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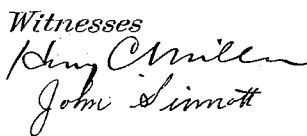
Fig. 1.

Witnesses
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1,008,280.

3 SHEETS—SHEET 2.



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KNITTING MACHINE.
APPLICATION FILED APR. 17, 1909.

1,008,280.

Patented Nov. 7, 1911.

3 SHEETS—SHEET 3.

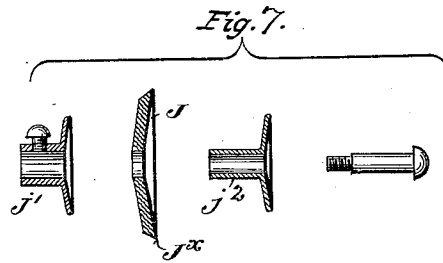
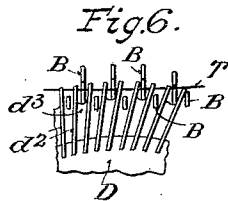
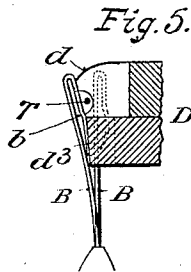
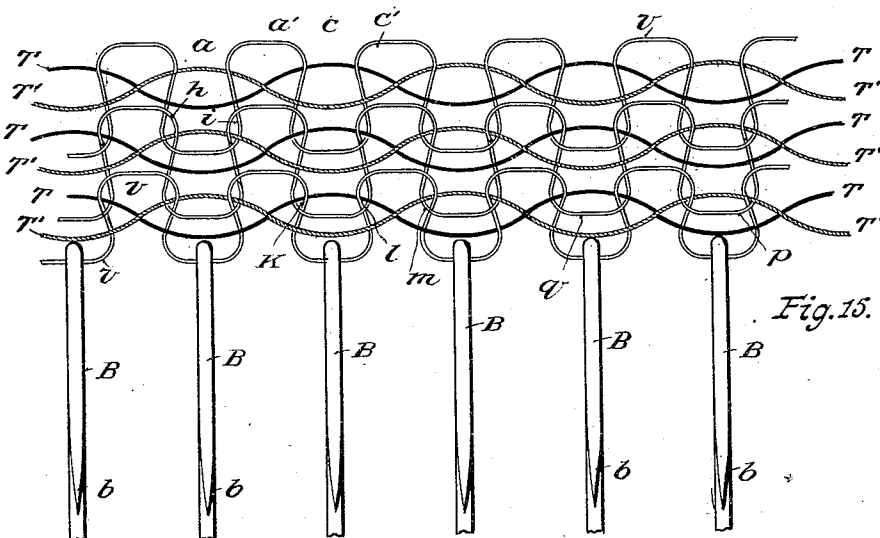
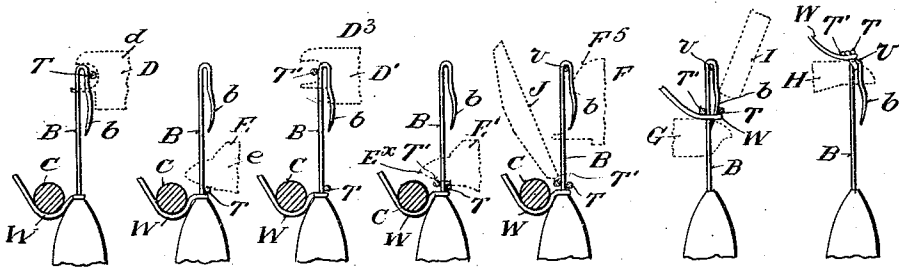
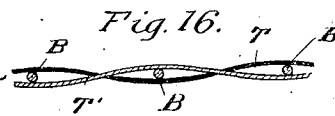


Fig. 8. Fig. 9. Fig. 10. Fig. 11. Fig. 12. Fig. 13. Fig. 14.



Witnesses

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UNITED STATES PATENT OFFICE.

