May 19, 1959 C. F. BROWN ET AL 2,886,959

YARN CONTROLLING DEVICE AND METHOD OF KNITTING

Filed June 1, 1954 2 Sheets-Sheet 1

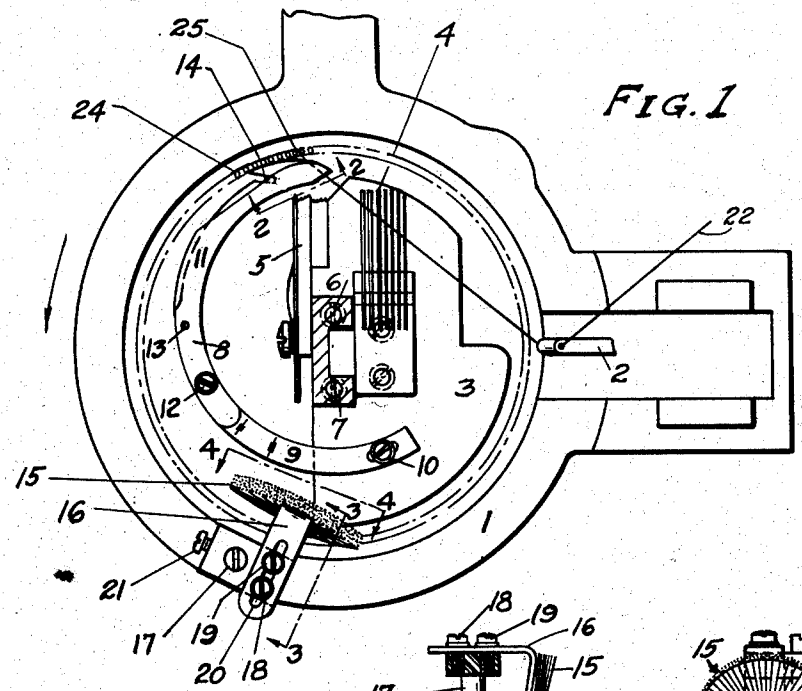


FIG. 1



FIG. 2

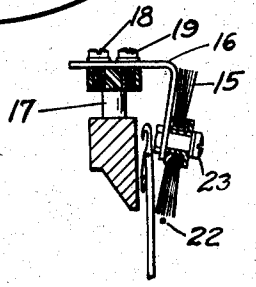


FIG. 3

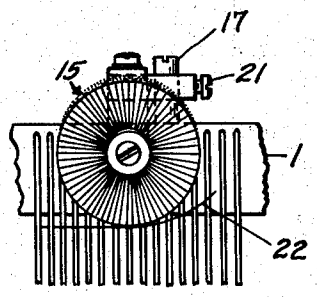


FIG. 4

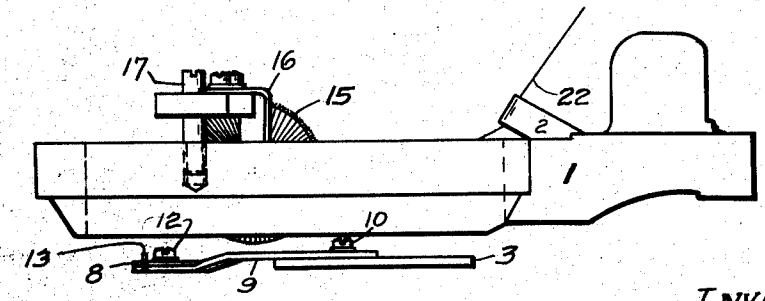


FIG. 5

INVENTORS:
CHARLES F. BROWN
ISAAC H.C. GREEN

BY

ATTY.

