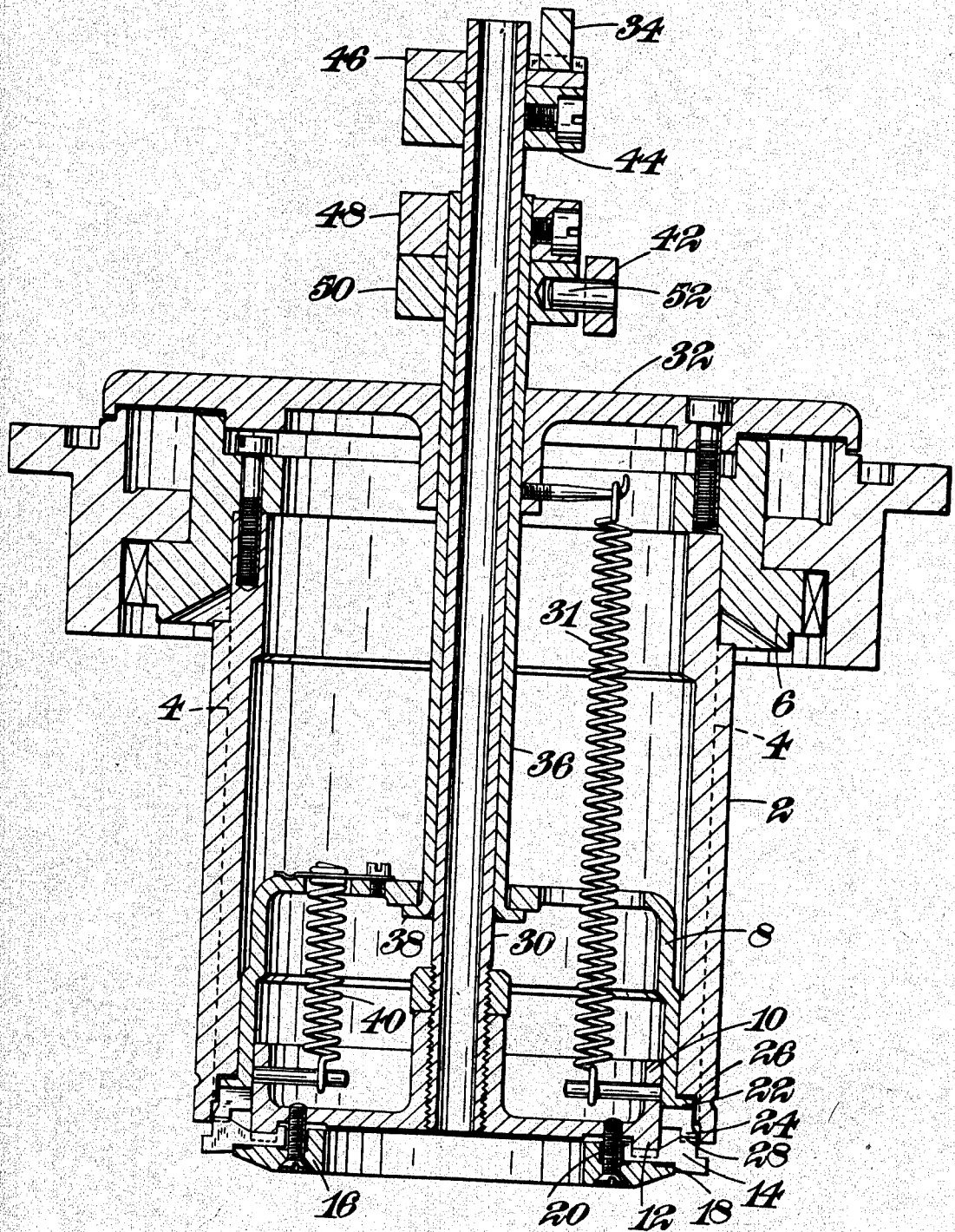
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CIRCULAR KNITTING MACHINE

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CIRCULAR KNITTING MACHINE

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6 Claims. (Cl. 66—14)

This invention is for improvements in or relating to circular knitting machines.

The invention is concerned with circular knitting machines of the superposed cylinder type and an object of the invention is to provide such machines with a verge of improved construction. The machine element which is known as a verge is located within and at the lower edge of the upper or rib needle cylinder of the machine and it carries at its lower end the bits over which the rib needles draw their loops. An example of a verge is disclosed in the specification of British Letters Patent No. 220,355 from which it will be noted that automatic movements of adjustments are given to the verge in a direction axially of the needle cylinders.

