

[54] **ELASTIC RIBBON HAVING A BAND OF FANCY DESIGNS AND A METHOD OF MANUFACTURE OF THIS RIBBON**

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[52] **U.S. Cl.** 66/193

[51] **Int. Cl.** D04b 23/06

[58] **Field of Search** 66/190-195, 172 E, 202

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Primary Examiner—James Kee Chi

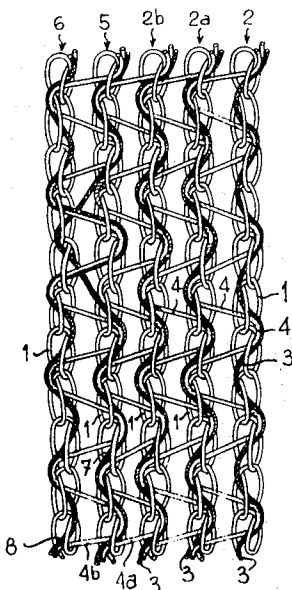
Attorney—Graybeal, Barnard, Uhler & Hughes

[57]

ABSTRACT

An elastic ribbon with fancy designs, especially intended for sewing on the edges of articles of underwear. The ribbon is produced on a straight drop-stitch loom and comprises two adjacent bands of elastic threads and non-elastic threads, one of said knitted bands being flat and uniform and having at least one elastic thread associated with a column of stitches, the other band being constituted by a succession of designs resulting from an association between at least two columns of stitches of non-elastic thread respectively associated with an elastic thread, and is coupled to said flat band by at least one non-elastic thread, in which the elastic thread of the column of stitches in the band of designs adjacent to said flat band has a length practically equal to that of the elastic threads of said flat band and smaller than that of the elastic threads of the other columns of stitches of said band of designs, at least one of the elastic threads of the columns of stitches of said band of designs being transposed here and there from the column of stitches with which it is associated and becoming integrated with one of the other columns of stitches of said band of designs, the transfer of the elastic thread affecting in all cases the column of stitches located on the border of said ribbon.

10 Claims, 13 Drawing Figures



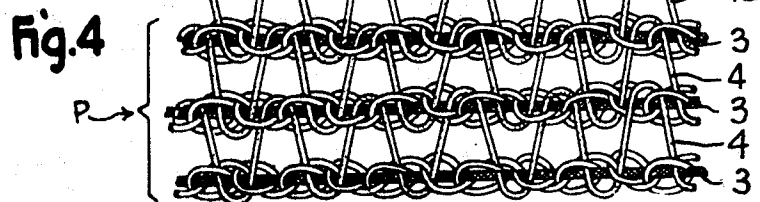
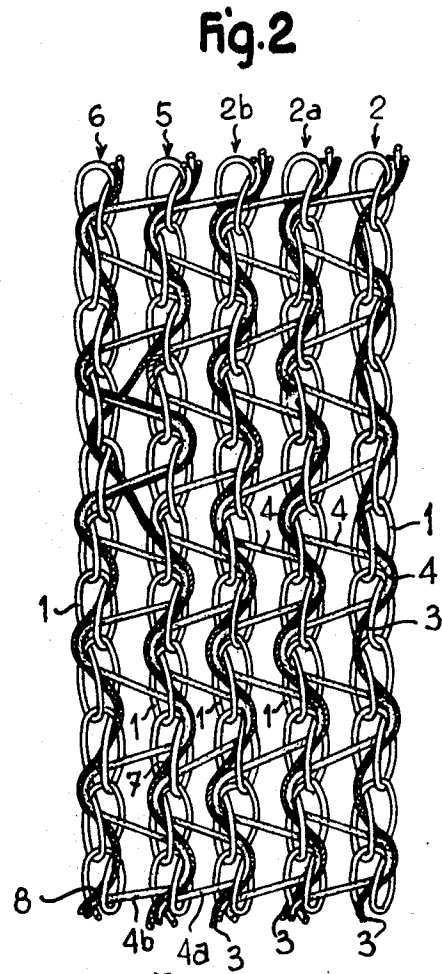
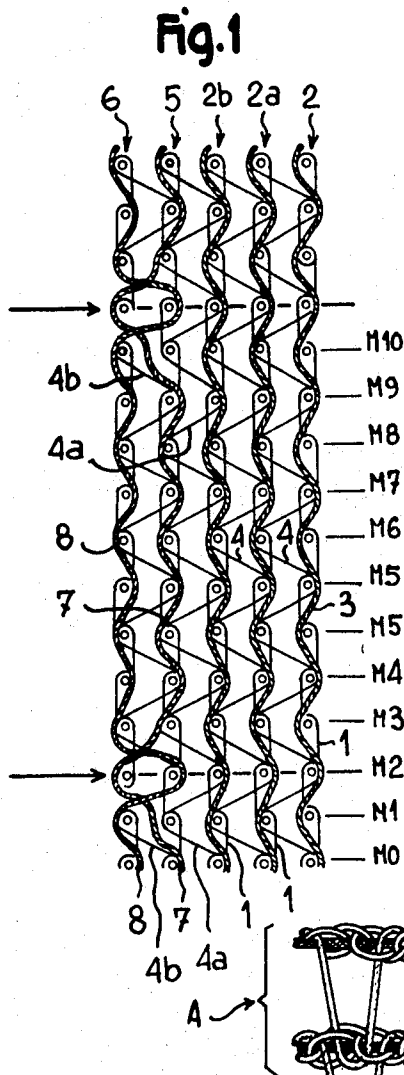
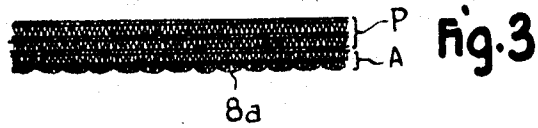


