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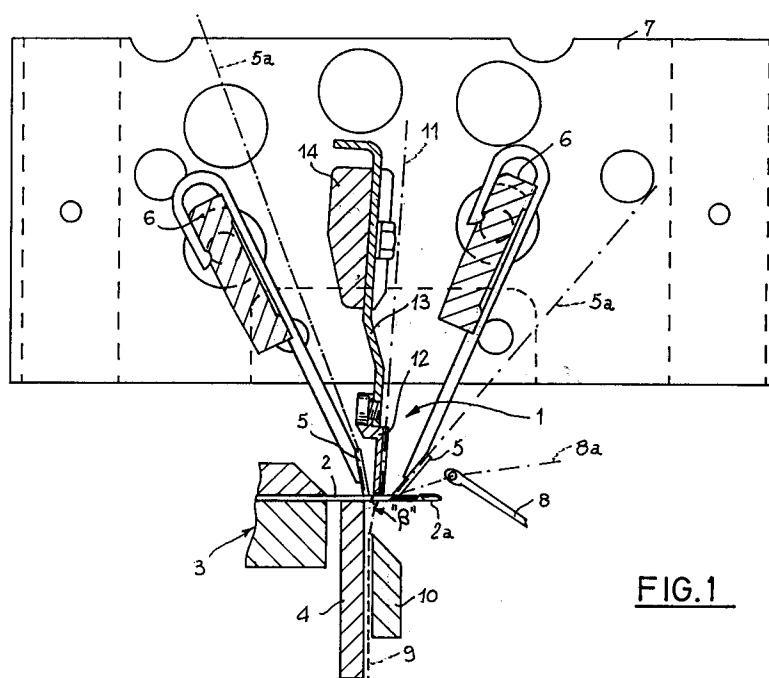
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I-20159 Milano(IT)(54) **A guide device for elastic yarns in crochet galloon looms.**

(57) In a crochet galloon loom, at least a guide reed (12) is rigidly connected to a supporting bar (14) driven in horizontal reciprocating motion, transversely to the longitudinal movement of the needles (2). The guide reed (2) extending horizontally above the needles (2), is provided with a plurality of vertical grooves (15) disposed consecutively in side by side relation and each of them engaging an elastic yarn

(11) for guiding it towards a respective needle (2). Each groove (15) of a length corresponding to at least ten times the distance between the lower end (15c) thereof and the lying plane of the needles (2), has a transverse outline in the form of an acute angle so as to impose a precise positioning to the corresponding elastic yarn (11), which is centred to the bisecting line of the angle itself.

**FIG.1****EP 0 511 455 A2**

The present invention relates to a guide device for elastic yarns in crochet galloon looms, of the type comprising at least a guide reed extending horizontally above a plurality of needles disposed mutually in side by side relation according to a horizontal plane and driven in reciprocating motion in the longitudinal direction, said guide reed exhibiting, on one front surface thereof, a plurality of vertical grooves disposed parallelly alongside each other, each of which slidably engages an elastic yarn so as to guide it towards a respective needle, and being rigidly connected to a supporting bar driven in horizontal reciprocating motion in order to transmit the elastic yarns a reciprocating motion astride of said needles.

It is known that in crochet galloon looms the production of manufactured articles is generally carried out by interlacing operations between the weft and warp yarns. These operations take place at the heads of a plurality of needles, disposed consecutively in side by side relation in a horizontal plane and driven in reciprocating motion in the longitudinal direction above a front plate. The weft yarns are brought to the needles through corresponding tubular weft yarn guides supported by one or more tubular guide carriers disposed horizontally and operated such as to impart a reciprocating motion astride of one or more of the corresponding needles to each of said tubular weft yarn guides.

The warp yarns, on the contrary, are brought to the needles through respective drawing-in hooks located in front of the needles and reciprocating between the needle heads.

In producing particular manufactured articles such as for example elastic ribbons, it is also provided that elastic yarns fed under pre-tensioning conditions be looped too between the weft and warp yarns.

