

No. 646,474.

Patented Apr. 3, 1900.

B. T. STEBER.
KNITTING MACHINE.

(Application filed July 14, 1899.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1.

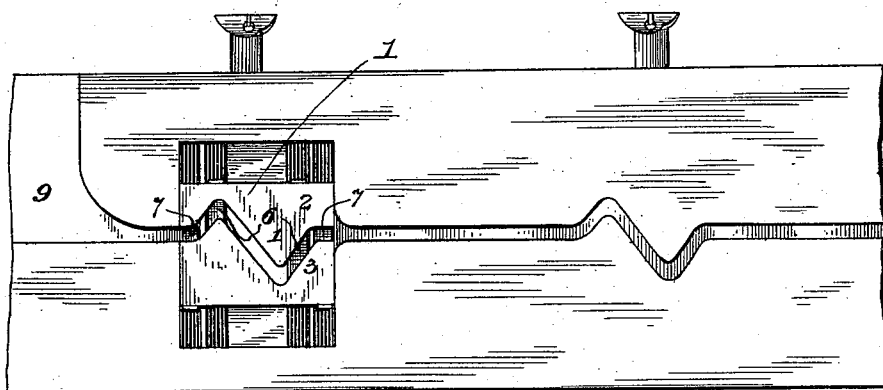
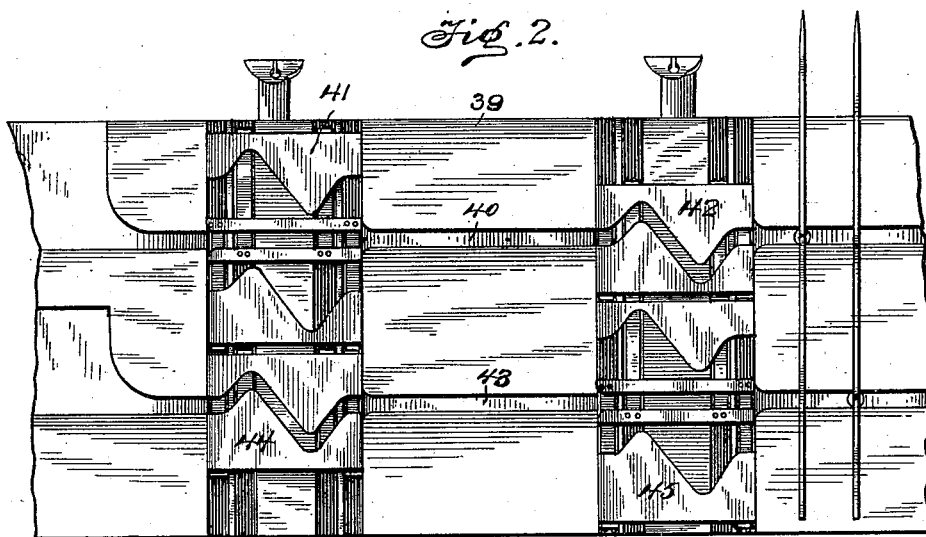


Fig. 2.



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Fig. 3.

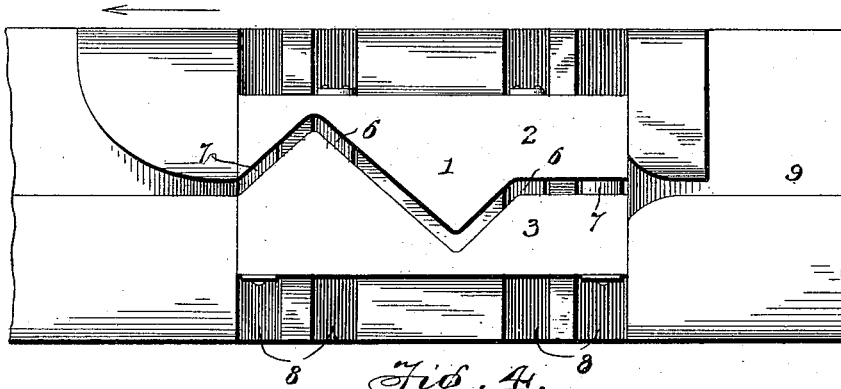


Fig. 4.