With the usual construction of verge, it is found that when the yarn supplied to the needles is changed from one kind of yarn to another during the operation of the machine at a time when the verge is in a lower position, as it is during rib knitting, the yarn ends are liable to project from the outerside of the knitted hose or the like and consequently by so doing to impair the appearance of the finished article. The outwardly projecting ends of the yarns are particularly noticeable when a relatively large number of them appear close to one another in the finished article, such for example as is liable to occur in a hose or the like having a plain foot bottom knitted from one kind of yarn and a ribbed instep portion knitted from another kind of yarn, the yarn changing operation occurring during the knitting along each side of the foot.

The above-mentioned difficulty is due to the fact that although it is comparatively easy to ensure that, provided there be no obstruction to their movement, the yarn ends can be turned to the innerside of the needle circle, the verge when in its lower rib-knitting position forms a complete obstruction to the inward movement of the yarn ends.

With a view to overcoming the above difficulty the present invention provides a verge which comprises two independently adjustable parts one of which carries the bits over which the loops of the rib needles are drawn, while the other part is constituted by the portions of the verge which in the older construction extend between the bits and form the obstruction above-mentioned. In operation, the bits-carrying part of the verge alone is maintained in its working position when rib-knitting is being performed, and the space thus afforded between the bits is available for the turning-in of the yarn ends. As a further precaution for ensuring a successful turning-in operation of the yarn ends under all conditions that are likely to arise, further space for the yarn ends may be made by the removal of three or four of the bits which are located at that part of the needle circle where the yarn ends are to be turned in.

A convenient construction illustrative of the features of the present invention (all of which features are pointed out in the appended claims) will now be described with the aid of the accompanying drawing and will be considered as applied to a machine of the above type of the kind wherein the needle cylinders rotate within stationary associated cam boxes.

The accompanying drawing shows, in section, the upper or rib needle cylinder of a superposed cylinder machine, other parts of the machine such as the cam box for the rib needle cylinder as well as the lower needle cylinder and its associated cam box having been omitted from the drawing, the presence of these parts in the drawing being deemed unnecessary for an understanding of the present invention. It may here be pointed out that in order to show in the drawing one of each of two pairs of springs **31** and **40** which are hereinafter more particularly referred to, the two parts of the drawing on either side of the cylinder axis represent sections which do not lie in the same plane.

The rib needle cylinder **2**, which has formed therein the usual tricks **4** in which the needles are received, is rotated by connections from the main shaft of the machine, which connections include a gear wheel **6** which is secured to the cylinder **2**. The verge comprises an inverted cup-shaped outer member **8** fitting within and adjustable axially of the rib needle cylinder and a piston-like inner member **10** fitting within the cup-shaped outer member **8** and also adjustable in the same direction relatively to the outer member. On the outer edge of the inner member **10** there is a depending flange **12** which is slotted radially to receive the bits **14** over which the loops are drawn by the rib needles. The bits **14** are relatively thin blade-like elements which are retained in the slots in the depending flange **12** against downward and inward movement by a retaining plate or ring **16** attached to the inner member **10**, the outer edge of which plate engages a depending shoulder **18** on each of the bits. Each of the bits is prevented from outward movement in the slots formed in the depending flange **12**, by means of an upstanding lug **20** on the bit which engages the inner surface of the said depending flange **12**. The outer member **8** of the verge has at its lower end a short flange **22** having a depending portion **24**, which flange and portion are received within a recess **26** formed for them on the inner side of the rib needle cylinder, the height-wise dimension of which recess is sufficient to accommodate the up and down movements of adjustment which are given to the outer member **8** of the verge. The flange **22** and depending portion **24** of the outer

member 8 are provided with radial slots within which are received upwardly-extending parts 28 formed on the bits 14 in rear of the front ends of the bits. These slots are deep enough to allow the inner member 10 of the verge to be raised in relation to the outer member 8 to the necessary extent.