Fig. 6

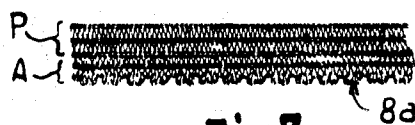


Fig. 7

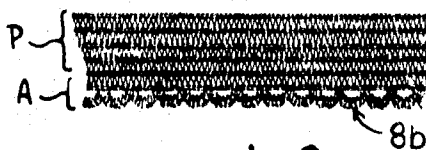


Fig. 9

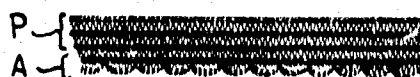


Fig. 5

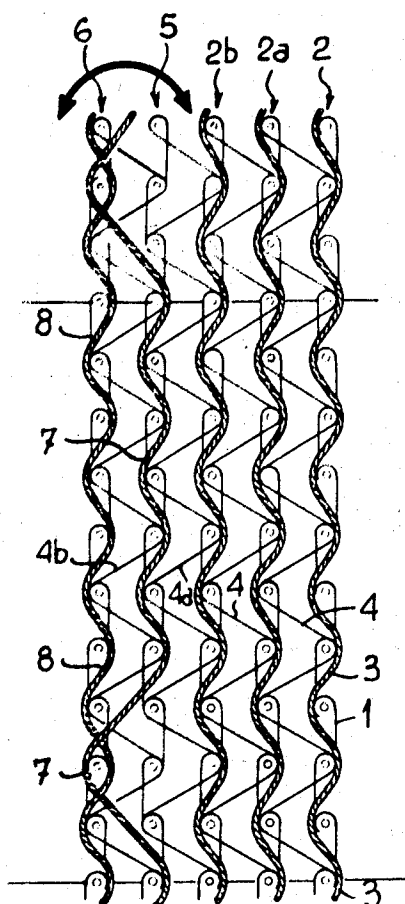
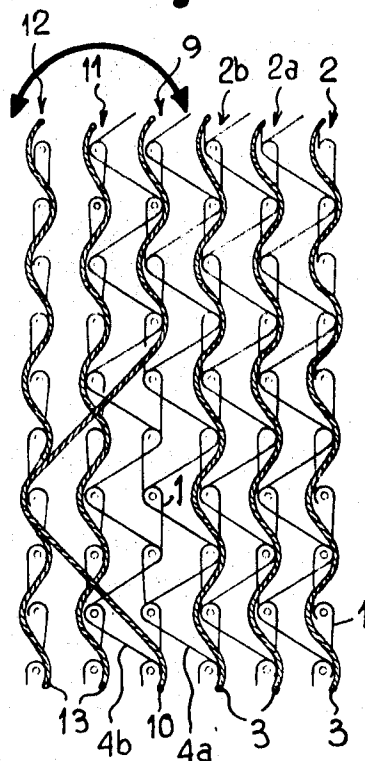