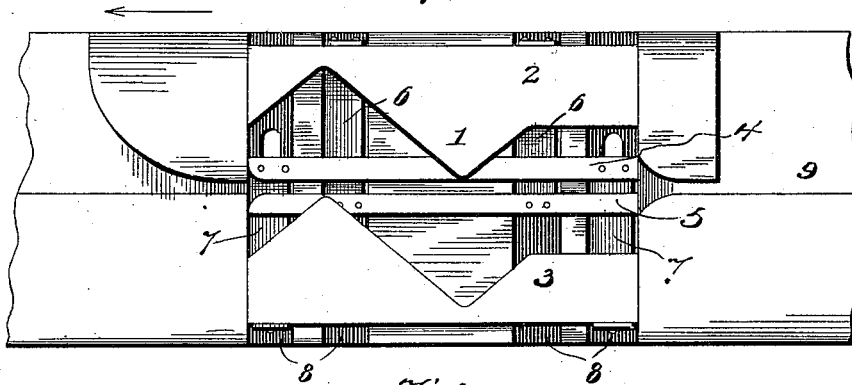
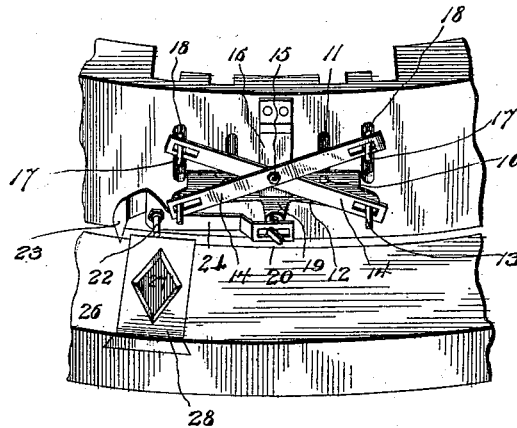


Fig. 5.



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3 Sheets—Sheet 3.

Fig. 6.

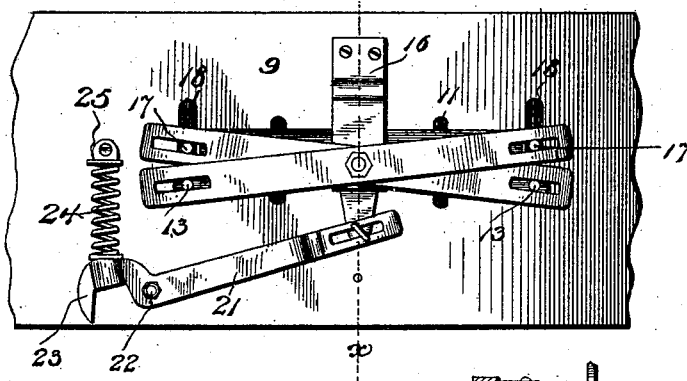


Fig. 9.

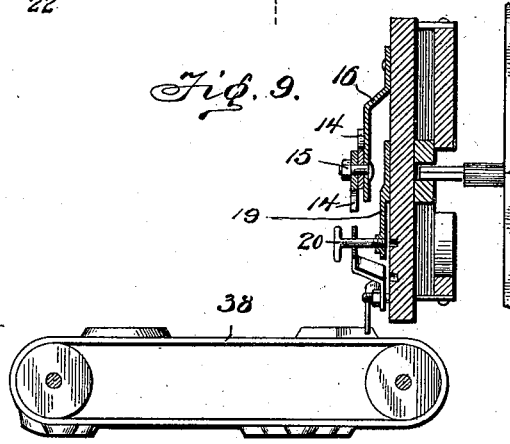


Fig. 8.

