(No Model.)

L. C. HUSE.

FASHIONING MECHANISM FOR KNITTING MACHINES.

No. 589,174. Patented Aug. 31, 1897.

Fig. 1.

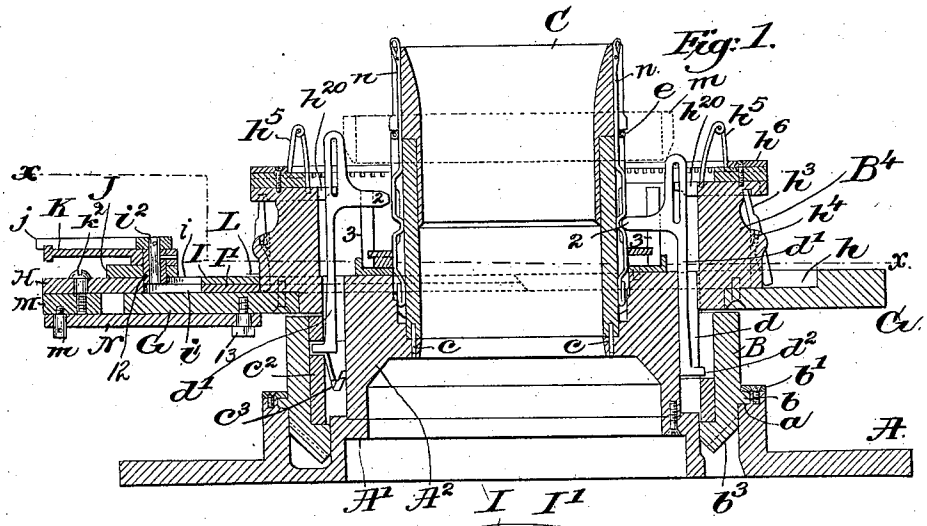


Fig. 4.

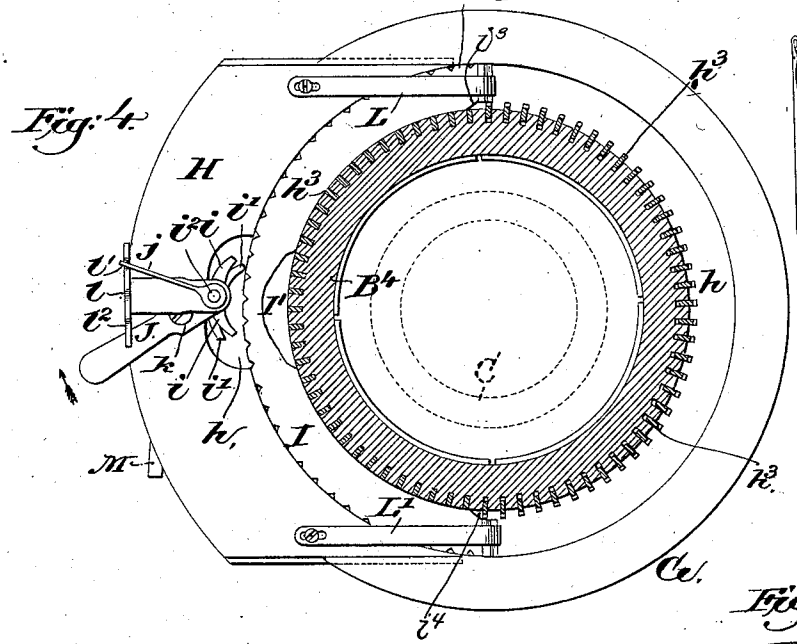


Fig. 2.

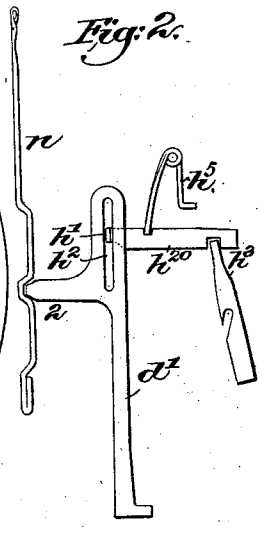


Fig. 6.

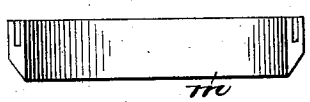


Fig. 3.

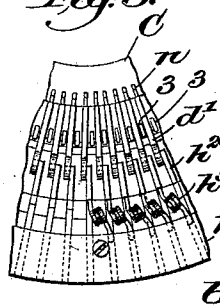
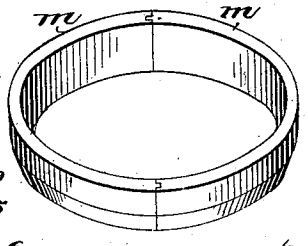


Fig. 5.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

LEON C. HUSE, OF LACONIA, NEW HAMPSHIRE.

