H. T. BALLARD.

KNITTING MACHINE.

APPLICATION FILED JAN. 22, 1920.

1,423,175. Patented July 18, 1922.

Fig. 1.

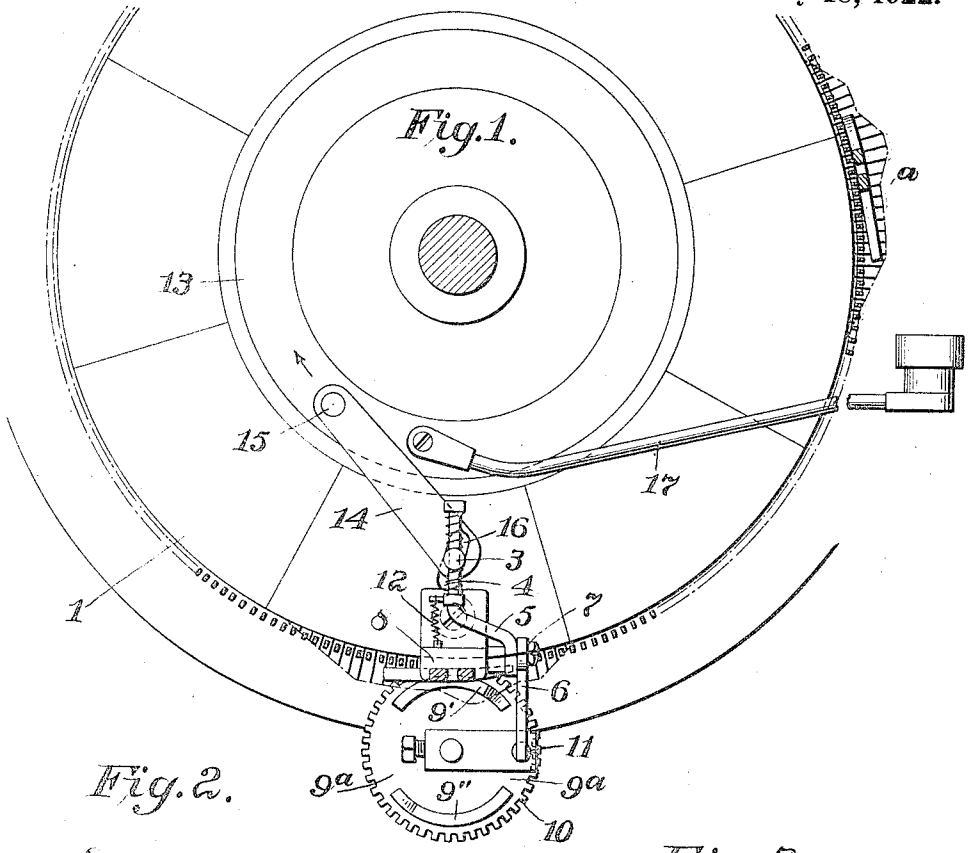


Fig. 2.

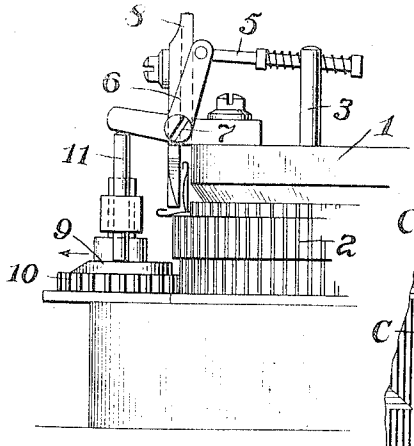
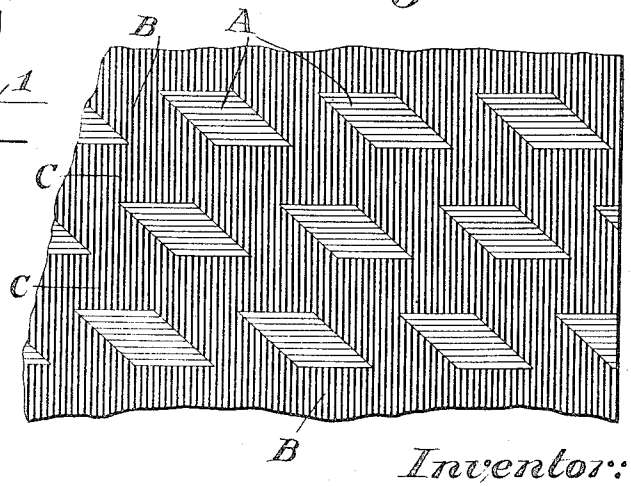


Fig. 3.