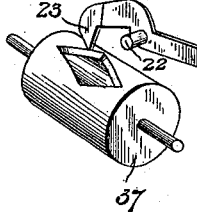
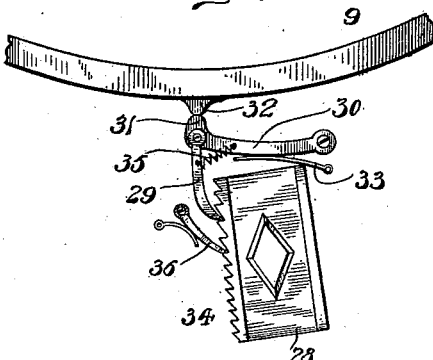


Fig. 7.



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UNITED STATES PATENT OFFICE.

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KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 646,474, dated April 3, 1900.

Application filed July 14, 1899. Serial No. 723,835. (No model.)

To all whom it may concern:

Be it known that I, BERNARD T. STEBER, a citizen of the United States, residing at Utica, in the county of Oneida and State of New York, have invented certain new and useful Improvements in Knitting-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in knitting-machines; and it has for its object the production of machines which are capable of doing a great variety of work with a small outlay of time, especially in producing goods having checked surfaces or for producing figures or leaves, flowers, or other designs in knitted fabrics.

It consists in providing a knitting-machine, having suitable needles and guides therefor, with one or more adjustable cams, whereby at a predetermined time the cams can be thrown out of engagement with the needles, so that a different stitch will be produced.

It also consists in a knitting-machine having knitting-needles and guides therefor, of actuating-cams for engaging the said needles, and means connected with the said cams for automatically throwing them out of engagement and into engagement with the said needles to produce the desired figure in the fabric.

It also consists in a knitting-machine having reciprocating needles, of cams for actuating the same, mechanism for operating the said cams comprising a lever connected with the cams, and a pattern or actuating cam for engaging the said lever, whereby the needle-cam will be thrown out of engagement or returned to the same at the proper time to produce a figured fabric.

It also consists of certain other novel constructions, combinations, and arrangements of parts, as will be hereinafter fully described and claimed.

In the accompanying drawings, Figure 1 represents a side elevation of a portion of a cam cylinder or ring employed in my improved knitting-machine looking at the same from within. Fig. 2 represents a similar view, but showing a different arrangement of the

cam-paths. Fig. 3 represents a detail elevation of one of the compound cams employed for changing the stitch of the needles. Fig. 4 represents a similar view showing the cam thrown out of engagement. Fig. 5 represents a detail perspective view of the mechanism for operating the said cam. Fig. 6 represents an enlarged detail view of a portion of the same. Fig. 7 represents a detail plan view of a portion of the device, illustrating the means of actuating the pattern or figure cam for changing the needle-cam. Fig. 8 represents a detail view illustrating the use of a roller for carrying the figure-cam; and Fig. 9 represents a detail sectional view through the cam ring or cylinder, illustrating the use of a belt for carrying one or more figure-cams.

By manipulating the needles of a knitting-machine in different ways at different points the operation of the said needles can be so effected as to produce fabrics having different stitches and in such a way as to produce figured fabrics or such as have designs or configurations formed upon them by the difference in the stitch of one part from that of the rest of the fabric. Some knitting-machines employ needles having long and short heels for producing plain or ribbed fabrics, while my machine preferably employs needles having heels of the same length, but arranged at different distances from their hooked ends for a similar but enlarged purpose. Part of my invention is applicable to both classes of machines and is designed to enable the operator to quickly and automatically throw certain of the needles out of and into engagement at a predetermined time or at will to produce the desired results in the fabric.

My invention is particularly well adapted for use upon knitting-machines having two or more actuating-cams for producing ribbed or plain fabrics.