Fig. 8



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Fig. 11

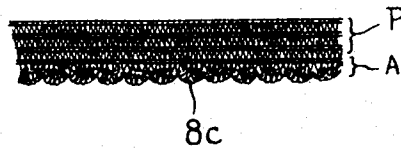


Fig. 10

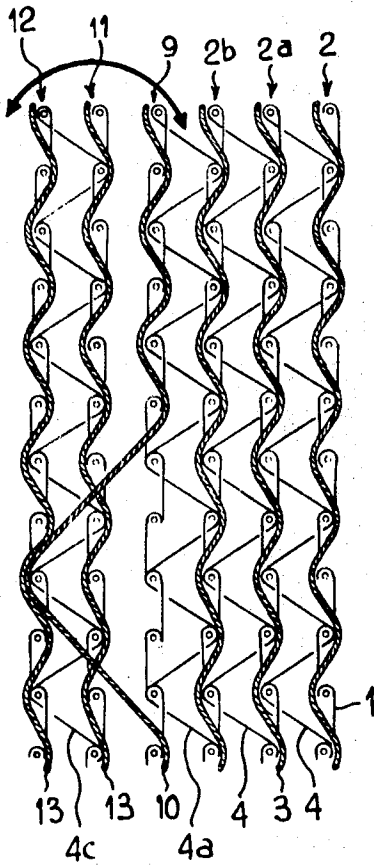


Fig. 12

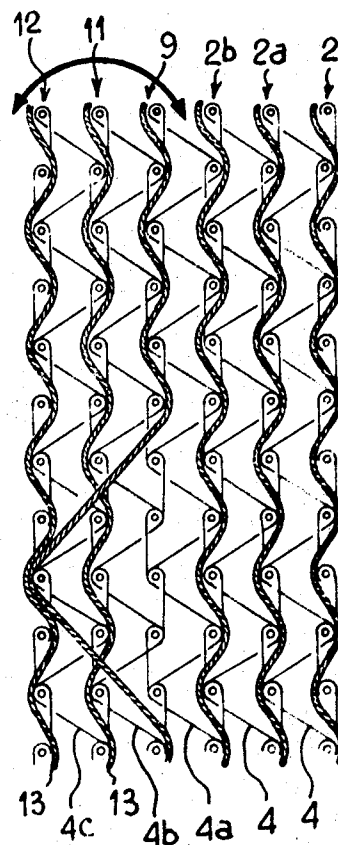
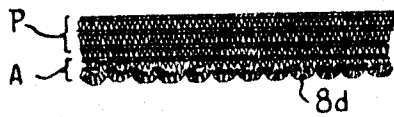


Fig. 13



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ELASTIC RIBBON HAVING A BAND OF FANCY DESIGNS AND A METHOD OF MANUFACTURE OF THIS RIBBON

The invention relates to an elastic ribbon having a succession of fancy designs on at least one of its edges. It also relates to a method of industrial manufacture of such a ribbon on a drop-switch loom.

Elastic ribbons are already known which make it possible to produce, conveniently by sewing, an edge of an article of underwear decorated with a design.

Ribbons of this kind in fact comprise two adjacent bands, one of which is flat and uniform and consists of columns of stitches of non-elastic threads, individually associated with an elastic thread and connected to each other either by weft threads or by threads of the said columns, this connection resulting from transfers of stitches between two adjacent columns.

The other band connected, in a similar manner, to the flat band is provided with a succession of designs resulting from a judicious association between at least two columns of stitches formed in a similar way to that of the columns of the flat band.

Ribbons of this kind can be advantageously produced on a drop-stitch loom and the flat band which they comprise can be easily sewn on the edge of an article of underwear, whereas the other band which has a general zig-zag shape, gives this latter a pleasing appearance and ensures good wearing qualities for the article.

The invention has for its object a ribbon of the type described above and having a structure and aesthetic appearance different from those of known elastic ribbons, this structure and aspect resulting from judicious working, on a drop-stitch loom, of certain elastic threads of the columns of stitches of the decorative band of a ribbon of this kind.

According to the invention, the elastic thread of the column of stitches which, in the design band is adjacent to the flat band, has per unit of length a length practically equal to that of the elastic threads of this flat band and smaller than that of the other elastic threads of the columns of stitches of the design band. In addition, at least one of the elastic threads of the end columns of stitches in the design band escapes from the column of stitches here and there so as to become integrated in the other end column of this design band.

Such a transfer of elastic threads gives designs which have an agreeable appearance, similar to that of the hoops of known bands of lace, and very different from the zig-zag appearance of the designs of known elastic ribbons.