May 19, 1959 C. F. BROWN ET AL 2,886,959

YARN CONTROLLING DEVICE AND METHOD OF KNITTING

Filed June 1, 1954 2 Sheets-Sheet 2

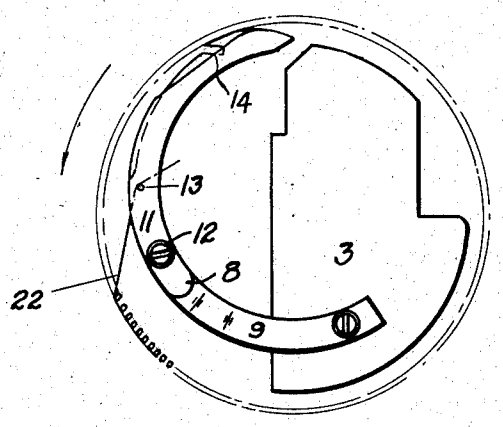


FIG. 6

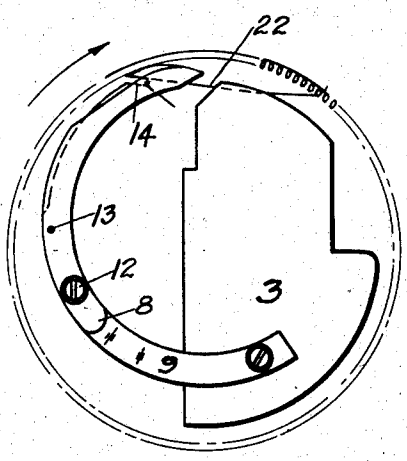


FIG. 7

INVENTORS:-
CHARLES F. BROWN
ISAAC H. C. GREEN
BY
ATTY.

United States Patent Office 2,886,959 Patented May 19, 1959

2,886,959

YARN CONTROLLING DEVICE AND METHOD OF KNITTING

Charles F. Brown and Isaac H. C. Green, Pawtucket, R.I., assignors to Hemphill Company, Pawtucket, R.I., a corporation of Massachusetts

Application June 1, 1954, Serial No. 433,498

10 Claims. (Cl. 66—140)

This invention relates to circular, independent needle, knitting machines. It is particularly concerned with hosiery machines, and auxiliary equipment for automatic yarn cutters and binders in such machines.

In solid color pattern hosiery knitting machines of the so-called "single feed" type, for example, the one described in co-pending U.S. application No. 341,582 filed March 10, 1953, now Patent No. 2,861,441, each pattern area is knit as a unit of a single yarn. When a unit has been knit with a particular yarn, that yarn is automatically severed from the fabric and held in a binder while other yarns knit other units. The loose ends of severed yarn left trailing from the fabric as a result of the severing and binding operation have always presented a problem in automatic knitting of this type. This free end is generally an inch or more in length and has a tendency to be caught into the hooks or underneath the latches of the needles which are knitting another area with a different yarn. The accidentally caught yarn may be brought to the face of the fabric in the other area and shows up as a blemish in the finished article.

One of the principal objects of the present invention is to provide a method of knitting and a mechanism which will insure that free ends of yarn trailing from one pattern area of the fabric as a result of automatic severing are prevented from being caught into other pattern areas. Other objects are to lock-in the incoming and outgoing ends of pattern yarns, and to improve the sutures between pattern areas.

These objects are accomplished by drawing the trailing end of yarn in front of and under the latches of a number of suture needles, and then behind the rest of the needles; and holding it there by means of a yarn trapper or a brush.

A preferred embodiment of the invention is set forth in the accompanying drawings in which:

Figure 1 is a top view of part of a knitting machine equipped with the mechanism of the invention;

Figure 2 is a side view of one feature of the mechanism along the line 2—2 of Figure 1;

Figure 3 is a sectional view along the line 3—3 of Figure 1;

Figure 4 is an interior view from the line 4—4 of Figure 1;

Figure 5 is a front view of the mechanism; and

Figures 6 and 7 are plan views showing different stages in the operating cycle of the invention.

Referring to Figure 1, a conventional carrier ring 1 supports in the usual manner a plurality of yarn feeding levers, such as 2, and a binder plate 3 which, in this case, carries a plurality of individual yarn binders such as 4. At one side of the binder plate is a yarn cutter 5 which is secured to the plate by screws 6 and 7.