Inventor:

Herbert T. Ballard,

by Spear, Middleton, Donaldson & Hall

Atty's.

UNITED STATES PATENT OFFICE.

HERBERT T. BALLARD, OF NORRISTOWN, PENNSYLVANIA.

KNITTING MACHINE.

1,423,175. Specification of Letters Patent. Patented July 18, 1922.

Application filed January 22, 1920. Serial No. 353,195.

To all whom it may concern:

Be it known that I, HERBERT T. BALLARD, a subject of the King of Great Britain, and resident of the city of Norristown, State of Pennsylvania, have invented certain new and useful Improvements in Knitting Machines, of which the following is a specification.

The invention is designed to make changes in the structure of a knitted fabric to vary its appearance from that of plain rib.

The invention consists in the features hereinafter described and particularly pointed out in the appended claims.

In the accompanying drawings:

Figure 1 is a plan view of the head of an ordinary rib knitting machine with my improvement combined therewith.

Fig. 2 is a side view of parts shown in Fig. 1 and

Figure 3 is a view of the fabric.

The invention may be carried out in different ways and I have therefore shown herein one embodiment of the invention as an illustration of its characteristics without meaning to restrict myself to the particular form used as an example of the ways the invention may be carried into effect.

The machine includes a needle dial 1 and needle cylinder 2 as in ordinary rib knitting practice. There is a wing cam in the dial cam set for advancing and retracting the dial needles for forming the stitches. This wing cam is of ordinary form and is not illustrated. For the purpose of my invention it is provided with a post 3 extending up through a slot 4 in the dial cap, to which post is connected a rod or link 5. This is operated by a bell crank lever 6 pivoted at 7 to the bracket 8 of an ordinary yarn guide, which bell crank is operated by a vertically movable pin 11 from a cam 9, carried by a toothed wheel 10 which is suitably mounted on the machine frame, so that its teeth will mesh with the stems of the cylinder needles to be driven thereby, as shown in Fig. 2. The cam is composed preferably of the two upstanding ribs 9′ 9″ of segmental form with spaces 9^a between their ends forming the low parts of the cam. When the pin 11 rides upon the high part of the cam, i. e. upon either rib 9′ or 9″, the wing cam will be adjusted inwardly towards the axis of the knitting machine and consequently the dial needles will do tuck work owing to the reduction in the advance movement of the dial needles, this reduction being sufficient to prevent the old loops from getting back of the latches, if latch needles are used, and consequently two loops will be held on these needles until cast off at the regular knitting feed *a*. When the pin 11 is in its lowermost position consequent upon the low part 9^a of the cam passing below the pin, the wing cam will be moved outwardly, by the pull of the spring 12 into knitting position, and ordinary plain rib fabric will be knit. Each course, therefore, with the mechanism thus far described, will be made up of alternating portions of tuck and plain rib stitch, this resulting from the fact that the wing cam is adjusted in and out a number of times during the knitting of a course, and if the wheel, as is the case here, has such a number of teeth as will not divide evenly into the number of needles in the cylinder, which mesh with and drive the wheel, then the line of changes will either lag or advance around the fabric from course to course, according to the number of teeth in the wheel, and will make striped work running diagonally around the fabric, if no other condition or modifying influence exists to change the continuity of the stripes.

For modifying the action and effect just mentioned, however, I provide means which will produce in the fabric a series of blocks of one structure in a field of another structure. For instance, the blocks shown at A will be of plain fabric in a field of tuck fabric, represented at B. To do this I provide means by which horizontal bands of tuck fabric will be knit as shown at C, C and forming part of the tuck field B. These bands of tuck fabric will cut across the stripes of plain fabric and leave isolated spots of the latter of more or less diamond shape, according to the incline of the lines along which the changes in knitting are made.

The mechanical means for carrying out this part of my invention may be of various forms. I have shown one form as illustrative of my invention without intending to limit its scope to this particular organization now to be described, which is selected as being effective, simple, and requiring little change in or additions to existing machines.

