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KNITTING MACHINE

Filed March 6, 1930

Fig.3.

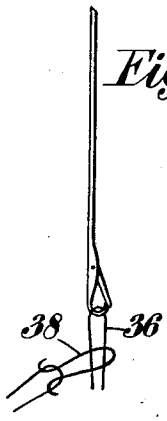


Fig.1.

Fig.2.

INVENTORS

Percival Arthur Bentley,
Charles Frederick Mauger
& Carlyle Herbert Wainwright

By Watson, Cole, Morse & Grindle

Attys.

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PERCIVAL ARTHUR BENTLEY, CHARLES FREDERICK MANGER, AND CARLYLE HERBERT WAINWRIGHT, OF LEICESTER, ENGLAND

KNITTING MACHINE

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This invention concerns improvements in or relating to knitting machines, and is particularly, although not exclusively applicable to circular knitting machines of the superimposed cylinder type, examples of which type are disclosed in the specifications of British Letters Patent Nos. 15008/1900; 24290/1912; and 171,483.

In rib-knitting machines of the above-mentioned type, difficulty is sometimes experienced in the knitting of ribbed fabric immediately following the formation of a toe-pouch, owing to the absence of proper tension upon certain parts of the work. This difficulty is due to the fact that the usual winding rollers, which are provided to apply tension to the work, cannot—by reason of the presence of the toe-pouch—have any effect upon the loops being knitted on the side of the work on which the toe-pouch is located. Consequently, a rib-needle, in the location indicated, after drawing a new loop through the old or previously-formed loop is liable, when advancing again, to pass through the old loop instead of outside it, thus causing tucking; or if the fabric is sufficiently slack, the rib-needle may not even pull the new loop completely through the old loop—this will also cause tucking.

The above-mentioned difficulty has been recognized in the past and endeavors to cope with it have been made by careful adjustment of the appropriate cams, resulting, however, in limiting considerably the available range of quality in the work, it being appreciated that adjustment of the quality cams beyond a certain small range will cause the formation of bad fabric in the part of the work under consideration.

An object of the present invention is to overcome in a novel manner the difficulty above mentioned.

A feature of the present invention is a method of knitting by machine which comprises as a characteristic step applying tension to that portion of a knitted fabric which, in the knitting operation, immediately follows and is adjacent to a toe-pouch or the like formed in the work.

A further feature of the invention is the provision in a knitting machine of means for applying automatically tension to the work at a location adjacent a toe-pouch or the like and between that pouch and the needles.

The said means, when applied to machines of the superposed cylinder type, may comprise a member normally located within or substantially within the rib-needle cylinder, which member after the formation of a toe-pouch or the like is moved automatically into engagement with the pouch within the plain needle cylinder and by pressing on said pouch produces tension on the work at the desired location. The invention, however, as hereinafter pointed out, is applicable in other connections than those above set forth.

A convenient construction of mechanism illustrative of the above method and means will now be described by way of example, and, also by way of example, will be considered as applied to a machine of the type disclosed in the prior specifications hereinbefore mentioned.

In the accompanying diagrammatic drawing which illustrates such convenient construction:

Figure 1 shows in elevation and partly in section and with parts broken away, sufficient of a knitting machine as will enable the present invention to be understood;

Figure 2 is a plan of a work-engaging member hereinafter described; and

Figure 3 is a diagram of a rib-needle in operation which is hereinafter referred to.

In the top or rib-needle cylinder 2 there is mounted, axially of that cylinder, a rod 4 which can slide endwise in a tube 6 secured to the verge 8 and rotating with the cylinder 2. Near the top of the tube 6, which extends above the cylinder top, there is a sleeve 10 surrounding the tube 6 and secured to the rod 4 by a screw 12 the reduced inner end of which passes through a slot 14 in the tube and enters a hole formed for it in the rod 4. The slot 14 extends lengthwise of the tube 6, thus permitting the rod 4 to move endwise but constraining it to rotate with the tube and cylinder.

At the bottom end of the rod 4 there is secured a work-engaging member 16. This

member (see Figure 2) is disc-like in form with its centre coinciding with the axis of the rod 4. The disc 16, at its circumference, is cupped or bent downwardly slightly and is provided with a few, say seven, rounded projections or teeth, that is to say, the disc is somewhat star-shaped in form.

The work-engaging member 16 is moved up and down by the combined action of a lever 18, the forked end of which engages a flange 20 on the sleeve 10, and of a spiral spring 22 contained within the tube 6 and engaging at one end the top of the rod 4 and at the other a plug 24 screwed into the upper end of the tube.

Movement is imparted to the lever 18 at the appropriate times by connections, including a push-rod 26 and a lever 28, from a cam 30 on the main control drum of the machine or by other control mechanism of the machine.

In operation, the work-engaging member 16 is held up, out of the way of the fabric, within the verge of the top cylinder until it is required to operate. After a toe-pouch has been knitted, the lever 18 (by the action of the cam 30) is moved to permit the spiral spring 22 to force the said member downwardly into engagement with the pouch, within the plain needle cylinder 35, thus putting and maintaining tension on the loops immediately above the pouch, but not adversely affecting the fabric on the side opposite to the pouch.