THOMAS F. MORRIS, OF WATERFORD, NEW YORK, ASSIGNOR OF ONE-HALF TO CHARLES C. ORMSBY, OF WATERFORD, NEW YORK.

KNITTING-MACHINE.

1,008,280.

Specification of Letters Patent.

Patented Nov. 7, 1911.

Application filed April 17, 1909. Serial No. 490,593.

To all whom it may concern:

Be it known that I, THOMAS F. MORRIS, a citizen of the United States, residing at Waterford, in the county of Saratoga and State of New York, have invented certain new and useful Improvements in Knitting-Machines, of which the following is a specification.

This invention relates to improvements in spring needle knitting machines.

The object of the invention is to arrange the mechanism in such manner as to assemble in a plain base knit fabric during the formation of the knitted loops two or more backing threads, the latter being tied in between the legs of alternate knitted loops to be prominently exposed on but one side of the fabric.

A further object of the invention is to provide a plurality of bur wheels to cooperate with what may be termed an ordinary spring needle knitting machine, to produce a plain knitted base fabric having one or more backing threads interlaced between the legs of alternate loops, each adjacent backing thread engaging the legs of different knitted loops.

The mechanism employed in carrying out my invention is such as will permit of the production of a fabric made from fine yarn or silk for use in the manufacture of fine gloves or similar articles.

The invention further contemplates improvements in the means employed for regulating the tension on the backing threads to produce a greater or less degree of elasticity in the product, which is quite essential when making varving grades of fabric designed for various purposes.

The invention also contemplates improvements in the means employed for holding the knitted fabric and the backing threads down on the needles and away from the spring beards, to prevent interference with the bur wheel when placing the thread to form the knitted loops in said beards. This feature is also designed to act as a support for the body of the needles to prevent displacement of the latter by pressure of the cooperating stitch bur wheel.

The improvements also relate to the specific details of construction and arrangement of parts, all of which will be hereinafter described, and particularly pointed out in the claims.

In the drawings:—Figure 1, is a plan view of a part of a circular spring needle knitting machine showing my improvements applied thereto. Fig. 2, is a diagrammatic elevation, illustrating in conventional form the various bur wheels, and their relative positions with reference to the spring needles. Fig. 3, is a view similar to Fig. 2, but omitting the bur wheels, and illustrating the threads on the spring needles. Fig. 4, is a plan view, somewhat in diagrammatic form showing the mechanism on a straight line to give a clear understanding of the location of the parts shown in Figs. 2, and 3. Fig. 5, is a detail enlarged section on the line 5—5 Fig. 1. Fig. 6, is a detail plan view of a portion of the first backing bur wheel, and several needles with which it cooperates. Fig. 7, is a detail sectional view, parts separated, of the rotary hold down wheel. Fig. 8, is a detail section on the line 8—8 Fig. 3, looking in the direction of the arrow. Fig. 9, is a detail section on line 9—9 Fig. 3, looking in the direction of the arrow. Fig. 10, is a detail section on line 10—10 Fig. 3, looking in the direction of the arrow. Fig. 11, is a detail section on line 11—11 Fig. 3, looking in the direction of the arrow. Fig. 12, is a detail section on line 12—12 Fig. 3, looking in the direction of the arrow. Fig. 13, is a detail section on line 13—13, Fig. 3, looking in the direction of the arrow. Fig. 14, is a detail section on line 14—14, Fig. 3, looking in the direction of the arrow. Fig. 15, is a diagram of the fabric, and several of the spring needles. Fig. 16, is a diagram showing the position of the backing threads and the needles.

A, indicates the cylinder of a circular spring needle knitting machine, B, the spring needles, provided with the usual beards *b*, and C, a fabric push down rod, curved at its forward end, to cause its extended part to lie close to the inner base line of the circular series of needles, and some distance down from the tops thereof. The bur wheel D, is located near the tops of the needles and adjacent to the point where the push down rod has first deflected the fabric downwardly.