FASHIONING MECHANISM FOR KNITTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 589,174, dated August 31, 1897.

Application filed May 8, 1894. Serial No. 510,438. (No model.)

To all whom it may concern:

Be it known that I, LEON C. HUSE, of Laconia, county of Belknap, State of New Hampshire, have invented an Improvement in Fashioning Mechanism for Knitting-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention has for its object the production of a novel knitting-machine wherein any needle or needles of a series of needles may be operated to knit or may be left at rest at will, according to whether it or they are to be used to knit in the course of loops being made, my invention being devised to facilitate narrowing and widening.

In accordance with my invention the needles are mounted in a needle-bed, the needles to be used to knit any course or part of a course being engaged separately by a needle-actuator, one for each needle, said actuators being reciprocated by the usual cam-groove in the usual cam carrier or cylinder, the needle-actuators coöperating with the needles, which are not to be reciprocated during any one or more courses of knitting, being put out of engagement by a needle-actuator controller, which performs the functions and purpose of a pattern device.

The needle-actuators as I have herein chosen to illustrate my invention are supposed to be moving constantly up and down or substantially parallel to the needles, and each actuator will engage and move its own needle substantially in unison with it unless the controller or a suitable pattern device places the actuator out of engagement with the needle before the actuator rises far enough to lift the needle to knit.

I have chosen to illustrate my invention as embodied in connection with a circular series of needles, but my invention may be used to advantage with needles sustained or guided in other than cylindrical beds, and so also this invention is not to be limited to the exact shape shown for the needle-actuators nor to the exact shape shown for the devices for controlling said actuators to determine whether or not in their reciprocation they shall engage and move a needle.

By my invention each needle, it having been used to knit, is left by the actuator where the actuator took it from.

I have shown the upper ends of the needle-actuators as having combined with them actuator-selecting mechanism, whereby the actuators may be moved without moving a needle, and as herein shown said mechanism contains suitable springs to keep the needle-actuators borne toward the needles in a yielding manner, as thereby in case a needle should accidentally get out of the position in which it was left when the needle-actuator was disengaged from it the said actuator, when it should again engage and move a needle, may contact with said needle and slide along its shank, if need be, until it finds the proper point to engage the needle and reciprocate it.

It will be remembered that the actuators are to engage and reciprocate only those needles which are to knit in the course of loops being made, and it will happen in the use of the machine that a needle will be moved to make a stitch and then be left at rest holding a loop while other courses of loops are being knitted, and during this time if a needle should accidentally get up or down the needle-actuator will not catch the needle and move it.

The machine herein to be described will in practice have coöperating with its needles a series of sinkers which may be of any usual form and adapted to keep the work down next the rising needles; but herein I have not deemed it necessary to illustrate sinkers.

For narrowing, the needle-actuators will be disengaged from the needles and they will thereafter be permitted to engage said needles for complemental widening and for all-around work, and the time and order of this disengagement and reëngagement will in practice be regulated by or through a suitable needle-actuator controller or pattern device, and this controller or pattern device may be variously modified within the skill of a mechanic and without the exercise of invention and yet fall within the scope of my invention.

I have chosen to illustrate as one form of controller devices such as are found substantially in United States Patent No. 335,587; but my invention herein contained is not limited to the use of the form of controller shown,

and instead I may use any other well-known equivalent device.

I have in the present form in which I have embodied my invention interposed between the needle-actuators and the needle-actuator-controlling mechanism an actuator-selecting mechanism composed, essentially, of a series of sliding guide-bars and a series of levers and springs; but this my invention is not limited to the exact form of selecting mechanism shown, and the devices entering into said mechanism might be variously modified by only the exercise of mechanical skill and yet enable the constantly-reciprocating needle-actuators to be made, by or through a needle-actuator controller, to move any desired needle or needles for knitting in any desired course and leave the other needles at rest.

The employment of springs in the actuator-selecting mechanism is further of advantage in that class of machine wherein it is desired to knit a stocking-leg to have a fashioned heel and which leg is to be knitted to a circular rib-top, said springs enabling all the needle-actuators to be simultaneously disengaged from the needles by or through a displacer, herein shown as a conical ring made, preferably, in segments and adapted to surround the needle-cylinder and needles and act on the upper ends of said actuators, the disengagement of the actuators from the needles enabling the needle-cylinder then in the machine to be removed and be replaced by another like cylinder containing needles, onto which the loops of the rib-top have already been picked, to save time, the needles of the cylinder so withdrawn having the loops of another rib-top picked onto them preparatory to again using that cylinder in the machine. It is supposed that each machine will have two or more cylinders or sets of cylinders having proper grooves for the character of work to be done.

