

COMPUTER-CONTROLLED GROUND MESH JACQUARD KNITTING MACHINE

BACKGROUND OF THE INVENTION

The present invention relates to a computer-
5 controlled ground mesh jacquard knitting machine, and
more particularly to such a computer-controlled ground
mesh jacquard knitting machine in which each yarn feeder
has a recessed portion for receiving a corresponding color
changing head.

10 Most knitting machine manufacturers try hard to
improve jacquard knitting techniques, so as to knit out
versatile jacquard fabrics. In order to produce a colorful
jacquard pattern, color changing heads are installed to
provide different color yarns. When color changing
15 heads are used, the yarn feeders must be removed from the
jacquard knitting machine. If the color changing heads
are directly installed in the jacquard knitting machine
without removing the yarn feeders, the yard feeders will
be damaged by the yarn changing board at each color
20 changing head.

SUMMARY OF THE INVENTION

The present invention has been accomplished to
provide a computer-controlled ground mesh jacquard
knitting machine, which eliminates the aforesaid problem.
25 According to the present invention, the yarn feeders each

have a recessed portion. When color changing heads are installed, they are respectively received in the recessed portion at each yarn feeder. Therefore, the yarn feeders and the color changing heads can be concomitantly
5 installed in the jacquard knitting machine without causing any trouble.

BRIEF DESCRIPTION OF THE DRAWINGS

Figures 1A~1D illustrate relative positions of the needles, the first needle jacks, the second needle jacks,
10 the lifting cams, and the needle selector according to the present invention.

Figure 2 is an enlarged view of a part of a yarn feeder according to the present invention.

Figures 3A and 3B illustrate an action of the
15 needles in the lifting cams.

Figures 4A and 4B illustrate another action of the needles in the lifting cams.

Figures 5A and 5B illustrate still another action of the needles in the lifting cams.

20 Figure 6 is an enlarged view of a ground mesh jacquard fabric knitted according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to Figures from 1A through 1D, a
25 computer-controlled ground mesh jacquard knitting

machine is shown comprised of a set of yarn feeders 1 supported on the machine base (not shown) thereof, a set of needles 2 mounted in the needle cylinder (not shown), a set of first needle jacks 4 respectively coupled to the needles 2 at the bottom side, a set of second needle jacks 5 respectively coupled to the first needle jacks 4 at the bottom side, pairs of lifting cams 3 and 3' controlled to lift the first needle jacks 4 and the needles 2, and a needle selector 6 mounted in a cap (not shown) and controlled to selectively lift the second needle jacks 5.

The yarn feeders 1 each comprise a thread hole 11 or 12 through which a ground yarn 7 or face yarn 8 is inserted, a recessed portion 13, and a ceramic hole 14. The needles 2 each comprise a needle heel 21, and a coupling portion 22 adjacent to the needle heel 21. The first needle jacks 4 each comprise a butt 41, and a front coupling portion 42 coupled to the coupling portion 22 at one of the needles 2. The second needle jacks 5 each comprise a butt 51, and a front receptacle 52, which receives the rear end of one of the first needle jacks 4. The pairs of lifting cams 3 and 3' each include a first lifting cam 3 and a second lifting cam 3'. The first lifting cam 3 comprises an outer track 31, an inner track 32, a first projecting block 31a in the outer track 31, and a

second projecting block **32a** in the inner track **32**. The second lifting cam **3'** comprises an outer track **31'**, an inner track **32'**, a first projecting block **31a'** and a second projecting block **31b'** in the outer track **31'**, and a third
5 projecting block **32a'** in the inner track **32**.

The needle selector **6** is controlled by an external computer, comprising a plurality of selection jacks **61** corresponding to the second needle jacks **5**. The selection jacks **61** are selectively moved between a
10 horizontal position and a vertical position. When one selection jack **61** is moved to the horizontal position, it is stopped below the butt **51** at the corresponding second needle jack **5**, for enabling the corresponding second needle jack **5** to be moved to lift the corresponding first
15 needle jack **4** and the corresponding needle **2**.

Referring to Figure 2, the recessed portion **13** at each of the yarn feeders **1** is provided to receive corresponding color changing heads **15** of a color changing unit of the computer-controlled ground mesh
20 jacquard knitting machine, therefore the yard feeders **1** do not hinder the color changing heads **15**. Further, the ceramic hole **14** is provided at the bottom end of the recessed portion **13**. When using the computer-controlled ground mesh jacquard knitting machine to knit

an elastic fabric, elastic yarn can be arranged in the ceramic hole 14.