In many traditional looms these elastic yarns are guided by auxiliary drawing-in hooks linked to a supporting bar parallel to the tubular guide carriers and driven in reciprocating motion therewith.

It has been found, however, that the use of auxiliary drawing-in hooks in the above described manner gives rise to some drawbacks.

First of all each elastic yarn is forced to pass through the eye of the respective drawing-in hook taking a substantially S-shaped configuration. Under this situation the sliding of the elastic yarns in the auxiliary drawing-in hooks is greatly hindered and frictions generated between the elastic yarn and drawing-in hook can impair the good execution of the knitting and/or damage the elastic yarn.

In addition, since it is necessary to introduce each elastic yarn into the eye of the respective drawing-in hook, long times are needed for setting the machine to work and in case of breakage of

one or more of the elastic yarns the machine must stop for rather long periods of time.

A guide device specifically conceived for solving the above problems is disclosed in German Patent DE 3244014 A1. According to the teachings of this patent, the auxiliary drawing-in hooks are replaced by at least a reed element extending horizontally above the needles. This reed element has, on the lower end edge thereof, a front relief in which a plurality of vertical grooves disposed alongside each other is formed.

Each groove, having a substantially rectangular transverse outline, lends itself to slidably engage one of the elastic yarns, the holding of the elastic yarn within the groove relying on the tensioning given to the elastic yarn by feed rollers operated at different peripheral speeds and acting on the elastic yarns upstream of the reed elements and the manufactured article downstream of the needles.

In spite of the unquestionable improvements achieved by this device, it has been found, however, that it has some drawbacks too.

In particular it is noted that, since the grooves are of rectangular outline, the elastic yarns are not correctly guided towards the needles in the case in which the yarn diameter is lower than the groove width. In fact, each yarn instead of being carried sideways according to the whole stroke travelled by the reed element, moves laterally within the groove thereby reducing the extent of the displacement it undergoes.

Under this situation the corresponding needle that should penetrate between an elastic yarn and the next one, could instead impinge on the badly positioned elastic yarn giving rise to a manufacturing fault on the finished manufactured article.

In the worst cases, in addition, the elastic yarn impinged on by the needle might also disengage from the corresponding groove and permanently enter one of the adjacent grooves. In these cases it becomes necessary to stop the machine operation in order to correctly position the elastic yarn again.

The present invention aims at overcoming the above drawbacks.

The foregoing and further objects that will become apparent in the following description are substantially attained by a guide device for elastic yarns in crochet galloon looms characterized in that each of said vertical grooves has a pair of slide surfaces joined at an angle the bisecting line of which is normal to said one front surface, and acting simultaneously at laterally opposite positions on the respective elastic yarn to hold it according to a predetermined positioning, that is in constant alignment relation with said bisecting line, irrespective of the diameter of the elastic yarn.

Further features and advantages of the invention will be best understood from the detailed de-

scription of a guide device for elastic yarns in crochet galloon looms in accordance with the present invention, given hereinafter by way of non-limiting example with reference to the accompanying drawings, in which:

- Fig. 1 is a diagrammatic fragmentary cross-sectional view of the device of the invention together with other members that, in a crochet galloon loom, cooperate in knitting a manufactured article;
- Fig. 2 is a front view of a reed element being part of the inventive device;
- Fig. 3 is a sectional view of the reed element taken along line III-III in Fig. 2;
- Fig. 4 is an enlarged interrupted sectional view of the reed element taken along line IV-IV in Fig. 3.

Referring to the drawings, a guide device for elastic yarns in crochet galloon looms in accordance with the present invention has been generally identified by reference numeral 1.

The device 1 is associated with a conventional crochet galloon loom only the main members of which cooperating in knitting a manufactured article have been shown in Fig. 1.

With reference to Fig. 1, the loom essentially comprises a plurality of needles 2, only one of which is shown, disposed parallelly in side by side relation in a horizontal plane, rigidly engaged to a needle bar 3 and operated through said bar in reciprocating motion in a longitudinal direction above a front plate 4.