The sinkers (not shown, but which, as stated, may be mounted in any usual way) will be removable from the machine with the bed carrying the needles.

Figure 1, in section, represents a sufficient portion of a knitting-machine to enable my invention to be understood, the needle-actuators at the right being shown as in position to engage and move the needles with them, while those at the left are represented as put out of engagement with the needles by or through the selecting mechanism and the needle-actuator controller or pattern-surface, the displacer, hereinafter to be described, being indicated by dotted lines. Fig. 2 is a detail showing a needle-actuator and one form of selecting mechanism. Fig. 3 is a partial plan or top view of some of the devices shown in Fig. 1. Fig. 4 is a section supposed to be substantially in the line x, Fig. 1, said section showing only the levers of the selecting mechanism for putting the actuators into or out of engagement with the needles, and of one form of controlling mechanism therefor. Fig. 5 is a perspective view of one form of displacing device to effect the disengagement of all the needle-actuators from the needles preparatory to a change of needle bed or cylinder. Fig. 6 is an edge view showing one-half of the displacer shown in Fig. 5.

In the drawings, A represents a table-plate which constitutes part of a stationary framework, said table-plate having, as shown, a suitable shoulder a to sustain the cam-cylinder B, said cam-cylinder, as herein represented, having an annular projection b to rest upon said shoulder, said cam-cylinder being kept down in place by a suitable segment b', confined to the table-plate by suitable screws.

The lower end of the cam-cylinder is provided with suitable teeth b^3, which in practice will be engaged by a suitable bevel-toothed gear on a suitable shaft, which may be not only rotated but reciprocated, as desired, by power or otherwise, as commonly practiced in circular-knitting machines for knitting roundabout or circular work and narrowing and widening.

The table-plate A has a shoulder A′, on which is set the lower end of a needle-bed holder A^2, said holder sustaining the needle-bed C, herein represented as a cylinder and as prevented from rotating on said rest by means of suitable pins or projections c.

The upper end of the needle bed or cylinder may be of any usual or suitable shape, and in practice it will contain between its needle-grooves suitable slots through or in which may work the sinkers to be used, all as common, the said slots not being herein shown.

The interior of the cam-cylinder B has attached to or forming part of it preferably a steel plate, as c^2, provided with a cam-groove c^3 of usual shape—that is, of a shape commonly employed in circular-knitting machines—to receive the butts of and reciprocate the regular needles therein used to enable them to knit, the said plate or cam-groove having in or part of it suitable moving drawing-down or knitting cams which in practice will be of ordinary construction, whereby to not only draw loops of the desired length for the work to be done, the length being varied by adjustment of the cam, but also of such usual shape and construction as to enable knitting to be done either when the cam-cylinder is being rotated continuously in one direction or is being reciprocated as for narrowing and widening.

I have not herein shown the cams, and in practice they may be of any shape common to circular-knitting machines adapted to knit a cylindrical leg with a fashioned heel.

The holder A^2, which is stationary, is provided at its periphery with a series of vertical grooves d, in which are located the shanks of the needle-actuators d', said actuators having suitable butts d^2, which enter the cam-groove referred to in the cam cylinder or plate, so that said needle-actuators, as the cam is moved, are moved up and down constantly.

Each needle-actuator has a prong or finger 2, which may or may not engage a notch in the shank of the needle *n*, according as it is desired to reciprocate said needle to knit or leave it at rest, said needle being guided in a suitable groove in usual manner in the periphery of the needle-cylinder and being retained in said groove by a suitable coil or other spring or device *e*, commonly used for that purpose, said spring retaining the needles in place in the cylinder or bed when the latter is removed from its supports.

