Jan. 4, 1927. 1,613,304

H. T. BALLARD

PATTERN PRODUCING MEANS FOR KNITTING MACHINES

Filed May 25, 1925 2 Sheets-Sheet 1

Fig. 1.

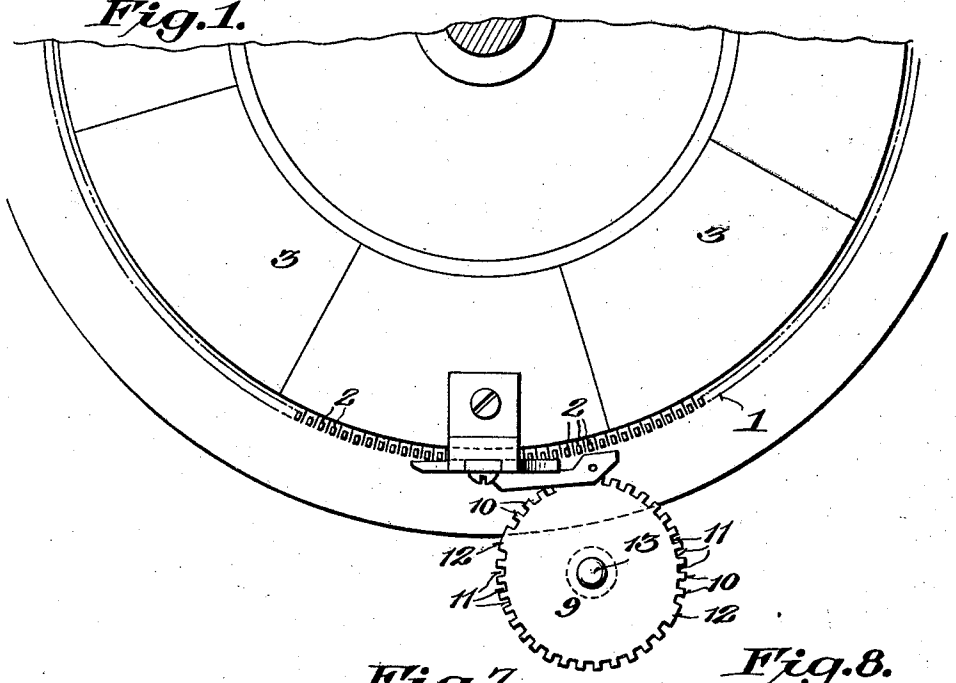


Fig. 7.

Fig. 8.

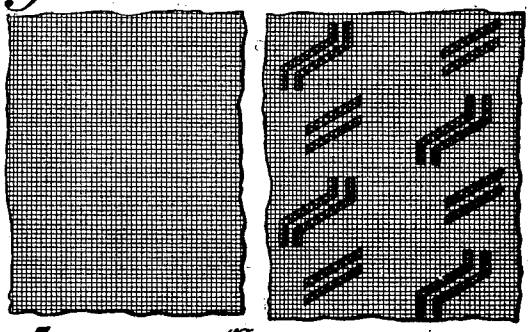


Fig. 2.

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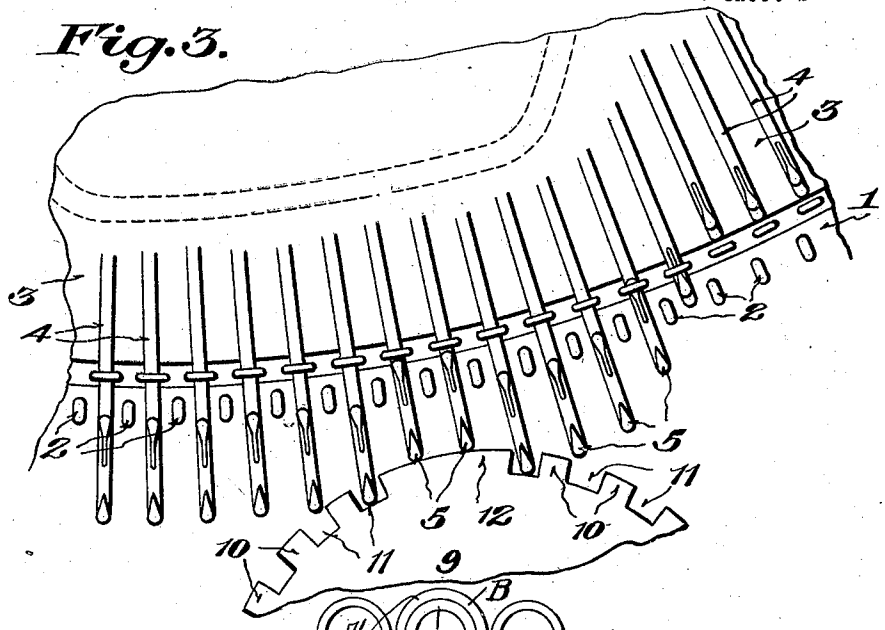
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Fig. 3.