Mounted on a support extending outwardly from the machine, is what I shall term the first backing bur wheel D, provided with the usual spaced apart wings *d*,

to cooperate with the needles in properly placing the first weft yarn backing thread T. Each alternate space between the wings d^3 , is provided with a block d^3 , which presses
 5 against the beard of each alternate needle to force the latter back of the adjacent needles to dispose the first weft yarn backing thread first on one side of one needle and then on the opposite side of the next succeeding
 10 needle, as shown clearly in Figs. 5, and 6. The weft yarn backing thread T, passes over a tension device U, mounted on the bur wheel support, and thence it extends through a guide d' , to the periphery of the bur
 15 wheel D.

Spaced somewhat from the first backing bur wheel, and mounted on a support E', is a clearing bur wheel E, having the usual wings e , to fit between the needles B. This
 20 clearing wheel is disposed below the plane of the backing wheel D, to force the thread down below the beards b , on to the body of the needles, and close to the previously formed fabric W, the last formed loops of
 25 which are still supported on said needles.

The bur wheel D, and the clearing wheel E, are solely for the purpose of properly positioning the first backing thread T, on the needles B, for subsequent cooperation with
 30 the other threads forming the fabric, as will be described later on.

Located a short distance from the clearing wheel E, and spaced therefrom, is a second backing bur wheel D', mounted on a
 35 support D, extending from the machine. This bur wheel D', is similar to the bur wheel D, and has the spaced wings D^3 , and is provided with blocks D^4 , in each alternate space formed by the wings. The wings are
 40 grooved on their outer edges to provide a grooved periphery, and they fit between the needles B, in the usual manner, the blocks D^4 , however contacting with and bearing on the beards b , of the needles skipped by the
 45 blocks d^3 , of the bur wheel D, to force the said needles out of alinement with the adjacent needles to properly position the second backing thread. The second weft yarn backing thread T', passes over a tension device
 50 U', on the support D', and thence through a guide d'' , to the periphery of the bur wheel D'.

Cooperating with the second backing bur wheel D', and spaced therefrom is a second
 55 clearing wheel E', having wings E^x and located below the plane of the second bur wheel D'. The bur wheel E', is mounted on a support E', extending from the machine. The wings E^x , serve to force the second
 60 backing thread T', down on the needles close to the first mentioned backing thread T, as shown in Fig. 11.

The sole purpose of the bur wheels D', and E', is to position the second weft yarn
 65 backing thread T', on the needles, to be

worked in the fabric as the movement of the needles progresses.

When the two backing threads T, and T', are placed on the needles, preparatory to the formation of the knitted loops, they are on
 70 alternate faces of adjacent needles, each thread crossing the other between the needles as shown in Fig. 16. The threads are crossed as shown, because of the disposition of the blocks d^3 , and D^4 , of the bur
 75 wheels D, and D', which as previously described operate on alternate needles, when the two backing threads are fed thereto.

Mounted on a suitable support extending from the frame of the machine, is a stitch
 80 bur wheel F, having wings F^b , to mesh with the needles. The stitch bur wheel is located so as to direct the thread under the beards b , of the needles B, as shown in Fig. 12. This bur wheel receives the thread V,
 85 from which the knitted loops are to be formed. The thread is directed to the under side of the wheel and by reason of the inclination of the latter, the thread is gradually elevated from its lowest point
 90 under the spring beards, up into the loops of the latter, as indicated in Fig. 12. In order to form a substantial support for the needles with which the stitch bur wheel F operates, and to force the previously located weft yarn backing threads T, and T', down
 95 on the body of the said needles while the thread V, is being fed, I provide a revolving element J, mounted on a support J'. The revolving element is in the form of a roller, comprising two opposite washers j , and j^2 , forming a hub, and a resilient interposed body J^x , which extends beyond the periphery of the hub, and which forms the operative surface of the element. The periphery of the resilient body J^x , bears
 100 against the needles and serves to brace them against accidental displacement by the action of the wings of the stitch bur wheel F, and the thread passing over the same. The element J, is of course revolved by frictional contact with the moving needles, and by its position skipping of the stitches is prevented, which is of the utmost importance in the manufacture of fine fabric. By
 105 making the element of yielding material it produces a cushion effect for the needles, and will prevent breakage if undue pressure should occur.