Outside the holder A^2, I have located a ring B^4, provided at its upper end with a series of radial grooves for the reception of the slide-bars h^{20}, forming in this instance of my invention part of the actuator-selecting mechanism, said slide-bars being shown as provided each with a projection h' to enter a slot h^3 in the needle-actuator d' or connected therewith loosely in other suitable or proper form to enable the needle-actuator to be reciprocated vertically on or with relation to said slide, as required by the shape of the cam-groove in the cam-cylinder, the other members of the said selecting mechanism, as herein shown, consisting of levers h^3, mounted on a suitable fulcrum h^4, carried by said ring B^4, and suitable springs h^5, one end of each spring acting upon one of the slide-bars, while the other end of the spring is fixed with relation to the ring B^4 by or through a suitable plate or ring h^6, said spring normally acting to move the slide-bar toward the center of the cylinder or bed and to push the fingers or projections 2 of the needle-actuators against and so as to engage and move a needle, the needle-actuator-controlling mechanism, to be hereinafter described, coöperating with the needle-selector mechanism to effect the movement of the said slides in opposition to the said spring, as when it is desired that any actuator shall skip and not move a needle.

The ring B^4 and the holder A^2 will, in practice, be so coupled together that both will remain at rest, and for connecting the said ring and holder several of the ribs or dividing-walls between the grooves *d* may be prolonged far enough to enter a short vertical groove made at the inner side of the ring B^4.

To further prevent any possibility or liability of the needle-actuators twisting or being displaced laterally, I have mounted upon the top of the holder A^2 a series of guide-plates or fillets 3, the lower ends of said fillets being represented as clamped in place between two rings or plates, one having an upwardly-projecting rim at its periphery, the fillets being set radially into peripheral notches in the inner of said plates; but this invention is not limited to this particular form of holding the plates or fillets in position, and in practice these fillets might form part of the ring which supports them.

Referring now to the actuator-controlling mechanism, I have herein chosen to illustrate for that purpose a form of device or devices illustrated in United States Patent No. 335,587, dated February 9, 1886.

G represents a ring or annulus which is connected by suitable screws with the lower end of a ring B^4, which embraces and is sustained by the outer side of the stationary head A^2, sustaining the needle-bed C, the said head having a slight shoulder, as indicated at *g* in my Patent No. 335,587, for receiving the lower end of the ring B^4.

The ring G is cut away at one side of the groove *h*, made therein to receive a segmental slide-plate H. The plate H is adapted to slide radially in the cut-away portion of the ring G, and the inner end of the plate is concaved to meet the segments I I′, to be described, and move them when the plate is moved toward the needle-bed, so that said segments I I′ will act on the lower ends of the levers or jacks h^3 at the left and push them in at their lower ends, causing said jacks, acting on the slides h^{20}, to move the needle-actuators in a direction to place their fingers 2 out of the range of the needles which are not to be used in the knitting of a heel or toe.

The plate H has secured to it by a suitable screw *k* a lever J, the short inner end of which receives a hub 12, having attached to its lower end a pawl *i*, the open center of said hub receiving a short stud i^2, provided with a pawl *i*′, each of said pawls being double-ended, as represented in Fig. 4, the upper end of said stud having fixed to it a spring-arm *j*, which is adapted to engage either one of a series of three notches *l*, *l*′, and l^2, formed in an arm K, secured or connected to the hub 12, referred to.

When the arm *j* intersects the middle notch *l*, the points of said pawls are held in their inoperative position, but by moving the said spring-arm into a notch *l*′ the segment I′ will at its upper end move to the right in Fig. 4 and the segment I in the opposite direction, and when said spring-arm is in notch l^2 the movements of the segments will be reversed, so that by moving the lever J in one and then in the opposite direction it is possible to move the said segments one on or with relation to the other step by step, so that the ends of said segments may be made to travel toward each other in the groove *h*, and so surround more and more the needle-bed and act upon one jack after another, controlling the outermost needles of the series of needles being used for knitting heels and toes, the said segments acting to gradually throw out of action the endmost needles of the series of needles used for heel-and-toe knitting, and then to gradually put said needles into action as the slides are moved in the reverse direction back into their normal position, (shown in Fig. 4,) thus letting all the needles used in heel-and-toe work come again gradually into action for widening, as is well understood.

The plate H has pivoted upon its under side, as provided for in said patent, by a screw k^2, (shown in Fig. 1,) a lever M, having an eccen-

trically-placed stud m, the said stud receiving over it one end of a link N, fixed at its inner end by a screw l^3 to the ring G, the movement of the lever M in one or the other direction causing the plate H to be slid in or out, as desired.

The springs L L′ act to hold down in the groove h the segments I I′, and each of said segments has a suitable cam portion, as i^3 i^4, to act upon the lower ends of the jacks h^3.

The plate H, the segments, and the devices referred to for moving the plates and the segments are common to the patent referred to, so need not be herein further described. This invention is not limited, however, to the employment of the particular pawls shown for moving the segments I I′, as I may employ any other suitable devices or other known mechanical equivalents.