Provision is also made for a plurality of tubular weft yarn guides 5 each of which slidably engages a weft yarn 5a for suitably guiding it to the needles 2. In greater detail, the tubular weft yarn guides 5 are supported in a conventional manner by one or more tubular guide carriers 6 extending horizontally, parallelly to the needle bar 3 and at a raised position relative thereto.

The tubular guide carriers 6 are connected, at the opposite ends thereof, to two lifting plates 7, only one of which is shown, driven in vertical reciprocating motion. The tubular guide carriers 6, longitudinally slidable relative to the lifting plates 7, are in addition driven in reciprocating motion in the longitudinal direction by further actuator means not shown as known per se and conventional. The combination of the horizontal and vertical reciprocating motions transmitted to the tubular guide carriers 6 imparts a reciprocating motion astride of one or more of needles 2 to each tubular weft yarn guide 5.

The presence of a plurality of drawing-in hooks 8 is also provided, each of them slidably engaging a warp yarn 8a in order to guide it to the needles 2. Each of the drawing-in hooks 8, operated in reciprocating motion astride of the needles 2, passes

between the heads 2a of two needles disposed in mutual side by side relation to make the warp yarns 8a interlace with the weft yarns 5a.

The manufactured article obtained as a result of the above interlacing, denoted by 9, is dragged along by a conventional collection device not shown, between the front plate 4 and a collection guide 10.

Within the practical operation of the loom the device 1 performs the function of suitably guiding a plurality of elastic yarns 11 to the needles 2 so that said elastic yarns may be suitably looped between the weft yarns 5a and warp yarns 8a.

In accordance with the present invention, the device 1 comprises at least a guide reed 12 extending horizontally above the needles 2 so that a lower edge 12a thereof is slightly spaced apart therefrom.

The guide reed 12 can be made in the form of a bar of a length corresponding to that of the tubular guide carriers 6 and needle-bar 2. Alternatively, the presence of a plurality of guide reeds 12 can be provided, said reeds being disposed consecutively alongside each other in mutual alignment and each of them having a length corresponding to the quantity subtended by a predetermined number of needles 2.

The guide reed or reeds 12 are rigidly engaged by a connecting plate 13 to a supporting bar 14 the opposite ends of which are connected to the lifting plates 7.

The supporting bar 14, in known manner, is oscillatably operated in the longitudinal direction so as to impart a horizontal reciprocating motion to the guide reeds 12 according to an orientation transverse to the movement of needles 2. Still in known manner, the opposite ends of the supporting bar 14 may be provided to be connected to the lifting plates 7 of the tubular guide carriers 6 so as to impart the same movement as described with reference to the tubular weft yarn guides 5 to the guide reeds 12. Alternatively, the supporting bar 14 can be completely disengaged from the vertical movement of the lifting plates 7, the guide reeds 12 being therefore submitted to the horizontal motion alone.

Each guide reed 12 has, on the front surface thereof defined in the plane indicated by line "S" in Fig. 4, a plurality of vertical grooves 15 disposed in parallel side by side relation, each of which slidably engages one of the elastic yarns 11 in the longitudinal direction. The vertical grooves 15 are spaced apart the same distance from each other, according to the same pitch as the needle spacing, so that each elastic yarn 11 is guided towards a respective needle 2.

Advantageously, each of the vertical grooves 15 is essentially defined by a pair of slide surfaces

15a, 15b joined together according to a predetermined angle " α ".

Preferably angle " α " is an acute angle the amplitude of which ranges between 60° and 90° . Angle values higher or lower than the above ones could cause the disengagement of the elastic yarns 11 from the grooves 15 or too great slide frictions between the elastic yarns and grooves, respectively. At all events angle " α " has a bisecting line "n" normal to the front surface "S" of the reed 12.

Still in accordance with the present invention, the front surface "S" of reed 12 is provided to have a substantially flat extension and each vertical groove 15 is provided to have a vertical extension H equal to at least 10 mm. In any case, the vertical extension H of each groove 15 must be at least ten times the distance existing between the lower end 15c of the groove and the lying plane of needles 2, for purposes to be explained in the following.