Referring to Figures 3A and 3B, the lifting cams 3 and 3' are rotated by the knitting machine, the needle heel 21 of each needle 2 and the butt 41 of each first needle jack 4 are respectively moved in the outer track 31 and inner track 32 at one first lifting cam 3, and the needle heel 21 of each needle 2 is moved over the left slope of the second projecting block 32a at the corresponding first lifting cam 3, thereby causing the needle 2 to be lifted. Thereafter, each needle 2 is lowered along the first projecting block 31a in the at the corresponding first lifting cam 3 to take a ground yarn 7. Then, the needle heel 21 of each needle 2 and the butt 41 of each first needle jack 4 are respectively moved in the outer track 31' and inner track 32' at one second lifting cam 3', and the needle heel 21 of each needle 2 is moved over the left slope of the third projecting block 32a' at the corresponding second lifting cam 3', thereby causing the needle 2 to be lifted, and then the needle 2 is moved along the second projecting block 31b' in the outer track 31' at the corresponding second lifting cam 3' to achieve part A shown in Figure 6.

Referring to Figures 4A and 4B, after passing

through the corresponding first lifting cam **3**, the needle heel **21** of each needle **2** and the butt **41** of each first needle jack **4** are respectively moved in the outer track **31'** and inner track **32'** at one second lifting cam **3'**. When
5 each needle **2** is moved along the first projecting block **31a'** at one second lifting cam **3'**, the selection jacks **61** of the needle selector **6** are at the needle section status, and selected selection jacks **61** are respectively stopped at the butt **51** of each of the second needle jacks **5** to lift the
10 second needle jacks **5** and the first needle jacks **4**, and therefore the butt **41** of each of the first needle jacks **4** is respectively spaced above the third projecting block **32a'** at each of the second lifting cams **3'**, i.e., each needle **2** is moved through the outer side of the corresponding third
15 projecting block **32a'** and then lowered along the corresponding second projecting block **31b'** to complete an idle knitting stroke, i.e., to achieve a ground mesh jacquard knitting (see part **B** shown in Figure 6).

Referring to Figures 5A and 5B, when the needle
20 heel **21** of each needle **2** and the butt **41** of each first needle jack **4** are respectively moved in the outer track **31** and inner track **32** at one first lifting cam **3**, and the needle heel **21** of each needle **2** is moved over the left slope of the second projecting block **32a** at the corresponding first

lifting cam 3, each needle 2 is lifted, and then moved toward the first projecting block 31a at the corresponding first lifting cam 3. When the needle heel 21 of one needle 2 is lifted to the flat surface portion of the
5 corresponding first projecting block 31a and the corresponding selection jack 61 is selected, the butt 51 of the corresponding needle jack 5 is pushed upwards by the corresponding selection jack 6, thereby causing the corresponding first needle jack 4 to be lifted from the
10 second projecting block 32a, therefore the needle 2 is moved through the outer side of the corresponding second projecting block 32a, and thereafter, the needle 2 is lowered along the corresponding first projecting block 31a to take a ground yarn 7, and then the needle heel 21 of
15 the needle 2 and the butt 41 of the corresponding first needle jack 4 are respectively moved in the outer track 31' and inner track 32' at the corresponding second lifting cam 3', and the needle heel 21 of each needle 2 is moved over the left slope of the third projecting block 32a' at the
20 corresponding second lifting cam 3', thereby causing the needle 2 to be lifted, and then the needle 2 is lowered along the second projecting block 31b' in the outer track 31' at the corresponding second lifting cam 3' to take a face yarn 8, so as to achieve part C shown in Figure 6.

CLAIMS

1. A computer-controlled ground mesh jacquard knitting machine comprising:

a set of yarn feeders, said yarn feeders each comprising elastic yarn, arranged in the recessed portion corresponding to color changing heads of the jacquard knitting machine, said color change head being arranged above the recessed portion at each of said yarn feeders, and said yarn feeders each comprising a ceramic hole at a bottom end of the recessed portion;

a set of needles mounted on a needle cylinder in the jacquard knitting machine;

a set of first needle jacks respectively coupled to said needles at a bottom side;

a set of second needle jacks respectively coupled to said first needle jacks at a bottom side; lifting cam means controlled to lift said needles and said first needle jacks, said lifting cam means comprising an outer track and an inner track, said outer track comprising needle lifting guide blocks, flat guide blocks and needle descending guide blocks respectively arranged in order, said inner track comprising needle lifting guide blocks; and

a needle selector mounted below said lifting cam means;

wherein said lifting cam means is driven to move said needles and said first needle jacks, and said needle selector is controlled to selectively drive said second needle jacks, causing the corresponding first needle jacks to be moved away from the descending guide blocks in said inner track, so as to achieve a ground mesh jacquard knitting effect.