In addition to the bracing effect of the resilient element, its action on the backing thread is such as to gradually force the same down without in anywise running the risk of breaking the thread. The revolving
 110 of the disk, and its yielding periphery makes this condition possible.

Inasmuch as I have found the yielding revolving element of such importance, when cooperating with the stitch bur wheel, it is evident it may be employed with the other
 120 125 130

bur wheels used in connection with my improvement.

The two backing threads, and the thread from which the knit loops are to be formed, having now been placed on the needles, the cast off mechanism, casts the loops of the previously made fabric from the needles, (which up to the point of feeding the thread V, have been held down by the push down rod C,) and forms the new loops or knit stitches, without drawing the weft yarns into a knit loop.

About at the termination of the push down rod C, and acting on the inside of the needles is a landing bur wheel G, which elevates the threads T, and T', to a point above the lower ends of the beards of the needles, as shown in Fig. 13, preparatory to finally casting the loops therefrom. Acting in conjunction with the landing bur wheel G, is a presser wheel I, mounted on the frame and positioned to bear on the outside of the beards to force them in against the body of the needles and close them to permit the wings of the landing bur wheel to force the threads up and over the beards as shown in Fig. 13.

The threads T, and T', being now above the open end of the beards of the needles, it only remains to force them higher up to slip them off entirely. For this purpose I employ a cast off bur wheel H, situated adjacent the upper ends of the needles, and positioned to cause its wings to act on the inside thereof as seen in Fig. 14. When this bur wheel H, casts the previously formed stitches of the fabric W, and the threads T, and T' new knitted loops are formed of the thread V, as will be readily understood.

In operation, the cylinder carrying the needles B, is revolved in the direction of the arrow 1, Fig. 1, and as the fabric indicated at W, supported on the needles contacts with the push down rod C, it is lowered below the operative plane of the various bur wheels, as seen in the diagram Fig. 3. When the needles B, reach the first backing bur wheel D, every other one is forced back by the blocks d³, to properly place the first backing thread T, (see Figs. 5, and 6). Obviously by reason of the displacement of the needles by the blocks, the first backing thread is located on the back of one needle and on the front of the next succeeding needle. The clearing wheel E, next combs the thread T, down to the previously formed stitches now supported on the lower portion of the needles (Fig. 9). The needles are next moved in operative position to the second backing bur wheel D', and its blocks D⁴, are arranged to contact with the alternate needles B, missed by the blocks d³, of the first backing thread bur wheel D. The second backing thread is therefore placed in front of the needles,

which have previously received the first backing thread on their rear, and in the rear of the needles having previously had the first backing thread placed on their fronts (see Fig. 10). The second backing thread is now combed down on the needles by the clearing wheel E'. As the needles are moved they are presented to the stitch bur wheel F, to receive the thread V, for forming the knitted loops of the fabric. The presser wheel I, and its cooperating landing bur wheel G, now elevates the fabric W, and the threads T, and T', above the bottoms of the beards of the needles, and as the latter are advanced in their movement they are presented to the cast off bur wheel H, as shown in Fig. 14. Of course it will be readily understood that after the fabric which has been held down by the push down rod C, passes the free end of the latter the usual take up mechanism (not shown) will to a certain extent cause the stitches on the needles to be elevated somewhat.

As a result of the cycle of operation of the described mechanism, I produce a knitted plain base fabric from one thread comprising a series of knit loops the legs of which intermesh. And in addition the base fabric has interwoven or tied in between the legs of the connecting loops two backing threads.

Referring to Fig. 15, I have shown therein the fabric produced by my improved machine, the subject matter of the fabric being claimed in my copending application filed July 10, 1911, Serial No. 637847. The figure shows the first backing thread T, in solid lines, and the second backing thread T', in double lines, and cross hatched. It will be observed that the thread T, passes over the rear face of one of the series of knitted loops a, thence through the next adjacent loop of the series of knitted loops a', over the front face of the next loop of the series a, and thence through the next loop of series a', and so on throughout the fabric. It will also be noted by referring to Fig. 15, that the thread T', lies over the thread T, and it passes over the front face of the loop a, through the loop a', over the rear face of the loop c, and thence through the loop c', and so on throughout the fabric. Thus it will be seen that the threads T, pass over and are entirely free of the loops a, and then pass between legs k, and l, of the loops c, and are free of the next legs m, of the following loop c'. The thread T', is tied between the legs of the loops in precisely the same manner as the thread T, except it passes through and is tied in between different connecting legs. The said thread T', passes over the front face of the loops a, thence through the connecting legs k, and l, and over the back of and being entirely

