United States Patent [19]

Tschumperlin

[11] **3,911,700**

[45] **Oct. 14, 1975**

[54] **FLAT KNITTING MACHINE WITH YARN CHANGE MECHANISM**

[75] Inventor: **Karl Tschumperlin**, Dietikon, Switzerland

[73] Assignee: **MADAG Maschinen-und Apparatebau Dietikon AG**, Dietikon, Switzerland

[22] Filed: **July 31, 1973**

[21] Appl. No.: **384,250**

[30] **Foreign Application Priority Data**

Aug. 16, 1972 Germany 2240158

[52] **U.S. Cl.** **66/127**

[51] **Int. Cl.** **D04b 15/52**

[58] **Field of Search** 66/125, 126, 127

[56] **References Cited**

UNITED STATES PATENTS

1,571,769	2/1926	Fels	66/127
2,026,744	1/1936	Lippitt	66/127
2,755,647	7/1956	Hafner	66/127
3,390,551	7/1965	Dhondt	66/127

FOREIGN PATENTS OR APPLICATIONS

1,122,783	9/1956	France	66/127

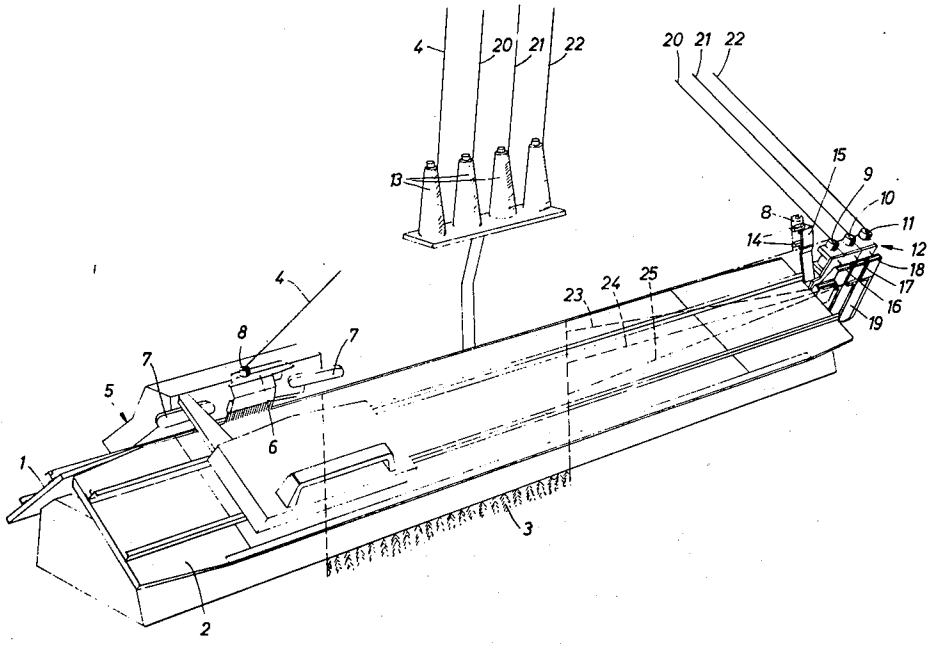
Primary Examiner—Ronald Feldbaum

Attorney, Agent, or Firm—Werner W. Kleeman

[57] **ABSTRACT**

A flat knitting machine provided with yarn change mechanism and stitch stripper and a cam assembly movable to-and-fro over at least one needle bed as well as with yarn guides located laterally of the needle bed and each associated with a respective yarn, the yarn guides being movable into or out of the knitting position via a control or switch mechanism controlled by the cam assembly movement. According to the invention, the yarn guides brought out of the knitting position can assume a position in which the yarn guide outlet ends are located beneath the start of the cloth.