In known manner, the elastic yarns 11 reach the guide reed 12 in a pre-tensioning condition. In known manner too, each reed 12 is positioned so as to give rise to a slight deviation " β " in the longitudinal extension of the elastic yarns 11. Therefore the elastic yarns 11 will automatically tend to keep against the guide reed 12.

Under this situation, the slide surfaces 15a, 15b of each vertical groove 15 will act on the corresponding elastic yarn 11 at laterally opposite sides, so as to give the yarn a precise positioning. In particular, each yarn 11 is held so that its axis is coincident with the bisecting line "n" of angle " α ". Advantageously, this condition is always maintained, independently of the diameter exhibited by the elastic yarn 11, as clearly illustrated in Fig. 4 where two yarns 11 having different diameters and engaged in respective grooves 15 are shown.

Consequently, the yarns 11 lend themselves to be reciprocated astride of the corresponding needles 2 as a result of the horizontal oscillation imparted to the supporting bar 14, without any risk that one or more of said yarns may take wrong positionings relative to the loom members, and in particular relative to needles 2.

Therefore the danger that the needles 2 may impinge on the elastic yarns 11 is eliminated or at least greatly reduced.

In addition, by virtue of the important longitudinal extension of the vertical grooves 15, any risk of disengagement of one or more yarns 11 from the corresponding grooves due to the yarns being retained by the needles 2 is greatly reduced as well. In greater detail, it is noted that when the reed 12 moves sideways and the elastic yarns 11 are retained by needles 2, there is the possibility that the yarns may disengage from the lower ends 15c of the corresponding grooves 15. However, the length of each groove can advantageously make the yarn

11 be correctly held in the upper part of the groove itself. The elastic yarn 11 will be therefore subjected to enter again the respective groove 15 in the right way as soon as it is disengaged from the needle 2.

In the same manner as above described, the selected length for grooves 15 also reduces all dangers of disengagement of the elastic yarns 11 due to their being impinged on by one or more needles 2.

The present invention attains the intended purposes.

The device in question, by virtue of the use of grooves of a wedge-shaped outline and of great length, brings an important improvement to crochet galloon looms in terms of liability in use, as far as the production of elastic manufactured articles is concerned.

In particular, due to the reduction in the risks of bad operation as regards the elastic yarns, the cases in which it is necessary to interrupt working in order to position the yarns again in the correct manner within the guide reeds are greatly reduced, and sometimes even eliminated.

Due to the improved liability in use thus achieved, it is also possible to increase the operating speed and therefore the knitting machine output.

Obviously modifications and variations can be made to the invention as conceived, all of them falling within the scope of the inventive idea.

Claims

1. A guide device for elastic yarns in crochet galloon looms, comprising at least a guide reed (12) extending horizontally above a plurality of needles (2) disposed mutually in side by side relation according to a horizontal plane and driven in reciprocating motion in the longitudinal direction, said guide reed (12) exhibiting, on one front surface (S) thereof, a plurality of vertical grooves (15) disposed parallelly alongside each other, each of which slidably engages an elastic yarn (11) so as to guide it towards a respective needle (2), and being rigidly connected to a supporting bar (14) moved in a horizontal reciprocating motion in order to transmit the elastic yarns (11) a reciprocating motion astride of said needles (2), characterized in that each of said vertical grooves (15) has a pair of slide surfaces (15a, 15b) joined together at an angle (α) the bisecting line (n) of which is normal to said one front surface (S), and acting simultaneously at laterally opposite positions on the respective elastic yarn (11) to hold it according to a predetermined positioning, that is in constant

alignment relation with said bisecting line (n),
irrespective of the diameter of the elastic yarn.

2. A device according to claim 1, characterized in
that the convergence angle (α) of said slide 5
surfaces (15a, 15b) has a value included be-
tween 60° and 90°.
3. A device according to claim 1, characterized in 10
that each of said vertical grooves (15) has a
vertical extension (H) of at least 10 mm.
4. A device according to claim 1, characterized in 15
that each of said vertical grooves (15) has a
vertical extension (H) corresponding to at least
ten times the distance existing between the
lower end of the groove and the lying plane of
the needles (2).