The columns of stitches of the flat band can obviously result from knitting which effects transfers of non-elastic threads, which ensure connections between the adjacent columns of stitches, obviating the use of weft threads. In addition, in this portion of traditional knitting on a drop-stitch loom, it is not necessary to associate an elastic thread with each column of stitches.

Furthermore, such association of columns of stitches of a design band of this kind may lead to different variations as a function of the number of columns which it comprises. These associations may or may not be accompanied by conventional passages of non-elastic weft threads between the columns or transfers of stitches between two adjacent columns of this design band.

An aesthetic effect well adapted to an underwear decoration is obtained simply for the design band by providing two columns of stitches which are in consequence associated with elastic threads having different lengths when at rest. Transpositions of the elastic thread from one or the other of these columns of stitches, or combined transpositions of these two elastic threads on each side of their columns, thus enabling three alternative forms to be obtained.

Finally, in a remarkable alternative form of the invention, the ribbon is provided on each of its two edges with a band formed by a succession of designs repeated along the flat band. A ribbon of this kind may be used for example to form a shoulder-strap for an article of underwear.

The invention also relates to a method of production on a drop-stitch loom of an elastic ribbon similar to the elastic ribbon described above, the utilization of a loom of this kind for carrying this method into effect resulting in particularly advantageous production costs of the elastic ribbons which can thereby be manufactured.

Other characteristic features and advantages of the invention will become apparent from the description which follows below with reference to the accompanying drawings, the description and drawings being given only by way of example and not in any limitative sense.

In these drawings:

FIG. 1 shows diagrammatically a weave for a ribbon according to the invention;

FIG. 2 shows to a larger scale and in the stretched state as it would appear on a drop-stitch loom, a ribbon corresponding to the weave of FIG. 1;

FIG. 3 shows the ribbon of FIG. 2 in a state of rest;

FIG. 4 shows to a larger scale a remarkable portion of the ribbon of FIG. 3;

FIG. 5 shows diagrammatically a weave of an alternative form of ribbon according to the invention;

FIGS. 6 and 7 show two alternative forms of ribbon which can be obtained from the weave of FIG. 5;

FIGS. 8 and 9 show respectively a weave and an alternative form corresponding to this weave, of a ribbon according to the invention;

FIGS. 10 and 11 show respectively a further weave and the corresponding alternative form of a ribbon according to the invention;

FIGS. 12 and 13 show respectively a further weave and the corresponding alternative form of a ribbon according to the invention.

In FIG. 1 there can be seen a non-elastic thread 1, stitched by conventional working of the needles and thread throwers of a drop-stitch loom, in the form of a column of stitches 2. An elastic thread 3, suitably stretched on this loom, passes alternately on each side of each stitch MO, M1, M2, . . . of this column, with which it is thus associated.

Two other columns 2a, 2b produced in exactly the same manner as column 2, from non-elastic threads 1 and elastic threads 3, are arranged parallel alongside this column 2 and each column 2 to 2b is coupled in the usual manner to the adjacent column by a non-elastic thread 4 so as to form a weft of one band of usual elastic fabric.

Two other columns of stitches 5 and 6 are similarly produced from a non-elastic thread 1 on the side of the column 2b opposite to the column 2a, and are respectively associated in the manner described above with elastic threads 7 and 8, weft threads 4a, 4b respectively

coupling together the columns 2b and 5 on the one hand and the columns 5 and 6 on the other.

It should be specified that the elastic threads 3, 7 and 8, made of rubber, are identical with each other. In addition, the threads 3 and the thread 7 are subjected on the loom to tensions which are equal to each other and which produce the usual elongations of these elastic threads, at least equal to 200 percent.

The elastic thread 8 is subjected to a very small tension and is delivered to its column by a system of regulation which delivers a uniform length of thread during the course of working of the loom, this length of thread, taken in the state of rest, being substantially greater than that, also taken at rest, of one of the four other threads 3 and 7, after they have passed out of the loom.

Furthermore (FIGS. 1 and 2) during the course of working on the loom, the elastic thread 7 is disengaged from the stitch MO of its column 5 and is transposed to the opposite side of the stitch M2 of column 6, after which it is again led to the opposite side of the stitch M4 of its column 5. It then winds uniformly in and out on each side of the stitches M5 to M10 of this column 5. After this stitch M10, after transposition is effected, similar to that described above.