In carrying out the features of my invention I provide a knitting-machine with one or more compound cams, as 1, which are capable of being adjusted to actuate the needles or to permit them to pass through undisturbed. The cam 1 is preferably formed of upper and lower members, as 2 3, having upon their adjacent faces a zigzag shape, as illustrated in Figs. 1, 2, 3, and 4 of the drawings. When

these members are drawn toward each other, as seen in Fig. 3 of the drawings, they form between them a cam-path capable of lifting the needles so as to insure engagement with the yarn and then depressing the needles to perform the knitting operation, after which it returns them to their normal position. Acting in conjunction with the members 2 and 3 are movable members 4 and 5, which when brought into their operative position form a straight continuation of the needle-supporting portion of the cam-ring, as shown in Fig. 4 of the drawings. The upper member 2 of the cam is connected by means of bars or slides 6 6 with the lower members 5 of the straight portion, while the lower member 3 of the cam is connected by similar bars or slides 7 7 with the upper straight member 4. The bars or slides 6 and 7 are arranged to move in grooves, as 8 8, formed in the inner surface of the cam ring or cylinder 9. Secured to each of the bars or slides 6 6 are studs 10, which pass through slots 11, formed in the cam-cylinder, to the outside thereof, where they are both attached to a moving plate or bar 12. The bar 12 carries at its ends pins or studs 13 13, which engage slots formed in levers 14 14, also secured on the outside of the cam-cylinder. The said levers 14 14 are preferably crossed about centrally of their length and mounted upon a common pivot point or stud, as 15, carried by a bracket 16, secured to the cam-cylinder. The upper ends of the said bars or levers 14 14 are also slotted and engage pins or studs 17, which extend through slots 18 in the cam-cylinder and are carried by the bars or slides 7 7 of the lower cam member 3. It will be evident that by raising and lowering the bar 12 the levers 14 14 will be so actuated as to draw the members of the cam 1 together or to separate them, thereby bringing the straight members 4 5 toward each other. The bar 12 is also provided with a downwardly-extending point or projection 19, which carries a stud 20, said stud engaging a slot in the end of an actuating-lever 21. The lever 21 is pivoted, as at 22, to the cam cylinder or ring and carries at one end a downwardly-extending pin or projection 23. This end of the lever 21 is normally held in its lower position by means of a spring 24, which is interposed between the said lever and a lug or projection 25, secured to the cam-cylinder 9. By the action of this spring the levers would be so operated as to separate the members 2 3 of the cam and bring the straight members 4 5 toward each other, as seen in Fig. 4. The projection 23, however, of the lever 21 engages the ledge or horizontal portion 26, formed near the outer periphery of the cam-cylinder 9, so that the said projection is held upwardly against the action of the spring, and the cam members 2 3 are held together to actuate the heels of the needles. When it is desired to throw the cam members 2 3 out of operative position, a pattern or stencil may

be used upon the ledge 26, said stencil having preferably a depressed portion, as at 27, into which the point 23 of the lever 21 may drop in order to force the cams apart under the action of the spring 24. The edges of the depressed portion or configuration 27 are preferably beveled, so as to easily lift the projection 23 out of the same as the cylinder continues to revolve.

It will be understood that in a machine of this kind the cylinder 9 is preferably rotated with respect to the needles which perform the knitting operation, and the ledge 26 is of course held stationary. It will be apparent, of course, that the ledge might be moved and the cylinder held stationary with the same result and all within the spirit of the invention.

As illustrated in Figs. 5 and 7 of the drawings, the pattern or stencil 27 is formed in a slide, as 28, which moves in a groove preferably dovetailed in the ledge 26. In order to feed the pattern radially, so as to continue the production of the figure in the fabric, I pivotally mount a pawl 29 to the pivoted lever 30, which is secured to the frame or ledge 26. The lever 30 is normally held against the periphery of the cam-cylinder 9 by means of a flat spring 33 and is provided with a cam end portion, as 31, which is adapted to be engaged by a lug 32, secured to the cam-cylinder 9. The pawl 29, carried by the lever 30, engages a series of ratchet-teeth 34, formed upon the block or slide 28, the said pawl being normally held in engagement with the teeth 34 by means of a spring 35, which connects it with the lever 30. In order to prevent a retrograde movement of the slide 28, a dog or pawl 36 is also secured to the ledge 26 and is held in engagement with the said teeth 34 by means of a suitable spring. It will thus appear that upon each revolution of the cylinder 9 the lug 32 will actuate the dog 29, so as to feed the pattern forward to a slight extent, and thus continue the production of a corresponding figure in the fabric.

