers makes constant feeding of the yarns practically impossible, when synthetic yarns are fed. Also, a considerable amount of impurities such as, for example, fly, collects on the surface of the rollers and it is necessary to remove such impurities by brushing or scraping, for example.

The principal object of the present invention is to provide a new and improved yarn feeding system for circular multifeed knitting machines.

In accordance with the present invention, a yarn feeding system for feeding a plurality of yarns to a plurality of outputs comprises a substantially circular frame. A plurality of guide rollers are mounted on the frame in substantially equiangular spaced relation. A pair of adjacent

feed belts are positioned on the guide rollers around the frame. A yarn guide supplies yarn to a position between the adjacent feed belts at each of the guide rollers. The feed belts are driven in a determined direction to transport the yarns to a determined number of outputs.

The yarn feeding system of the present invention avoids the difficulties of the known systems.

In order that the present invention may be readily carried into effect, it will now be described with reference to the accompanying drawing, wherein:

FIG. 1 is a view of a part of an embodiment of the yarn feeding system of the present invention;

FIG. 2 is a view of the guide roller of the embodiment of FIG. 1; and

FIG. 3 is a view, partly in section, of a part of the embodiment of FIG. 1, on enlarged scale.

In the figures, the same components are identified by the same reference numerals.

In FIG. 1, the knitting machine **1** has a frame **18**. A plurality of guide rollers **2** are mounted on the frame **18** for yieldability or resiliency in the radially outward direction. That is, each guide roller **2** is resiliently mounted for movement in a radially outward direction. Each of the guide rollers is mounted on a corresponding holder **3** by any suitable mounting arrangement, only two holders **3** being illustrated in order to maintain the clarity of illustration. Each of the holders **3** is adjustable in position in a radial direction on the frame **18** by a corresponding wedge **4**, only two wedges being illustrated in order to maintain the clarity of illustration. Each of the wedges **4** is movably mounted on the frame **18** in a manner whereby it may be moved in a direction perpendicular to the corresponding holder **3** and in which it is engaged with a projection **17** on said corresponding holder, so that the wedges **4** function to adjust the guide rollers **2** in radial directions. Only two projections **17** are illustrated in order to maintain the clarity of illustration.

A plurality of tension rollers **5** are mounted on the frame **18**. Each of the tension rollers **5** is positioned between a pair of corresponding guide rollers **2**, each tension roller being positioned closer to the axial center of the knitting machine **1** than the guide rollers. Each tension roller **5** is spring-mounted by means of a spring **6** which urges the corresponding tension roller toward the axial center of the knitting machine. The guide rollers **2** are equiangularly spaced from each other and the tension rollers **5** are equiangularly spaced from each other, the guide and tension rollers being equiangularly spaced from each other.

A pulley or drive wheel **7** is mounted on the shaft of a control unit **8** which may comprise, for example, a gear box driven by the unit (not shown) which drives the knitting machine. The drive wheel **7** is positioned substantially coplanarly with the guide rollers **2** and the tension rollers **5**. A plurality of equiangularly spaced pins **9** (FIG. 3) extend radially from the peripheral area of the drive wheel **7**.

A pair of adjacent feed belts **10** and **11** are positioned on a portion of the peripheral area of the drive wheel **7**. Each of the feed belts **10** and **11** has a plurality of substantially linearly extending holes **12** formed through it along its length. The holes **12** are equally spaced from each other and are of the same distance from each other as the pins **9** of the drive wheel **7**, so that said pins extend through said holes and said drive wheel functions to drive the feed belts **10** and **11**.

A pair of spaced retaining rollers **13** are positioned and mounted in the area of the drive wheel **7** between and spaced from the two guide rollers **2** closest to said drive wheel. The feed belts **10** and **11** are both driven by the drive wheel **7**, but the feed belt **10** is positioned on the retaining rollers **13** and the guide rollers **2** and is driven

around said retaining and guide rollers. The feed belt **11** is positioned on the guide rollers **2** and the tension rollers **5** and is driven around said guide and tension rollers. The feed belt **11** abuts each of the guide and tension rollers and the feed belt **10** abuts the feed belt **11**, so that the feed belt **11** is between the feed belt **10** and each of the guide rollers **2**.

Yarn guiding devices **14** such as, for example, porcelain guides, are positioned on the sides of each of the guide rollers **2** adjacent thereto and to the lateral edges of the belts **10** and **11**. The yarn guiding devices **14** function to guide yarn **19** inwardly towards the lateral edges and between the feed belts **10** and **11** at each of the corresponding guide rollers **2**, and may be mounted on the corresponding holders **3**. Each guide roller **2** has a plurality of radially extending spaced lips or collars **15** (FIG. 2) which function to keep the feed belts **10** and **11** from slipping off the guide rollers. The adjacent pair of end collars **15** form a peripheral area (FIG. 2) **16** between them which functions to feed yarn **19** by slippage.

The feed belts **10** and **11** may be made of leather, plastic material or any suitable material. During operation of the machine, the feed belts **10** and **11** are driven by the drive wheel **7**, via the pins **9** and the holes **12**, at the same speed and in the same direction.

Yarns **19** are supplied, from bobbins, for example, which are not shown, to each of the yarn guiding devices **14** whence they are guided to between the feed belts **10** and **11** at each of the guide rollers **2**. The feed belts **10** and **11** transport the yarns at a determined speed. The feed belts **10** and **11** grip the yarns between them and transport said yarns to the knitting cams.