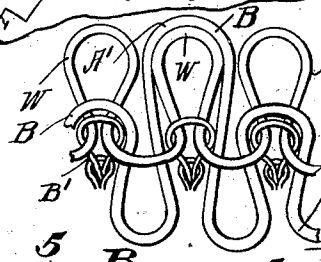


Fig. 9.

Fig. 4.

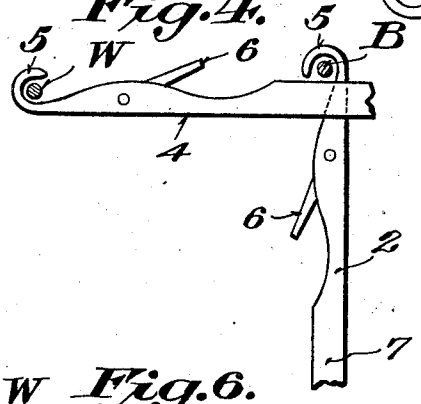
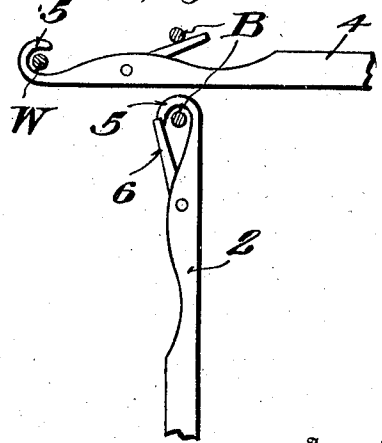
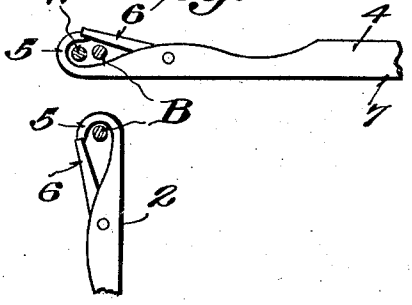


Fig. 5.



W Fig. 6.



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UNITED STATES PATENT OFFICE.

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PATTERN-PRODUCING MEANS FOR KNITTING MACHINES.

Application filed May 25, 1925. Serial No. 32,811.

This invention relates to knitting mechanism for fabricating double-faced or two-ply fabric, and more particularly to a novel means for selectively producing in or on one of the faces of the fabric any predetermined fancy stripe or pattern.

Heretofore, it has been difficult to produce a pattern other than stripes in or on a double-faced fabric because of complications involved in the knitting operations, and in the form and disposition of the controlling cams for both the cylinder and the dial needles; however, the present invention contemplates a very simple and reliable method of accomplishing that result without making any change in the mechanism of an ordinary circular rib knitting machine other than to equip the machine, at one or more yarn feeding locations, with a suitably arranged pattern wheel cooperating with one set of needles, preferably the dial needles which knit the yarn or thread for one side or face of the fabric. This permits of an almost unlimited selection of designs or patterns, and at the same time involves merely a pattern wheel attachment that can be readily removed, replaced and interchanged according to the requirements.

With these and other objects in view which will be apparent to those familiar with this art, the invention consists in the novel pattern attachment and knitting operation hereinafter more fully described, illustrated and claimed.

The primary feature of the invention necessarily is susceptible of considerable modification without departing from the principle thereof, but a practical embodiment of the invention is exemplified in the accompanying drawings, in which:—

Figure 1 is a top plan view, partly in diagram, of the head of an ordinary rib knitting machine showing one of the yarn feeding stations where the pattern device is located.