Instead of employing a slide, as 28, a roller, as 37, may be used to carry the configuration or pattern, said roller being actuated by the cam-cylinder in a similar manner to that just described with respect to the slide 28. A belt, as 38, may also be used for carrying patterns of various configurations to actuate the cam, as illustrated in Fig. 9 of the drawings, all within the spirit of my invention. The belt 38 will be actuated in a similar manner to the roller 37. While I prefer to produce the pattern or stencil by depressing the same in the surface of the slide or roller, yet it will be apparent that I may use a raised configuration, as illustrated in Fig. 9 of the drawings, for operating the cam without departing in the least from the scope of my invention.

From the above description it will be observed that by using a pattern or suitable stencil the cams can be automatically actuated to operate the needles of the knitting-

machine at the proper time to produce a reproduction of the said pattern in the knitted fabric.

As above stated, I preferably use my improved compound cam in a machine using two or more cams, and therefore employ two or more yarn holders or guides. Machines of this character are adapted by the drawing out of engagement of some of its needles at certain times to produce a fancy or plain fabric, according as may be desired. It will be seen by reference to Fig. 1 of the drawings that by making one of the cams movable and adapted to be changed as heretofore described the said machine may be operated so as to actuate the needles to knit a plain fabric by knitting with every needle with stationary cam only, and yet may be instantly changed so that the yarn supplied by the carrier of the adjustable cam will not be knit at that point by every needle, but will pass every alternate needle and produce a ribbed mark on the fabric. This arrangement of cams is particularly well adapted to machines having needles with long and short heels, the adjustable cam being adapted to engage the long heels only, while the other cam projects inwardly from the cam-cylinder a sufficient distance to engage both the long and short heels to produce a continuous plain fabric. If the long-heeled needles are arranged alternately or otherwise with the short-heeled needles and the adjustable cam 1 be adapted to engage only the long-heeled needles, when the said cam is thrown out of engagement it will permit the said long-heeled needles, as well as the short-heeled needles, to pass undisturbed and only operated by the second cam. I find, however, that machines employing long and short heeled needles and one cam-path can only be actuated to produce rectangular-shaped configurations in the fabric, because they are limited by the fixed position of the long and short heeled needles, and for producing other designs, therefore, I employ a machine which uses needles having their heels arranged at different distances from their knitting-hooks. In using this kind of needle the cam-ring, as 39, is formed with upper and lower cam-paths for engaging the heels of the needles. By providing each of these cam-paths with two or more cams and corresponding yarn-carriers I am enabled by means of my adjustable compound cam to produce fabrics having various and different configurations, according to the patterns which actuate the cam-operating levers or by operating the levers by hand. In a cylinder of this sort the upper path 40 may be provided with two or more adjustable cams, as 41 and 42, and the lower cam-path 43 may be provided with two or more adjustable cams 44 45. By throwing the cams 41 and 45 out of engagement the alternate needles will be operated by the cams 42 and 44 to produce a design or configuration; so, also, the cams 42 and 44 may be thrown out of engagement and the cams 41

and 45 be used to produce the desired result. In constructing a machine of this kind also the cams 41 and 45 may be made stationary instead of adjustable, or the cams 42 and 44 may be stationary instead of adjustable, according as may be desired, without departing from the scope of this invention.

It may be desirable to knit a certain kind of fabric for a given time, and in this case I disconnect the automatic lever 21 and place the cams in the desired position by hand and fasten them in their place by means of a thumb-screw or other catch until I wish to knit differently, when I place the cams in required position and proceed as before. The thumb-screw may be placed at the bottom end of the projection 19—say through a hole which extends through pin 20, which hole is a screw-hole—and this screw which passes through stud or pin 20 can enter a hole in the outside of the cam-ring either when cams are open or when they are shut, as desired, and hold the cams in the desired position until otherwise wanted.