During the operation of the machine the two members 8, 10 of the verge are adjusted automatically both relatively to one another and to the rib needle cylinder 2 by connections from the main control drum of the machine. The connections for the inner member 10 of the verge comprise an upstanding tube 30 attached to the inner member 10 at the centre thereof which tube projects beyond a cap plate 32 which is secured to the cylinder 2. At its upper end the tube 30 is operatively connected with one end of a lever 34 which is pivoted upon the machine frame and the other end of which is engaged by a push rod having its lower end in the path of a cam on the main control drum. Two diametrically-opposite springs 31 (only one of which is shown) each connected at one end to the cap plate 32 and at the other end to the inner member 10 and passing through a hole in the outer member 8, are provided to urge the inner member 10 upwardly. It will be noted that the arrangement just described is similar to that disclosed in the said British specification No. 220,355 for the operation of the verge described therein. The connections for the outer member 8 of the verge comprise a tube 36 which surrounds the tube 30 and passes with that tube through a central hole formed in the outer member 8. The bottom end of the tube has a flange 38 formed upon it with which flange the outer member 8 tends to remain in engagement under the action of two diametrically opposite tension springs 40 (only one of which is shown) extending between the inner and outer members 8 and 10. At its upper end the tube 36 is operatively connected with a lever 42 having one of its ends pivoted to the machine frame and the other end engaged by a push rod the lower end of which is in the path of a cam on the main control drum. To provide for the rotation of the tubes 30 and 36 with the needle cylinders of the machine, the operative connections between the tube 30 and the lever 34 consist of a collar 44 fast on the tube 30 and a collar 46 which is loose on the tube, in a notch in which collar a pointed part of the lever 34 bears, while the operative connections between the tube 36 and the lever 42 consist of a collar 48 fast on the tube 36 and a collar 50 which is loose on the tube and into a hole in which a pin 52 on the lever 42 extends.

In the operation of the machine when the rib-needles are to knit, the cams on the main control drum through the connections before described, will move the verge members 8, 10 relatively so as to separate their bottom edges and thereby remove from between the bits 14 those portions of the outer member 8 of the verge which would otherwise fill the spaces between the bits 14 and thus prevent the yarn ends from being turned within the needle circle.

We claim:

1. In a circular knitting machine, a rib needle cylinder, a verge located at an end of said cylinder, said verge comprising two separate parts, bits carried by one of said parts, and automatic means for effecting relative adjustment of said parts in a direction axially of the rib needle cylinder.

2. In a circular knitting machine, a rib needle cylinder, a verge located at an end of said cylinder, said verge comprising two separate parts, bits carried by one of said parts, and automatic means for effecting relative adjustment of said parts in a direction axially of the rib needle cylinder and for adjusting each of said parts in said direction relatively to the rib needle cylinder.

3. In a circular knitting machine, a rib needle cylinder, a verge comprising a cylindrical outer member fitting within the rib needle cylinder and provided with radial slots and a cylindrical inner member fitting within said outer member and also provided with radial slots, bits received in said last-named radial slots and extending into the radial slots first mentioned, and automatic means for adjusting said cylindrical members independently of one another in a direction axially of the rib needle cylinder.

4. In a circular knitting machine, a rib needle cylinder, a verge comprising a cup-shaped outer member fitting within the rib needle cylinder and provided with radial slots and a piston-like inner member fitting within said outer member and also provided with radial slots, bits received in the slots of the inner member and extending into the slots of the outer member, means for retaining said bits in the slots of the inner member, and means for automatically adjusting said members axially of the rib needle cylinder comprising a tubular member extending into the rib needle cylinder axially thereof and also extending through an aperture formed in said cup-shaped outer member, a flange on the inner end of said tubular member for engaging the inner side of said cup-shaped member, a rod-like member extending through said tubular member and operatively connected at its inner end with the said piston-like member, and spring means tending to draw said piston-like member within the cup-shaped member.

5. A circular knitting machine according to claim 4, wherein the piston-like member has a depending flange in which the bit-receiving radial slots are formed, and the retaining means for the bits comprise a ring-like member attached to the piston-like member in position to support the bits, and each bit has a depending shoulder which is engaged by the outer edge of the ring-like member, an upstanding lug which is engaged by the inner side of the depending flange on the piston-like member, and an upwardly-extending part which extends into the associated radial slot in the cup-shaped outer member of the verge.

6. A circular knitting machine according to claim 4, wherein to accommodate a rotating rib needle cylinder, mechanism for moving endwise the tubular member and the rod-like member comprises a pair of levers, one of which levers is operatively connected with a collar loose on the tubular member and abutting against a collar fast on said member above the loose collar, and the second of which levers is operatively connected with a collar loose on the rod-like member and abutting against a collar fast on the rod-like member below the loose collar on that member.

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