free of the loops c , and through the connecting legs m , of the loops c' , and so on. On the back or rear face of the fabric the threads T , and T' , where they are free of their respective loops, form a surface which may be made as smooth or rough as may be desired, depending on the tension devices.

The placing of the threads T , and T' , in the fabric as described is due to the fact that the respective backing threads are arranged on each needle with which it is to be worked into the fabric by the stitch produced by said needle. For instance, when the loop p , (at the left of Fig. 15), was cast from its needle, it carried with it the thread T' , which by reason of its position on the needle B , caused it to be tied in the legs of the two connecting loops, whereas the thread T , which was on the opposite side of the needle from which loop p , was cast is free of the legs of said loop as shown. But when the next succeeding needle casts its stitch q , the thread T , will be tied in between the legs of the two connecting loops, while the thread T' , will be free of said loop q , because of the disposition of the two threads T , and T' , around the needles. The threads T , and T' , while being disposed one above the other, cross each other between adjacent needles, so that each needle is substantially embraced by the two threads, one being on the back and the other one on the front of the needle as hereinbefore described.

A fabric thus constructed possesses decided advantages over the prior art, particularly because of its controllable elasticity. While the back or rear face of the fabric will usually be a little rougher than the front face, I find by proper adjustment of the parts, I can produce both faces substantially alike.

I desire to emphasize the fact that I have but a single set of needles to produce a fabric composed of a base formed of a separate thread, and a backing formed of one or more threads, tied in and positioned as to expose same on but one face of the fabric.

As far as I am aware, it is broadly old in the art to have knitting machines to produce a base fabric, with a backing. But I believe I am the first in the art to produce a base fabric, and tie in backing threads between the connecting legs of adjacent loops by the employment of a spring needle knitting machine. Therefore I do not claim broadly in this application, a base fabric having tied in backing threads, or broadly the mechanism for producing such a fabric. But I do claim the specific means employed which enables me to produce a very high grade of fine fabric.

To produce a diagonal effect in the fabric, I provide an odd number of needles. However I do not desire to be limited to such an

arrangement as the fabric can be made substantially the same with an even number of needles, although the face of the fabric will not present such a pleasing effect.

What I claim is:—

1. In a circular knitting machine, the combination of fabric forming means including a knitting yarn guide and stitch forming and cast off means, means acting thereafter to lay an additional or weft yarn upon the active or hook sides of some only of the needles, means including a resilient instrument to prevent said weft yarn being drawn into a knit loop, similar means acting to similarly place another weft yarn with respect to other needles than those acted upon by said first named means, a second knitting yarn guide, and stitch forming and cast off means cooperating with said latter guide to form a course of loops, said cast off means also cooperating with the weft yarns to cast them off without knitting them.

2. In a circular knitting machine, the combination of fabric forming means including a knitting yarn guide and stitch forming and cast off means, means acting thereafter to lay an additional or weft yarn upon the active or hook sides of some only of the needles, similar means acting to similarly place another weft yarn with respect to other needles than those acted upon by said first named means, means including a resilient instrument acting on the needles and engaging both the weft yarns to prevent them from being drawn into a knit loop, a second knitting yarn guide, and stitch forming and cast off means cooperating with said latter guide to form a course of loops, and cooperating with the weft yarns to cast them off without knitting them.

3. In a circular knitting machine, the combination of fabric forming means including spring needles, a knitting yarn guide, and stitch forming means, means including a plugged wheel for thereafter acting to lay an additional or weft yarn upon the active or hook sides of every other spring needle, similar means including a plugged wheel acting to similarly lay another weft yarn upon the active or hook sides of the needles skipped by the first mentioned weft yarn, rotary means cooperating with the stitch forming means to prevent both said weft yarns from being drawn into a knit loop, a second knitting yarn guide, and means including a cast off means cooperating with said latter guide to form a course of loops and cooperating with the weft yarns to cast them off without knitting them.