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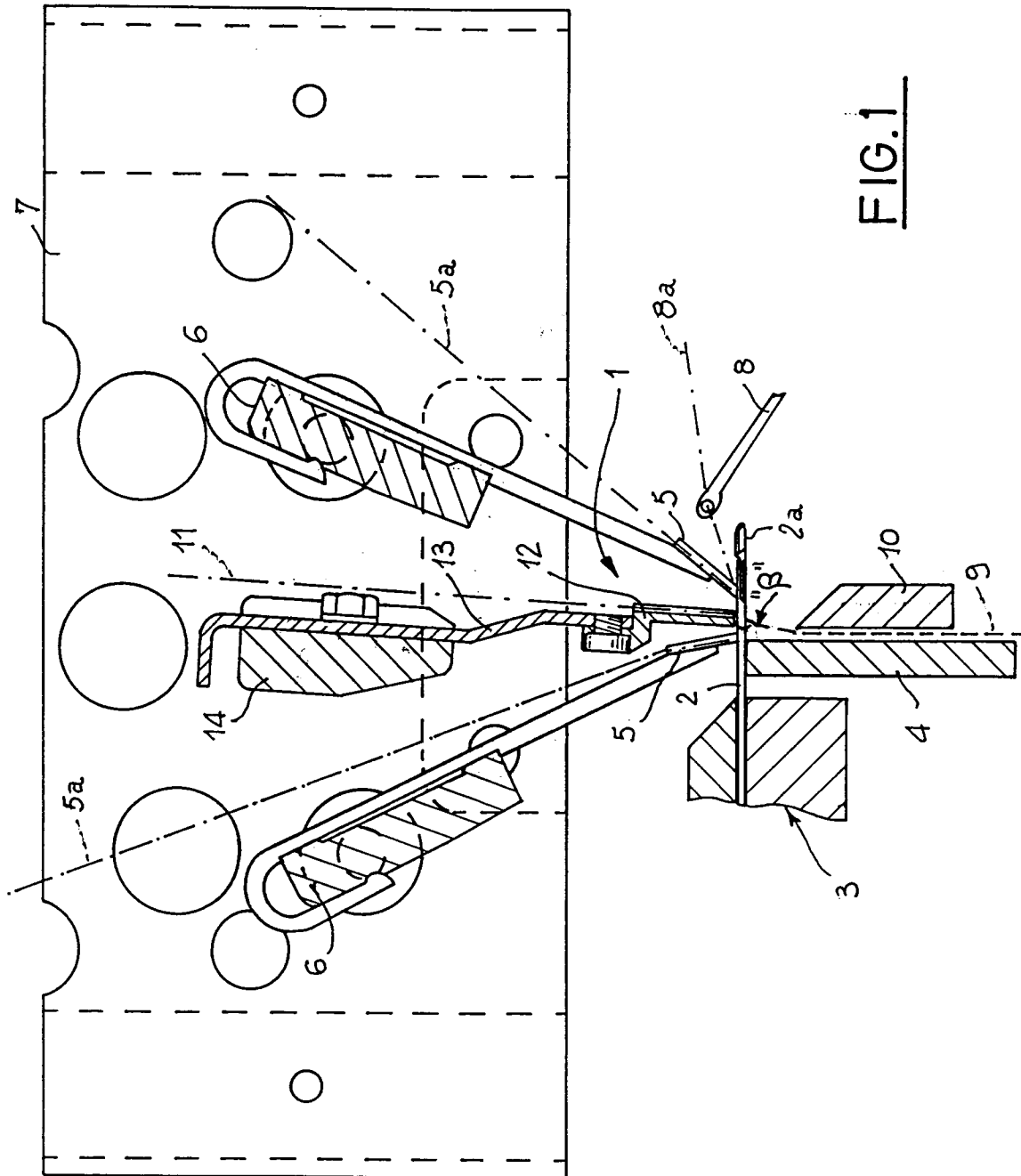


FIG. 1