The operator of the machine moves or slides each of the wedges **4** to displace each of the holders **3** and thereby displace each of the guide rollers **2** in a radial direction toward the axial center of the knitting machine. The displacement of the guide rollers **2** toward the axial center of the knitting machine separates the feed belts **10** and **11** and provides a gap between said feed belts into which the yarns fed by the yarn guiding devices **14** are positioned. After the yarns are positioned between the separate feed belts **10** and **11**, the wedges **4** are moved by the operator in directions opposite those in which they were first moved, so that each of the holders **3**, and thereby each of the guide rollers **2**, is displaced in a radial direction away from the axial center of the knitting machine back to its initial position. The displacement of the guide rollers **2** away from the axial center of the knitting machine removes the gap between the feed belts **10** and **11** and grips the yarns between said belts. The yarns are thus fed at constant speed to the various knitting cams supplied by the yarn feeding system of the present invention.

When the operator displaces the guide rollers **2** toward the axial center of the knitting cams, the tension rollers **5**, due to their spring mountings, compensate for the reduction in tension in the feed belt **11**. The tension rollers **5** achieve the tension reduction compensation by being displaced toward the axial center of the knitting cams by their mounting springs **6**.

The yarn feeding system of the present invention may be used in circular multifeed knitting cams to provide either reliable constant or slippage feeding of yarn. When yarn is to be fed by slippage, it is positioned on the peripheral area **16** of a guide roller **2** (FIG. 2). It is thus possible to feed yarn by slippage to a desired number of knitting cams and to feed yarn at constant speed to a desired number of knitting cams, by the yarn feeding system of the present invention.

While the invention has been described by means of specific examples and in a specific embodiment, I do not wish to be limited thereto, for obvious modifications will occur to those skilled in the art without departing from the spirit and scope of the invention.

What I claim is:

1. A yarn feeding system for feeding a plurality of yarns to a plurality of outputs, comprising frame means; guide roller means mounted on said frame means; a pair of adjacent feed belts positioned on said guide roller means around said frame means; yarn guiding means for supplying yarn to and from a position between said adjacent feed belts at said guide roller means; and driving means for driving said feed belts in a determined direction to transport said yarn to a determined number of outputs.

2. A yarn feeding system for feeding a plurality of yarns to a plurality of outputs, comprising substantially circular frame means; guide roller means mounted on said frame means in substantially equiangularly spaced relation; a pair of adjacent feed belts positioned on said guide roller means around frame means; yarn guiding means for supplying yarns to and from positions between said adjacent feed belts at said guide roller means; and driving means for driving said feed belts in a determined direction to transport said yarns to a determined number of outputs.

3. A yarn feeding system for feeding a plurality of yarns to a plurality of outputs, comprising a substantially circular frame; a plurality of guide rollers mounted on said frame in substantially equiangularly spaced relation; a pair of adjacent feed belts positioned on said guide rollers around said frame; yarn guiding means for supplying yarn to and from a position between said adjacent feed belts at each of said guide rollers; and driving means for driving said feed belts in a determined direction to transport said yarn to a determined number of outputs.

4. A yarn feeding system for feeding a plurality of yarns to a plurality of outputs, comprising a substantially circular frame having an axial center; a plurality of guide rollers mounted on said frame in substantially equiangularly spaced relation; a plurality of tension rollers mounted on said frame, each of said tension rollers being positioned between a pair of adjacent guide rollers closer to said axial center than said guide rollers; a pair of adjacent feed belts positioned on said guide and tension rollers around said frame means, one of said feed belts being positioned on said tension rollers and said guide rollers and the other of said feed belts being positioned on said guide rollers only in a manner whereby said one of said feed belts is positioned between the other of said feed belts and each of said guide rollers; yarn guiding means for supplying yarn to and from a position between said adjacent feed belts at each of said guide rollers; and driving means for driving said feed belts in a determined direction to transport said yarns to a determined number of outputs.

5. A yarn feeding system for feeding a plurality of yarns to a plurality of outputs as claimed in claim **4**, wherein each of said tension rollers is spring mounted for movement in a substantially radial direction, said tension rollers being substantially equiangularly spaced from each other.

6. A yarn feeding system for feeding a plurality of yarns to a plurality of outputs as claimed in claim **4**, wherein said guide and tension rollers are substantially equiangularly spaced from each other.

7. A yarn feeding system for feeding a plurality of yarns to a plurality of outputs, comprising a substantially circular frame; a plurality of radially movable guide rollers mounted on said frame in substantially equiangularly spaced relation; guide roller displacing means for moving each of said guide rollers in a substantially radial direction; a pair of adjacent feed belts positioned on said guide rollers around said frame; yarn guiding means for supplying yarn to and from a position between said adjacent feed belts at each of said guide rollers; and driving means for driving said feed belts in a determined di-

rection to transport said yarns to a determined number of outputs.

8. A yarn feeding system for feeding a plurality of yarns to a plurality of outputs as claimed in claim 7, wherein each of said guide rollers is mounted on a substantially radially extending holder, and said guide roller displacing means comprises a wedge associated with each of said holders for moving the associated holder in a substantially radial direction, each of said wedges being movable in a direction substantially perpendicular to the associated holder.

9. A yarn feeding system for feeding a plurality of yarns to a plurality of outputs, comprising a substantially circular frame; a plurality of guide rollers mounted on said frame in substantially equiangularly spaced relation; a pair of adjacent feed belts positioned on said guide rollers around said frame, each of said belts having a plurality of substantially linearly extending holes

formed therethrough; yarn guiding means for supplying yarn to and from a position between said adjacent feed belts at each of said guide rollers; and driving means for driving said feed belts in a determined direction to transport said yarns to a determined number of outputs, said driving means including a drive wheel having a plurality of radially extending pins which fit into the holes of said feed belts and move said belts in said determined direction.

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