Figure 2 is a side view showing more clearly the detail of the mounting of the pattern wheel.

Figure 3 is an enlarged detail plan view above the needle dial showing more clearly the relation of the pattern wheel to the hook ends of the dial needles.

Figure 4 is an enlarged detail sectional view showing the normal relation of a cylinder needle and a dial needle during the plain rib knitting operation when the pattern is not being made.

Figure 5 is a similar view showing the change that takes place in placing one of the yarns or threads on the latch of the dial needle when the pattern is being made on one face of the fabric.

Figure 6 is a view of the two needles at the next step beyond Fig. 5, that is when the latch of the dial needle is closed and traps both threads in the hook.

Figures 7 and 8 are two detail views of the fabric, one view showing the plain side, and the other view showing the pattern side.

Fig. 9 represents a view taken from the edge of a piece of fabric showing on a greatly enlarged scale the stitch employed, the last course of knitting and the loops of the preceding course being shown.

In carrying out the present invention the ordinary circular rib knitting machine may be employed without change or alteration in its usual mechanism, that is to say, it is the purpose of the improvement claimed herein to carry out on a machine of that type the conventional knitting operation of plain rib knitting with two threads or two yarns to produce a double-faced or two-ply fabric having the front and back of different materials, such as silk and cotton respectively produced with a silk thread and a cotton thread usually of different colors; and, to make a simple change in the feed of one of the threads at one or more locations about the cylinder in order to form by such thread the desired pattern on one side or face of the fabric.

To illustrate the feature of improvement the drawings simply show the only parts of a knitting machine which are in any affected by the invention. Referring thereto the numeral 1 designates the needle cylinder in which are mounted and controlled in the usual way the cylinder needles 2, and the numeral 3 designates the needle dial in which are mounted and controlled, in the usual way, the radial and horizontal dial needles 4. The needles 2 and 4 preferably are the ordinary latch needles each of which is provided at its outer operative end with the thread engaging hook 5, the pivotal latch 6 which automatically operates

to open and close the said hook, the stem part 7 and the butt 8, and in the operation of plain rib knitting, and fed with the separate thread or yarn, the said needles will produce a double-faced fabric consisting of two knitted webs, one overlying the other and being united at intervals by the thread of one web engaging with the thread of the other web.

In the normal operation of the machine every needle is knitting all the time, and there is no tuck stitching, as the present invention contemplates making the pattern without tuck stitching and without leaving any floating threads on the patternless side of the fabric, as would be the case with tuck stitching.

Referring to Fig. 4 of the drawings, it will be seen that in the normal plain rib-knitting operation of the machine one thread which may be conveniently designated by the letter B, representing the white cotton thread is fed at each yarn feeding location to the cylinder needles 2, and the controlling cam for the dial needles when passing this station will cause the needles to be projected a sufficient distance beyond the dial so that the said thread B will be laid in the throat or on the shank of the dial needles 4, in rear of the latch thereof. At the same station, the second thread which may be conveniently designated by the letter W as representing a blue silk thread, is fed into the hook of the dial needle a little later than the laying of the thread B on the shank of such needle. Consequently, when the dial needle retires, or is drawn back under the influence of its controlling cam or camway, the thread B will close the latch of the dial needle, thereby trapping thread W in the hook thereof and at the same time thread B will cast-off of the hook of the retreating dial needle so as not to interfere with the cylinder needles proceeding with the knitting of the ordinary web to form one face of the fabric, which according to the example being described will be the white face of the fabric.

Now, in order to produce the pattern at the one or more yarn feeding stations about the machine the present invention provides a very simple but reliable expedient, namely, that of a pattern device which arrests the advance of the dial needle so that it will project a less distance than normally beyond the edge of the dial so that when the thread B is laid thereon it will be positioned over or substantially inside of the latch of the dial needle. Therefore, when the dial needle retires under the influence of its controlling cam and pulls through the loop thereon its latch 6 will be closed, thereby trapping both threads W and B within its hook 5, with the thread B inside of and against the thread W. The knitting which ensues with the two threads in this relation and juxtaposition will leave the thread B as the predominant thread whose stitches are exposed in and through the face of the fabric formed by the colored thread W, and the stitches of the thread B so exposed are of any predetermined extent or angle according to the pattern desired, and such pattern is determined by the use of the pattern wheel designated by the reference 9.