The invention herein claimed is not limited to the particular form of means employed for effecting the engagement and disengagement of the needle-actuators with or from the needles.

The feet of the fillets 3 are turned in at right angles at their lower end and are embraced between the two rings, the upper ring being both notched at its outer edge and cross-grooved at its under side, but such construction is not new and is not claimed.

Referring now to the needle-actuator displacer, (see Figs. 5 and 6,) the same is represented as composed of two segments m m, somewhat cone-shaped, which segments may be slipped about the needle-cylinder from either side above the springs h^5 and joined together, one segment registering with another in suitable manner, (see dotted lines, Fig. 1,) and then the complete displacer may be pushed down so that its conical part acts upon the upper ends of the actuators and pushes them all back, the springs h^5 permitting such movement, thus leaving all the needles free, so that the needle-cylinder may be readily removed from the machine in order that another cylinder having needles upon which a rib top or cuff has been already picked may be put back onto the holder and knitting be commenced on said rib top or cuff.

Herein it will be noticed that the cam device for moving the needle-actuators is located at a considerable distance from the periphery of the needle-bed, and neither the needles nor the needle-bed are subjected to any friction from the actuating-cam or its cylinder, and consequently the wear on the needles and needle-bed and on the face of the cam-cylinder is reduced, and by interposing between the needle-bed and the cam-cylinder a series of actuating devices adapted to be reciprocated in the path of movement of the needles themselves it is possible to use finer needles than in other plans known to me, and the wear upon the cam-cylinder and its cams is reduced to the minimum, and it will be understood that the thickness of the walls or partitions of the needle-bed between the needle-grooves therein may be made very thin, for the needle-actuators have independent guides or fillets located at some little distance from the cylinder and in a much larger circle, that they may be made stronger and act to steady in proper manner the needle-actuators in their movements, thus relieving the thin dividing-walls of the needle-bed from strain.

When my invention is not to be used for narrowing and widening or simply for knitting a straight tube, it will be obvious that the means described for moving the actuators so as to remove their fingers 2 from engagement with the needles will not be needed, for then each actuator will remain constantly in engagement with its own needle.

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

1. A knitting-machine containing the following instrumentalities, viz: a needle bed or cylinder, a series of needles therein, a cam plate or cylinder having suitable cams for knitting, a series of needle-actuators loosely mounted therein and adapted to be bodily reciprocated thereby in the direction of movement of the needles by the said cams and having projections to engage and move each its own needle when it is desired that a needle shall knit, and needle-actuator-selecting mechanism coöperating with said needle-actuators to move the same into and out of engagement with said needles, to operate, substantially as described.

2. A knitting-machine containing the following instrumentalities, viz: a needle bed or cylinder, a series of needles therein, a cam plate or cylinder having suitable cams for knitting, a series of needle-actuators adapted to be longitudinally reciprocated in the direction of movement of the needles by the said cams and having lateral projections to engage and move each its own needle when it is desired that a needle shall knit, and needle-actuator-selecting mechanism positively connected to said needle-actuators and actuator-controlling mechanism coöperating with said selecting mechanism to determine which of the said needle-actuators in their reciprocations by the cam-cylinder shall engage and move a needle, substantially as described.

3. In a knitting-machine, a needle-cylinder grooved for the reception of needles, a series of needles mounted in said grooves, a series of needle-actuators having laterally-extended fingers to engage said needles, devices removed from said needles and interposed between said fingers to guide said needle-actuators in their reciprocations, means to move said actuators into and out of engagement with the needles, and a cam device to reciprocate said needle-actuators, to operate, substantially as described.

4. In a knitting-machine, a needle bed or cylinder having a series of grooves for the reception of a series of needles, a series of needles having notches, a series of needle-

actuators, one for each needle, adapted to engage said notches, and arranged to swing to and from said needles at their engaging ends, a cam to reciprocate said actuators in the direction of the length of the needle, devices to serve as guides for said needle-actuators in their movement of reciprocation, and a series of springs to normally keep the fingers of the needle-actuators pressed toward and so as to engage said needles, substantially as described.

5. A needle bed or cylinder, a series of needles therein, a series of reciprocable needle-actuators adapted to engage said needles, means to press the upper ends of said needle-actuators in a yielding manner toward the said needle-cylinder and needles in order that the projections on the said needle-actuators may engage the needles and move them, combined with a needle-actuator displacer to displace the projections of the needle-actuators from the notches of the needles to enable the needle bed or cylinder to be withdrawn, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LEON C. HUSE.

Witnesses:
EDGAR F. REEVES,
JOHN W. ASHMAN.