The binder plate 3 also supports a yarn trapping device 8 which consists of a supporting member 9 adjustably screwed to the binder plate at 10 and a spring element 11 lying on top of the supporting member 9 and secured to it by a screw 12. A pin 13, the function of which will be described later, passes from the supporting member 9 up through an opening in spring member 11. The spring member 11 is bent upwards at its leading end, as shown in Figure 2, to aid it in engaging the severed ends of yarn which trail from the fabric, and thus trap them between the members 9 and 11. At the leading edge of the supporting member 9 is a notch or slot 14. The function of this notch will be described later.

Figure 1 also shows a brush 15 supported by a bracket 16 which is carried by a stud 17 (see Figure 3) tapped into the carrier ring. The brush is made adjustable in a horizontal plane by the combination of screws 18 and 19 and slot 20. It is radially and vertically adjustable on the stud 17 by means of set screw 21.

After a particular pattern area has been knit with a yarn such as 22, the yarn feeding lever 2 is raised out of action during a counter-clockwise stroke of the cylinder to discontinue the feeding of the yarn. As the needles rotate past the yarn feeding lever 2 going into inactive position, the yarn 22 is drawn from the last needle to knit it in front of a few inactive needles, and then between the needles, through the binder 4, which has been automatically opened at the proper time (by a mechanism not shown), and under the raised tip of the spring member 11 of the trapper assembly 8, as shown in Fig. 1.

When the cylinder has turned a few degrees further than the position shown in Figure 1, the yarn 22 trailing within the needle circle is drawn into the cutter 5 and severed. The severed end, on the fabric side, continues to slide between the spring member 11 and the supporting member 9 of the trapping device 8 as the needles continue to rotate in a counter-clockwise direction until it engages the pin 13 which prevents it from getting caught in the area where these two members are tightly held together by the screw 12 (see Figure 6). If the yarn is caught here, it tends to break off the pile up between the spring 11 and its support 9, thus interfering with the binding function of the spring.

When the cylinder reverses its stroke and the needles travel in a clockwise direction, the end of yarn is drawn between the members 11 and 9 until it engages the recess 14 as shown in Fig. 7. Then, it is drawn through the recess and underneath the member 9 and the binder plate 3, as shown in Fig. 7.

Up to this point, the severed yarn has been kept from springing into the hooks, or under the latches, of the knitting needles because its end has been held by the trapping mechanism 8. After the end leaves the trapper 8 and passes under the binder plate 3 in the manner just described, it is held down by the binder plate 3 during the continuing clockwise stroke of the cylinder until it reaches the area of the brush 15. At this point, the end of yarn passes out from under the plate 3 but it is engaged by the brush 15 and wiped down flat behind the needles, as shown in Figure 4. As the cylinder reciprocates back and forth in clockwise and counter-clockwise directions, the yarn end is wiped behind the needles by the brush 15, first in one direction and then in the other, thus holding the yarn tight across the front of the inactive needles.

The brush shown is circular i.e. radially tufted, but not freely rotatable. This insures that the yarn, even if it is knocked about by lint or other causes, will be engaged by the bristles and drawn down flat behind the needles. The brush can be turned to compensate for wear and extend its useful life by loosening the screw 23.

If the end of yarn trailing within the needle circle is pulled out of the trapper 8 because it is too short for the swing of the cylinder, or for any other reason, it will still be caught by the notch 14 and the brush 15 which will, respectively, carry it below the binder plate 3 and wipe it behind the needles.

During the operation described above, as the lever 2

rises from yarn feeding position and its yarn **22** is bound, severed and trapped, the yarn **22** is drawn from the last needle to knit it (**24** in Fig. 1) across the front and under the latches of a few needles and then between needles to the rear of the needle circle, as shown at **25** in Fig. 1. As knitting of an adjacent pattern area with another yarn progresses, the yarn **22**, which is held in front and under the latches of adjacent needles, is laid into the stitch as each of these needles knits. In diamond type patterns where the pattern area tapers, i.e. widens or narrows a needle or so per course, these needles which lay-in the trailing end of yarn do so as they knit the suture between adjacent pattern areas. This anchors the loose end of yarn into the fabric, and makes a better suture.