I utilize the ring 13 which already exists

on many rib machines as the means for additionally controlling the position of the dial wing cam, which as above described, is controlled by the toothed wheel and its cam. This ring has a link 14 connected thereto by a pin 15 and it is provided with a slot 16 receiving the post of the wing cam. The ring is moved circumferentially of the dial cam cap, in which it is seated, by a connection 17 leading to any suitable form of pattern mechanism, not shown. When this ring is moved in the direction of the arrow by the pattern mechanism to the position shown, it will hold the post with the wing cam in its retracted position and while so held any desired number of tuck courses will be formed in the fabric to make a band C—C of any desired width. After the desired number of tuck courses have been knit the pattern mechanism will shift the ring 13 and the link 14 will be shifted outwardly so that its slotted end will no longer hold the wing cam in its retracted position but will allow this to shift in and out by reason of the high and low parts of the cam 9 acting on the pin 11. The slot 16 in the link will now be in position to allow the post of the wing cam to move back and forth and hence any desired number of courses may be knit, according to the character of the pattern mechanism, each of which courses will be made up of a series of tuck stitches alternating with a series of plain rib stitches, and this will form blocks of plain rib fabric alternating with stripes of tuck fabric, when the tuck band is again knit by the shifting of the ring 13 in the direction of the arrow and the wing cam, as a result, is held in retracted position.

The drawing and description are to be regarded as illustrative of my invention and not restrictive of its scope, which is defined in the appended claims. The effect can be secured with one cam as well as two.

The mechanism described can be attached to any ordinary rib knitting machine without changing the construction thereof.

It will be understood that instead of forming 1 and 1 rib spots on a field of tuck fabric, the field may be formed of 1 and 1 rib and the spots of tuck.

This can be done by reversing the action of the ring 13 so that the wing cam will be held out in knitting position by the link 14. In this instance, operation of the bell crank 6 will be ineffective because the springs will allow the link 5 to move idly through the post 3. The drawing, Fig. 3, representing the fabric may therefore be regarded as representing the spots A of tuck or 1 and 1 rib.

It will be observed that the horizontal courses of one stitch which form bands breaking across the diagonal stripes of tuck and plain rib fabric, are of such number that the diamond shaped spots of one horizontal row do not register vertically with the spots of the adjacent rows above and below, but on the contrary the spots of one row are staggered in relation to the spots of the adjacent rows above and below. To express the effect in a different way, the spots of one row begin and end on certain wales while the spots of adjacent horizontal rows begin and end on different wales from the beginning and ending points of the row just mentioned, and furthermore, the spots of the said adjacent rows above and below, begin and end on different wales in respect to each other.

I claim as my invention:

1. In combination, in a circular rib knitting machine, a dial wing cam and means for adjusting the same to make a plurality of groups of courses, each made up of alternate sections of tuck and plain rib with the changes beginning on different wales on the successive courses, and for making groups of courses all of one stitch between the courses of alternate tuck and plain rib knitting, and beginning and ending the sections of alternate knitting on different wales in the successive group courses of alternate knitting to produce diamond shaped spots staggered vertically in one row from those of the adjacent rows, substantially as described.

2. In combination with the ring cam of a rib knitting machine automatic means for shifting the same to tucking and knitting position, a ring in the knitting head pattern mechanism for operating the ring and means connected with the ring for eliminating the function of said shifting means, substantially as described.

3. In combination with the wing cam of a rib knitting machine automatic means for shifting the same to tucking and knitting position, a ring in the knitting head pattern mechanism for operating the ring and means connected with the ring for eliminating the function of said shifting means, said eliminating means consisting of a link operated by the ring and having a slotted end to receive the post of the wing cam.

4. In combination in a circular rib knitting machine, a dial wing cam and means for adjusting the same to make each of a series of composite courses of alternate tuck and knit stitch, the changes beginning at different wales in successive courses to run spirally about the fabric, from end to end thereof in the same direction and for making series of contiguous courses all of one stitch bounding the series of courses of alternate tuck and knit stitch, whereby canted diamonds of one character of stitches are produced, substantially as described.

In testimony whereof, I affix my signature.

HERBERT T. BALLARD.