1 Claim, 2 Drawing Figures



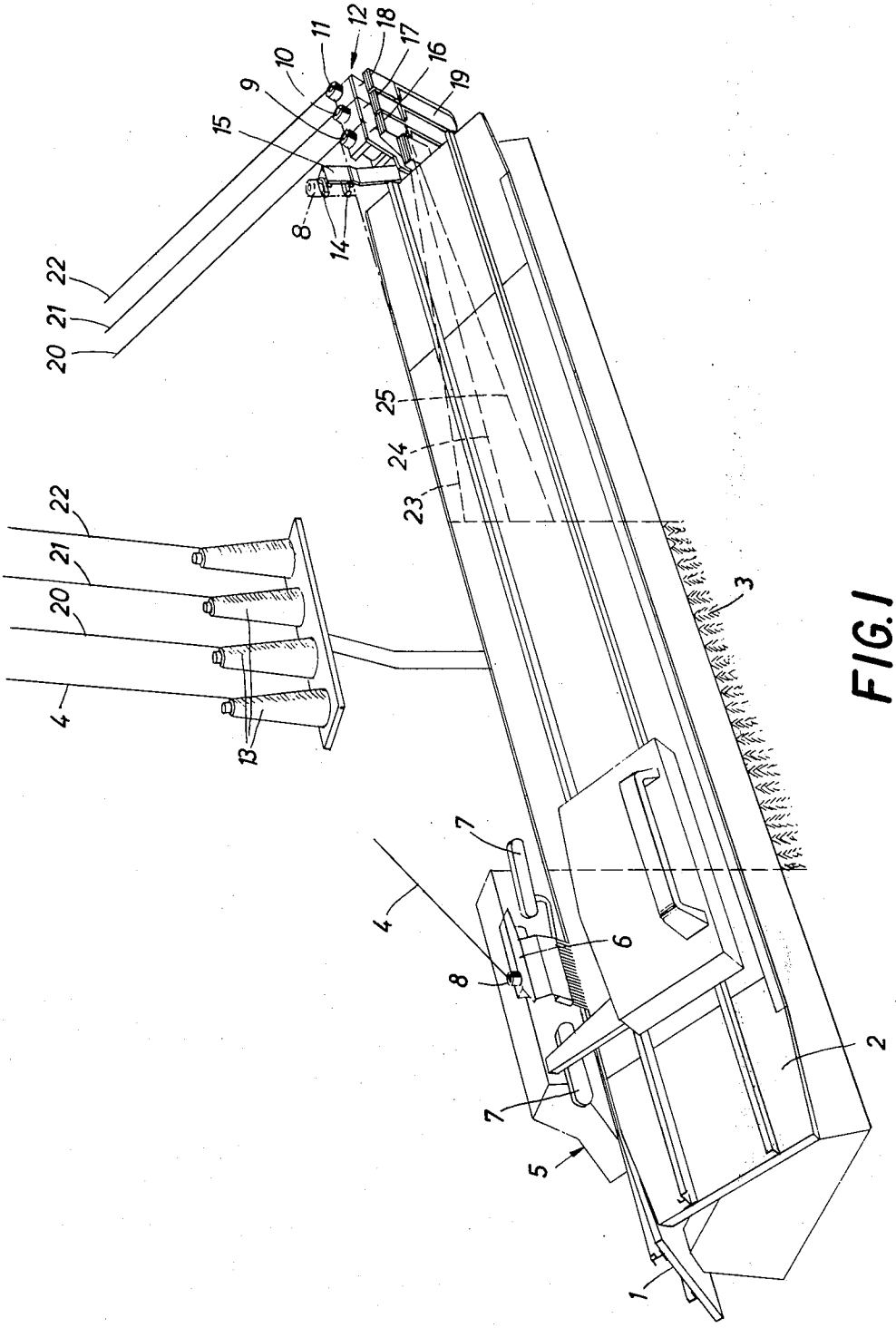

12
18
17
16
19
11
10
9
15
8
14
22
21
20
25
24
23
3
22
21
20
4
13
7
4
6
8
2
7
5
1

FIG. 1

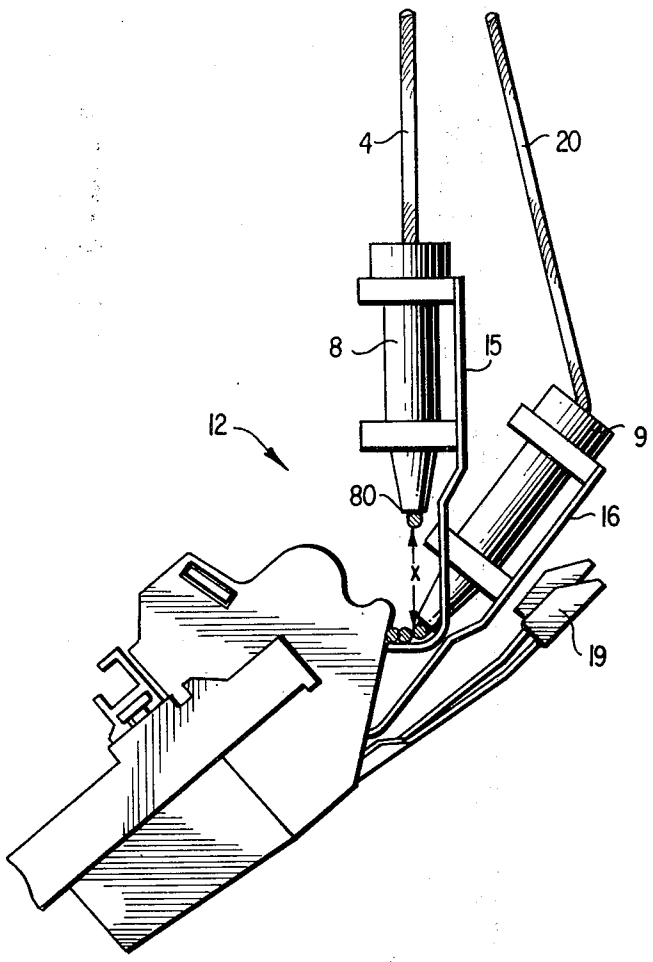


FIG. 2

FLAT KNITTING MACHINE WITH YARN CHANGE MECHANISM

BACKGROUND OF THE INVENTION

The present invention relates to a flat knitting machine with yarn change mechanism and stitch stripper and with a cam assembly which is movable to-and-fro over at least one needle bed as well as with yarn guides located laterally of the needle bed and each associated with a respective yarn, the yarn guides can be brought into or out of the knitting position by means of a switching or control mechanism controlled by the cam assembly movement.

With a state-of-the-art flat bed knitting machine of this type, the yarn guides which are brought out of the knitting position assume a position in which the outlet ends of the yarn guides are located above the start of the cloth or fabric. In this connection attention is directed to Swiss Patent No. **387,858.** The drawback of this prior art apparatus resides in the fact that the yarns which are momentarily not used cross the planes in which the cam assembly moves to-and-fro. Hence, there is present the danger that the stitch stripper coupled with the cam assembly will be hindered by the yarns which are momentarily not used, or that the stitch stripper will damage such yarns.

The problem could be solved, for instance, in that there is dispensed with the use of the stitch stripper and instead of the same there is suspended a weight at the knitted web or that the stitched web is withdrawn from the machine by means of another additional device, as such has been disclosed for instance for another prior art apparatus in French Patent No. **689,727.** However, this is associated with the drawback that the flat knitting machine is increased in size by virtue of such additional device which, moreover, is more complicated and expensive than the stitch stripper which has proven itself in practice.

SUMMARY OF THE INVENTION

Hence, it is a primary object of the present invention to provide an improved construction of flat knitting machine which is not associated with the aforementioned drawbacks and limitations of the prior art proposals.

Another and more specific object of the present invention relates to an improved construction of flat knitting machine with a yarn change mechanism and stitch stripper wherein the flat knitting machine is of simple construction and design, and wherein further there is precluded any hindrance of the stitch stripper by non-used yarns or threads.