4. In a circular knitting machine, the combination of fabric forming means including a knitting yarn guide and stitch forming and cast off means, means thereafter acting to lay an additional or weft yarn upon the active or hook sides of some only

of the needles, and similar means acting to similarly place another weft yarn with respect to other needles than those acted upon by said first named means, a second knitting yarn guide, and stitch forming and cast off means coöperating with said latter guide to form a course of loops, and coöperating with the weft yarns to cast them off without knitting them, and an instrument having a yielding edge engaging the body portions of the needles and located between the two knitting yarn guides for preventing the laid in weft yarns interfering with the placing of the second mentioned yarn in the hooks of said needles.

5. In a circular knitting machine, the combination of fabric forming means including a knitting yarn guide and stitch forming and cast off means, means for holding the knit fabric down on the base of the needles, means acting to lay an additional or weft yarn upon the active or hook sides of some only of the needles while the knit loops are held down on the base of the needles, similar means acting to similarly place another weft yarn with respect to other needles than those acted upon by said first named means, a frictionally rotated roller having a yielding edge engaging the body portions of the needles to prevent said weft yarns from being drawn upward while the knit loops are held down on the base of the needles, and a second knitting yarn guide and stitch forming and cast off means coöperating with said second guide to form a course of loops and coöperating with the weft yarns to cast them off without knitting them.

6. A knitting machine comprising a series of circularly arranged spring needles, means for feeding knitting yarn to the needles, a bur wheel on the outside of the needles for introducing a weft yarn to the active or hook side of certain of said needles only a clearing wheel for forcing said weft yarn down on the needles, a second bur wheel acting on the needles to similarly place a second weft yarn with respect to other needles than those acted upon by said first named bur wheel, a clearing wheel for forcing the second mentioned weft yarn down on the needles adjacent the first mentioned weft yarn, a stitch bur wheel on the outside of the needles for introducing a second knitting yarn to the needles, a yielding pressure wheel on the inside of the needles and adjacent to the stitch bur wheel, a rod located below the

plane of the bur wheels and the presser wheel to hold the previously formed fabric down, means for closing the beards of the needles after the stitch bur wheel has introduced the second knitting yarn, a bur wheel on the inside of the needles for elevating the previously formed stitches and the two weft yarns beyond the points of the beards of the needles while said beards are closed, and a cast off bur wheel for casting the previously knit loops and the weft yarns from the needles.

7. In a circular knitting machine, fabric forming means including a knitting yarn guide and stitch forming and cast off means, similar fabric forming means including a knitting yarn guide and stitch forming means, means including a bur wheel, for laying in a weft yarn on the active side of certain of the needles, similar means including a bur wheel for laying in a second weft yarn on the active side of certain of the needles skipped by the other mentioned weft yarn placing means, means including a resilient element engaging the needles and acting on both the weft yarns to prevent the latter being formed into knit loops, said weft yarn laying in means being located between the two yarn guides and stitch forming and cast off means, and means for simultaneously casting off the weft yarns and also the knit loops of the first mentioned fabric forming means without knitting the weft yarns.

8. In a circular knitting machine, the combination of fabric forming means including spring needles, a knitting yarn guide and stitch forming means, means including a plugged wheel for placing an additional or weft yarn on the active or hook side of a needle or needles, other similar means for placing a second additional or weft yarn on the back or opposite side of said needle or needles on which the first weft yarn has been placed, means including a resilient instrument to prevent both of said weft yarns from being drawn into a knit loop, a second knitting yarn guide and means including a cast off means coöperating with said latter guide to form a course of loops and coöperating with said weft yarns to cast them off without knitting them.

In testimony whereof I affix my signature in presence of two witnesses.

THOMAS F. MORRIS.

Witnesses:

DOUGLASS McRAY,
CHARLES L. MEAD.