The pattern wheel 9 is of simple construction. It is provided with a toothed periphery 10 forming the peripheral needle kerfs 11 which loosely mesh with the hook ends of the dial needles 4 at each thread or yarn feeding station. At predetermined intervals about the toothed periphery of the pattern wheel 9 the latter is provided with a pattern land or abutment blank 12 which is not provided with the kerfs 11 and is of any predetermined width, and each such land or blank 12 when it comes into opposition to the dial needles, between the needle feeding points of the threads W and B, operates to hold or press back the dial needles to the position shown in Fig. 5 of the drawings wherein the thread B will be laid on or inside of the latch of the dial needle with the accompanying result hereinbefore referred to. It will be understood that because of its meshing engagement with the dial needles the pattern wheel 9 is rotated on its axis by and with such needles as they move past the thread feeding station where the pattern wheel is located.

The pattern wheel 9 may be mounted in any suitable manner, as for instance upon a short upstanding spindle or axle 13 adjustably bolted as at 14 to and within a slotted supporting bracket 15 which may be conveniently fastened to the stationary cam casing, surrounding the needle cylinder, immediately below the horizontal plane of the dial.

In Fig. 9 at the point marked A′ is shown the course of the yarn fed to the cylinder needles when the needle is pressed back by the pattern wheel operating on the end of the needle. The stitch at this point is what is termed plaited, the yarn B showing back of the yarn W will show on the face of the cloth. When the needle is pressed back to receive the cylinder yarn, the yarn takes a different course, as is shown by loop A′.

The last courses of knitting are shown at C′ and the preceding courses at B′.

I desire it to be understood that mere reversal of parts and minor changes in details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

I claim:

1. In a knitting machine for fabricating a double-faced fabric with two threads, said mechanism including cylinder and dial nee-

dles, and a pattern device at the thread-feeding station having means for causing both threads to be trapped in the hook of one of said needles whereby the threads are transposed on the exposed surface of the goods from the position they normally occupy thereby forming a pattern on said exposed face.

2. In a knitting machine, for fabricating a double-faced fabric with two threads, the knitting mechanism including cylinder and dial needles, and a pattern device having means for causing both threads, at a predetermined point or points, to be trapped in the hook of the dial needle.

3. In a knitting machine for fabricating a double-faced fabric, with two threads, the knitting mechanism including two sets of needles, and a pattern device having means for causing both threads, at a predetermined point or points, to be trapped in the hooks of one set of needles.

4. In a knitting machine for fabricating a double-faced fabric from two threads, the knitting mechanism including cylinder and dial needles, and a pattern device actuated by the dial needles and having means to change the feed of one of said threads to expose it on the opposite face of the fabric from that which it normally occupies and form a desired pattern upon said face.

5. In a knitting machine for fabricating a double-faced fabric from two threads, the knitting mechanism including cylinder and dial needles, and a pattern device actuated by the dial needles and having means for regulating the positions of such needles to change the feed of one of said threads to form a superposed pattern on one face only of the fabric.

6. In a knitting machine for fabricating a double-faced fabric from two threads, the knitting mechanism including cylinder and dial needles, and a pattern device actuated by the dial needles and having means for determining the projection of the dial needle hooks beyond the dial plate to provide means for changing the feed of one of said threads at predetermined intervals to cause it to be exposed on the opposite face of the fabric to that which it normally occupies and form a desired pattern on said face.

7. In a knitting machine for fabricating a double-faced fabric with two threads, the knitting mechanism including cylinder and dial needles, and a pattern device having means for normally causing the thread for the cylinder needle to be laid on the dial needle shank back of the latch, and at predetermined intervals to be laid on or inside of said latch.

8. In a knitting machine for fabricating a double-faced fabric with two threads, the knitting mechanism including cylinder and dial needles, and a pattern device having means for normally causing one thread to be laid on the dial needle shank back of the latch in advance of the feed of the second thread into the hook of the dial needle, and at predetermined intervals causing the first mentioned thread to be trapped with the second thread in the hook of the dial needle.

In testimony whereof I hereunto affix my signature.

HERBERT THEODORE BALLARD.