Now in order to implement these and still further objects of the invention, which will become more readily apparent as the description proceeds, the flat knitting machine of the previously mentioned type is constructed in such a way that the yarn guides which are brought out of the knitting position assume a position in which the outlet ends of such yarn guides are located beneath the start of the cloth or fabric. Since those yarns which are not being used at the moment are always located beneath the plane of movement of the cam assembly, they cannot hinder the stitch stripper. The stitch stripper, which is an element which has proven itself in practice, of the cam assembly or carriage can press against the knitted goods or cloth, so that it is not necessary to provide, in addition to the machine or externally of the machine, devices which maintain the knitted goods under tension.

BRIEF DESCRIPTION OF THE DRAWING

The invention will be better understood and objects other than those set forth above, will become apparent when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawing wherein FIG. **1** schematically illustrates enough of the essential components of the flat knitting machine of this invention so as to understand the underlying concepts thereof and FIG. **2** is a side elevation of a more detailed view of the storage assembly of FIG. **1** with yarn guides positioned therein.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Describing now FIG. **1,** there is depicted therein a flat knitting machine constructed according to the teachings of the present invention and wherein for the sake of clarity in illustration only enough of the essential components of the knitting machine have been depicted so as to enable those versed in the art to fully understand the underlying concepts of this development. Hence, the illustrated flat-bed knitting machine will be seen to comprise two needle beds **1** and **2** in which there are displaceably mounted standard latch needles. A carriage **5** is arranged above both of the needle beds **1** and **2,** and in such carriage there is located a conventional needle cam assembly for actuating such needles. The knitting operation occurs by virtue of the to-and-fro movement of the carriage **5** over both of the needle beds **1** and **2.** There is thus produced a web **3** of the knitted goods or cloth. At the carriage **5** there is located a conventional stitch stripper **7.** This stripper **7** acts upon the knitted cloth or goods, smooths and aligns the same.