In addition, the elastic thread 8 winds in and out in the usual way on each side of the stitches of its column 6, with the exception however of the stitch M2 of this column 6; at this level, it is in fact transposed to the opposite side of the stitch M2 of column 5.

As and when the ribbon thus formed is released by the loom, the tension of the elastic threads diminishes so that the elastic threads 3 take up a straight-line position and the fabric formed by the columns 2, 2a, 2b and the weft threads 4 is presented in the form of a flat band "P" of conventional elastic knitting (FIGS. 3 and 4). In addition, the particular coupling at the level of the stitches M2 of the columns 5 and 6 causes pinching of this latter on the column 5, and the elastic thread 8 tends, between two successive pinchings, to take the form of a hoop 8a further coupled at its base 5 by radii formed by the weft thread 4b.

In FIG. 4, it has especially been attempted to give a clear representation of the respective positions of the threads which give this hoop effect in the slack state. In fact, the stitches M1 to M3 of columns 5 and 6 are closely bound to each other (FIG. 3) and the ribbon is presented in the form of two adjacent bands, one flat and uniform "P" being constituted by three columns 2, 2a, 2b, while the other "A" has a succession of hoops formed by the couplings of column 6 to column 5.

Furthermore, as shown in FIGS. 5 and 6, it is possible to obtain a ribbon similar to the ribbon of FIG. 3 solely by effecting here and there a transposition of the elastic thread 7 on stitches of column 6, the elastic thread 8 winding in and out in the usual way, under a particular tension in its column of stitches 6.

It will be noted (see FIG. 7) that there is obtained by way of an alternative, a band of free hoops 8b by eliminating the weft thread 4b.

It would also be possible to cause the elastic thread 7, subjected to exactly the same tension as that of the thread 3, to wind in and out in a continuous manner in the stitches of column 5, and to ensure the formation of hoops by transpositions of the thread 8 on stitches of column 5.

The alternative forms of ribbon described above each have a band of designs which comprises solely two col-

umns of stitches. It is also possible to obtain a hoop effect from a band consisting of three columns, each associated in an appropriate manner with an elastic thread.

Thus, as shown in FIGS. 8 and 9, a flat and uniform band constituted in this example by three columns 2, 2a, 2b, identical with those described above, may be coupled by a weft thread 4a to another band comprising:

A column 9 formed in a manner identical with that of column 5 from a non-elastic thread 1 and an elastic thread 10 identical with the thread 3 of the three columns 2 to 2b;

Two further columns 11 and 12 identical to each other, each associated with an elastic thread 13 and similar to column 6 of the alternative form shown in FIG. 5.

In this alternative, a weft thread 4b couples together only the columns 9 and 11, and the hoop effect is obtained by transposition at intervals, of the elastic thread 10 of column 9 on the stitches of column 2 forming the border of the design band of the ribbon.

The ribbon produced has two succession of hoops 8a, 8b; the hoops 8b corresponding to column 12 are completely free, while the hoops 8a produced from column 11 have radiating threads corresponding to the weft thread 4b.

A further alternative form of band of hoops 8c can be obtained, as shown in FIGS. 10 and 11, by eliminating the weft thread 4b and coupling together the columns 11 and 12 by a weft thread 4c.

Finally, as shown in FIGS. 12 and 13, another alternative form having a succession of hoops 8d comprises weft threads 4a, 4b, 4c which respectively ensure the couplings between the columns 2b and 9, 9 and 11, 11 and 12.

It is clear that similar results would be obtained by carrying out other transpositions of elastic threads causing the intervention of the border column 12 of the design band, for example by transposing the elastic thread 13 of column 12 on column 9, or by effecting, at the same knitting level, a combination of transfers as mentioned above.

It will be observed that ribbons such as those described above may be produced by working a number of elastic threads at most equal to that of the columns of stitches of their band of knitting and of their band of designs, since it is not necessary to associate an elastic thread with each column of stitches of the band of knitting to obtain this scallop edging effect.

Furthermore, the forms of construction of elastic ribbon described above comprise, both in their conventional knitted portion "P" and in their design band "A", weft threads 4 to 4c which ensure the couplings between adjacent columns of stitches. It is possible to eliminate such weft threads by ensuring these couplings by conventional transfers of stitches from one column to an adjacent column.