It will be apparent that I am enabled by my adjustable automatically-operated compound cam to produce knitting-machines which can be automatically operated to produce a given pattern in the machine or a fabric and that these cams may be operated to vary the fabrics produced by the machine by throwing them into and out of engagement at a predetermined time.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A knitting-machine having reciprocating knitting-needles comprising a cam-cylinder or cam-carrier having a cam-path adapted to engage the heels of the knitting-needles, one or more adjustable cams interposed in the said cam-path, whereby the needles may be forced to travel in a straight line and out of action, or be caused to move up and down to perform the knitting operation as may be required to produce the desired configuration in the fabric, substantially as described.

2. In a knitting-machine, the combination with reciprocating needles, of a cam ring or cylinder having a cam-path for engaging the needles and an adjustable cam interposed in said path comprising upper and lower members having corresponding adjacent faces, and means for separating the said cam members or drawing them together to hold certain of the needles in a straight course and entirely out of action or to move them up and down for knitting, substantially as described.

3. In a knitting-machine, the combination with reciprocating needles, of a cam-cylinder having an actuating-cam path, an adjustable cam interposed in the said path having upper and lower movable members, upper and lower straight members connected with the said cam members, and means for operating the same, whereby the cam members may be brought to bear upon the needles to actuate them or the

straight members may be used to produce a continuous path for the said needles, substantially as described.

4. In a knitting-machine, the combination
5 with needles and a cam-cylinder having a cam, of adjustable cams mounted therein comprising upper and lower movable cam members and upper and lower movable straight members, sliding bars connecting the cam
10 members and the straight members, and levers for operating the said cam and straight members, whereby they may be alternately thrown into and out of engagement with the knitting-needles, substantially as described.

15 5. In a knitting-machine, the combination with suitable needles and a cam-cylinder, of cams having movable cam members and movable straight members, bars connecting alternate cam and straight members, studs upon
20 said bars extending through slots in the cylinder, slotted cross-levers engaging the said studs and a slotted lever for actuating them, the construction being such that the cam and straight members may be alternately brought
25 into and out of engagement to produce the desired result in the fabric knitted, substantially as described.

6. In a knitting-machine, the combination with reciprocating needles, of a cam-cylinder
30 for engaging the same, cams interposed in the said cylinder comprising movable cam and straight members, levers for actuating the said cam and straight members, a bar also connected with the said members and levers,
35 a pivoted actuating-lever connected with the said bar and having a downwardly-extending projection at one end, a spring for normally holding the said projection downwardly and a pattern or stencil for engaging the said pro-
40 jection whereby the cam members will be automatically operated according to the pattern used, substantially as described.

7. In a knitting-machine, the combination

with needles and a cam-cylinder, of an adjustable cam mounted thereon, a lever for actuating the said cam having a projection formed
45 thereon, a pattern or stencil movably mounted on a portion of the machine, and means for moving the said pattern or stencil for causing it to engage the projection on the operating-
50 lever and actuate the same, substantially as described.

8. In a knitting-machine, the combination with needles and a cam-cylinder, of one or more adjustable cams mounted thereon, a lever for operating the same, a block or slide,
55 a pattern for engaging the said lever formed in the said block or slide, ratchet-teeth formed on said slide, a dog adapted to engage the said ratchet-teeth and a lug upon the cam-cylinder
60 for automatically operating the said dog, the construction being such that the adjustable cams will be so actuated as to produce the desired configuration in the fabric, substantially as described.

9. In a knitting-machine, the combination with knitting-needles and a cam ring or cylinder, of adjustable cams mounted thereon,
a slide carrying a pattern or stencil for operating said cams, a rack upon the said slide, a
70 spring-pressed dog for holding the slide in its adjusted position, a spring-actuated pawl for engaging the rack and moving said slide, and a spring-actuated lever carrying said pawl,
said lever having a cam end for engaging a
75 cam or lug formed upon the cam-cylinder, the construction being such that the slide and the pattern carried thereby will be fed radially for operating the adjustable cams, substantially as described.

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

BERNARD T. STEBER.

Witnesses:

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