The operation of the invention has been described with reference to the severed end of yarn left trailing from the fabric (out-going end) after the particular yarn concerned has completed knitting of a pattern area. It is also applicable at the start of a pattern area when a yarn is pulled from its binder and trails from the first needle to knit it into the fabric (in-coming end). Operation with an in-coming end is as follows.

The needles are raised when they are inactive. When a pattern area is to be started, the needles which are to knit the first course are selected downward from the raised inactive position at a selecting station in advance of the yarn feeding position. The yarn lever is moved into feeding position in advance of these selected needles so that the yarn will be drawn from the binder between two inactive needles and will lie across the shanks and under the latches of a few inactive needles in advance of the first needle to knit it. The end of yarn trailing from the binder to the point where it passes between the inactive needles is not necessarily engaged by the trapper **8**; but it is caused to pass under the binding plate **3** by the notch **14** or a special yarn guiding member (not shown), and it is wiped behind the needles by the brush **15** in the same way as the trailing yarn at the outcoming end of the pattern to be incorporated into the suture in the same way.

The drawings show the free end of yarn **22** lying in front of approximately eight needles. It should be understood that fewer needles would be sufficient, and more would be acceptable. It is only necessary to lay-in the yarn at enough stitches to hold it and prevent loosening of the last stitches knit by it.

We claim:

1. A method of knitting on a circular, independent needle, knitting machine fabric having a plurality of separately knit pattern areas joined together by knitting course-wise terminal loops of the yarn of one pattern area through course-wise terminal loops of the yarn of an adjacent pattern area on adjacent needles in successive courses which includes the steps of drawing the yarn of one of said areas in front of and under the latches of a plurality of said adjacent needles and holding the end of said yarn inside of the needle circle until said adjacent needles have knit said first mentioned terminal loops and laid-in the yarn held under their latches.

2. The invention according to claim 1, and wherein said held end of yarn trails from the beginning of one of said areas.

3. The invention according to claim 1, and wherein said held end trails from the finish of one of said areas.

4. The invention according to claim 1, and wherein both the in-going and out-coming ends of yarn of one of said areas are so held and laid-in.

5. The invention according to claim 1, and wherein said end of yarn is held by a yarn trapping device.

6. The invention according to claim 5, and wherein said yarn trapping device comprises a spring binder within and proximate the needle circle.

7. The invention according to claim 1, and wherein said end of yarn is held by brushing it behind the needles.

8. In a circular, independent needle, knitting machine having a circle of needles a yarn controlling, radially tufted but non-rotating, brush within and proximate said needle circle.

9. In a circular, independent needle, knitting machine having a circle of needles, means for feeding a yarn to the needles of said circle, a cutter adapted to sever said yarn, a binder for said yarn on one side of said cutter, and a spring closed trapper on the other side of said cutter adapted to receive and frictionally to retard the withdrawal of said yarn both during and after the severing operation, said cutter, binder and trapper being located within the needle circle.

10. In a circular, independent needle, knitting machine having a circle of needles, means for feeding a yarn to the needles of said circle, a cutter adapted to sever said yarn, a binder for said yarn on one side of said cutter, and a spring closed trapper comprising an arcuately shaped spring binding element proximate said needle circle and positioned on the other side of said cutter adapted to receive and frictionally to retard the withdrawal of said yarn both during and after the severing operation, said cutter, binder and trapper being located within the needle circle.

References Cited in the file of this patent

UNITED STATES PATENTS

1,825,370	Smith	Sept. 29, 1931
2,048,432	Deans et al.	July 21, 1936
2,137,362	Smith et al.	Nov. 22, 1938
2,161,324	Thomas	June 6, 1939
2,268,039	Krasa	Dec. 30, 1941
2,287,131	Redeen	June 23, 1942
2,522,183	Lawson	Sept. 12, 1950
2,550,880	St. Pierre	May 1, 1951
2,551,385	Miller	May 1, 1951

FOREIGN PATENTS

682,473	Germany	Oct. 16, 1939