Finally, the elastic threads of the design band "A" could have a nature and/or a section different from that of the elastic threads of the band "P" of conventional knitting, and could be worked on the loom under a tension similar to that of the elastic threads of this band "P", the differences of nature or section between the elastic threads of these two bands "A" and "P" being chosen in such manner as to ensure, when at rest, the formation of hoops such as those described above.

It will of course be understood that the present invention is not limited to the terms of the preceding description but that it comprises on the contrary all the alternative forms within the scope of those skilled in the art.

What I claim is:

1. An elastic ribbon manufactured on a knitting machine having elastic threads worked in weft and non-elastic threads worked in stitch and in weft, comprising: two laterally adjacent bands interconnected by at least one non-elastic thread;

the first of said bands comprising a flat band of elastic knitting having columns of stitches with a single elastic thread associated with each column of stitches;

the second of said comprising at least two columns of stitches having a succession of designs repeated longitudinally therealong formed by a single elastic thread associated with each of said columns of stitches;

the elastic thread associated with the column of stitches of said second design band adjacent said first knitted band being substantially straight in the unstretched position and having a length substantially equal to the unstretched length of the elastic threads associated with each column of stitches of said first knitted band and being shorter than the elastic thread associated with the column of stitches of said second design band positioned at the extreme edge of said second design band away from said first knitted band; and

at least one of the elastic threads associated with at least one of said two columns of stitches of said second design band being transposed at intervals to the opposite extreme column of stitches of said second design band.

2. The ribbon of claim 1 wherein the elastic thread associated with the column of stitches of said second design band located on the edge of the ribbon away from said first band is integrated at longitudinally spaced points in the second column of stitches from said edge.

3. The ribbon of claim 1 wherein the elastic thread associated with the column of stitches of said second design band located on the edge of the ribbon away from said first band is integrated at longitudinally spaced points in the third column from said edge.

4. The ribbon of claim 1 wherein the elastic thread associated with the second column of stitches of said second band from the edge of the ribbon is integrated at longitudinally spaced points in the edge column of stitches.

5. The ribbon of claim 1 wherein the elastic thread associated with the third column of stitches of said design band from the edge of the ribbon is integrated at longitudinally spaced points in the edge column of

stitches.

6. The ribbon of claim 2 wherein the elastic thread associated with the edge column of stitches of said second design band is integrated at longitudinally spaced points in the second column of stitches from the edge of the ribbon, and the elastic thread associated with the second column of stitches of said design band from the edge of said ribbon is integrated at the same longitudinal positions in the edge column of stitches.

7. The ribbon of claim 3 wherein the elastic thread associated with the edge column of stitches of said second design band is integrated at longitudinally spaced points in the third column of stitches from the edge of the ribbon, and the elastic thread associated with the third column of stitches of said design band from the edge of said ribbon is integrated at the same longitudinal positions in the edge column of stitches.

8. The ribbon of claim 1 wherein said ribbon does not include a coupling thread between two adjacent columns of stitches of said second design band.

9. The ribbon of claim 1 including a second design band symmetrically positioned on each lateral side of said first knitted band.

10. A method of manufacture on a knitting machine of a ribbon having a first knitted band laterally interconnected with a second design band comprising:

producing a band of knitting from non-elastic threads worked in stitches and in weft and from elastic threads worked in weft;

knitting on at least one side of said band at least two columns of stitches on non-elastic threads each associated respectively with a single elastic thread; working a non-elastic thread in weft between the band of knitting and the next adjacent column of stitches to interconnect said band of knitting and said at least two columns of stitches to form a ribbon having a number of elastic threads at most equal to the number of columns of stitches in said ribbon;

said method additionally including the steps of forming said at least two columns of stitches by working an elastic thread in weft in each column of stitches including working an elastic thread in the edge column of stitches away from said knitted band having an unstretched length greater than the unstretched length of each elastic thread of said knitted band and greater in length than the unstretched length of the elastic band associated with the remaining columns of said at least two columns of stitches; transferring, at longitudinally spaced intervals, the elastic thread associated with the column of stitches distant from said knitted band, to one of the at least two columns of stitches laterally positioned therefrom.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,740,974 Dated June 26, 1973

Inventor(s) Alain Charles Bourgeois

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 3, line 23, change "after" (second occurrence)
to -- another --.

Column 4, line 21, change "2" to -- 12 --.

Column 5, line 15, after "said" insert -- bands --.

Signed and sealed this 27th day of November 1973.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

RENE D. TEGTMEYER
Acting Commissioner of Patents