In the diagram constituting Figure 3, a rib-needle is shown as having drawn a new loop 36 through a previously formed loop 38. If now adequate tension is not put upon the work, the loop 38 may stay in or approximately in the position in which it is shown in the diagram, with the result that the rib-needle when next it descends is very liable to pass again through the loop 38. The work-engaging member 16, however, by pressing on the work near the needles, draws the loop 38 to the back of the needles well out of the path of the descending rib needle which thereupon passes down outside the loop 38, as is required.

It will be appreciated that with the aid of mechanism according to the present invention fabric may be knitted by needles of the top cylinder without the need for top sinkers, such an arrangement being particularly advantageous when making a reverse welt as described in the specification of our British Letters Patent No. 321,210, or in the knitting of broad ribbed fabric at a portion of the work immediately following the formation of a toe-pouch or the like. Also, that the rib loops may be brought low down into the bottom sinkers without danger of tucking.

We claim:—

1. In a knitting machine having a rib-needle cylinder and a plain needle cylinder and control mechanism therefor, automatic tension-applying means, comprising a work-engaging member normally located substantially within the rib-needle cylinder, and means to move said member substantially within the co-operating plain needle cylinder into pressing engagement with a part of the work adjacent the needles and to retain said member in engagement therewith during the knitting of a predetermined and substantial length of fabric, said means comprising operative connections, including a yielding element, between said member and control-mechanism of the machine.

2. In a knitting machine having a rib-needle cylinder and a plain needle cylinder, automatic tensioning-applying means comprising a work-engaging member normally located substantially within a rib-needle cylinder, and means to move said member after the formation of a toe-pouch or the like to a position substantially within the cooperating plain needle cylinder into pressing engagement with said toe-pouch or the like, and to retain said member in engagement therewith during the knitting of a predetermined and substantial length of fabric, said means including a support for said member disposed co-axialy with respect to said cylinders.

3. In a knitting machine having a rib-needle cylinder and a plain needle cylinder and control mechanism therefor, automatic tension-applying means comprising a work-engaging member normally located substantially within the rib-needle cylinder, means to move said member, after the formation of a toe-pouch or the like substantially within the cooperating plain needle cylinder into pressing engagement with said toe pouch or the like and to retain said member in engagement therewith during the knitting of a predetermined and substantial length of fabric, said means comprising a slidable rod coaxial with said rib-needle cylinder and extending therethrough for supporting said member, and means engaging said rod and connected with the control mechanism of the machine for actuating said rod.

4. In a knitting machine having a rib-needle cylinder and a plain needle cylinder and control mechanism therefor, automatic tension-applying means comprising a work-engaging member normally located substantially within the rib-needle cylinder, means to move said member, after the formation of a toe-pouch or the like substantially within the co-operating plain needle cylinder into pressing engagement with said toe pouch or the like and to retain said member in engagement therewith during the knitting of a predetermined and substantial length of fabric, said means comprising a slidable rod coaxial with said rib-needle cylinder and extending therethrough for supporting said member, yieldable means engaging said rod for urging the rod and the member supported thereby into work-engaging position, and means engaging

said rod and connected with the control mechanism for automatically withdrawing said rod and member from work-engaging position against the action of said yieldable means.

5. In a knitting machine having a rib-needle cylinder and a plain needle cylinder and control mechanism therefor, automatic tension-applying means comprising a work-engaging member normally located substantially within the rib-needle cylinder, means to move said member, after the formation of a toe-pouch or the like substantially within the cooperating plain needle cylinder into pressing engagement with said toe pouch or the like and to retain said member in engagement therewith during the knitting of a predetermined and substantial length of fabric, said means comprising a slidable rod coaxial with said rib-needle cylinder and extending therethrough for supporting said member, yieldable means engaging said rod for urging the rod and the member supported thereby into work-engaging position, means engaging said rod and connected with the control mechanism for automatically withdrawing said rod and member from work engaging position against the action of said yieldable means, and a recess in the rib-needle cylinder for receiving the said member when the latter is withdrawn from work-engaging position.

6. In a knitting machine having a rib-needle cylinder and a plain needle cylinder and control mechanism therefor, automatic tension-applying means comprising a work-engaging member consisting of a circular disc having a beaded work-engaging peripheral edge thereon normally located substantially within the rib-needle cylinder, means to move said member, after the formation of a toe-pouch or the like substantially within the cooperating plain needle cylinder into pressing engagement with said toe pouch or the like and to retain said member in engagement therewith during the knitting of a predetermined and substantial length of fabric, said means comprising a slidable rod coaxial with said rib-needle cylinder and extending therethrough for supporting said member, and means engaging said rod and connected with the control mechanism of the machine for actuating said rod.

In testimony whereof we have signed our names to this specification.

PERCIVAL ARTHUR BENTLEY.
CHARLES FREDERICK MANGER.
CARLYLE HERBERT WAINWRIGHT.