Further, a support **6** is provided at the carriage **5,** this support **6** being extended or ejected during the movement of the carriage **5** at the region of a control rail which is mounted at the needle beds **1** and **2.** The support **6** carries a holder at which during knitting there is retained a small yarn guide shell or collar **8.** Exactly similarly constructed yarn guide shells **9, 10** and **11** are located at this time at a storage **12.** All four yarn guide shells **8, 9, 10, 11** guide a respective one of different colored yarns or threads, with which there is to be alternately knitted and which are withdrawn from the supply spools **13** or the like.

The yarn guide element, namely the yarn guide shell **8,** carries a yarn or thread **4** and is transferred from holders **14** in the manner of a type of relay transfer operation. The holders **14** are located in pairs at each of four carrier or support levers **15, 16, 17** and **18** arranged at the storage or storage device **12.** Each carrier lever **15, 16, 17** and **18** has associated therewith a selector lever **19,** with the aid of which there can be undertaken a pre-adjustment for the next color change.

The change of the momentary yarn guide shell **8, 9,** 10, 11 occurs via an automatic mechanism which is controlled by the movement of the carriage **5.** By means of this mechanism the relevant carrier or support lever **15, 16, 17, 18** is brought into the position in which there is located the support or carrier lever **15** in the illustrated embodiment. In so doing there is insured that initially the yarn guide shell **8** will be transferred to the associated support or carrier lever **15,** by

means of which there is to be momentarily carried out the knitting operation, before another yarn guide shell **9, 10, 11** is tapped for a further stitch row.

In this way it is possible to further work with one of the other yarns or threads **20, 21** or **22.** The details of operating the color change mechanism discussed above for the flat knitting machine have been disclosed in Swiss Patent No. **537,480,** the disclosure of which is incorporated herein by reference.

Those yarns, which have already been connected with the web **3** of the knitted goods or cloth by virtue of the preceding knitting operations or movements, and which are guided through the yarn guides or shells **9,** 10, 11, which are not located in the knitting position, extend beneath the working plane of the knitting cam assembly and externally of the path of the stitch stripper **7.** Their course has been depicted in the exemplary embodiment under discussion by the broken lines **23,** 24 and **25.**

FIG. **2** is a side elevation of the storage element **12** shown in FIG. **1** and more clearly illustrates the relative positions of the movable yarn guides **8, 9, 10** and **11** and the associated yarn carried by the guides. For example, yarn guide **8** carries thread **4** from supply spool **13** to the fabric being knitted. As shown in FIG. **2,** yarn guide **8** is in an intermediate position prior to its being carried to the knitting position which is shown in FIG. **1.** Thus, yarn guide **8** is first pivoted from an inclined (or rest) position, which is best seen by referring to the remaining yarn guides **9, 10** and **11,** to an upright position which is shown in phantom in FIG. **1** and in greater detail in FIG. **2.** The yarn guide outlet **80** of yarn guide **8** is thereby carried to an elevation corresponding to the last knitted course of the fabric being knitted which is above the outlets of the yarn guides at rest by an amount shown by the letter X. Stated another way, the yarn guides at rest have outlets which are below the last knitted course of the fabric being knitted, as is shown by the phantom lines **23–25** of FIG. **1.** In this manner the threads carried by the yarn guides at rest will not become entangled with the cam assembly which carries the appropriate yarn guide to the knitting position.

While there is shown and described present preferred embodiments of the invention, it is to be distinctly understood that the invention is not limited thereto, but may be otherwise variously embodied and practiced within the scope of the following claims. Accordingly,

What is claimed is:

1. In a flat knitting machine having a yarn change mechanism and stitch stripper and a cam assembly which can be moved to-and-fro over at least one needle bed as well as yarn guides having outlet ends and located laterally of the needle bed and each associated with a respective yarn, the yarn guides being movable via a control mechanism controlled by the movement of the cam assembly into or out of the knitting position, the improvement comprising a plurality of support levers each having holders for releasably holding a respective one of said yarn guides, each of said support levers being movable from a first, lower position to a second, upper position, said first position being the rest position of said yarn guides, said second position being the position by which said cam assembly can pass alongside said yarn guide and transfer said yarn guide into and out of the knitting position, the outlet end of said yarn guide in its first position being located below the last knitted course of yarn to prevent entanglement of yarn from said outlet to said knitted fabric by said cam assembly movement, the outlet end of said yarn guide in the second position situated at an elevation above the outlet ends of said yarn guides in its rest position, said elevation being approximately the same as the last knitted course of yarn in the knitting position.

* * * * *