(No Model.)

H. GARANT.

KNITTING MACHINE.

No. 559,327. Patented Apr. 28, 1896.

Fig: 1.

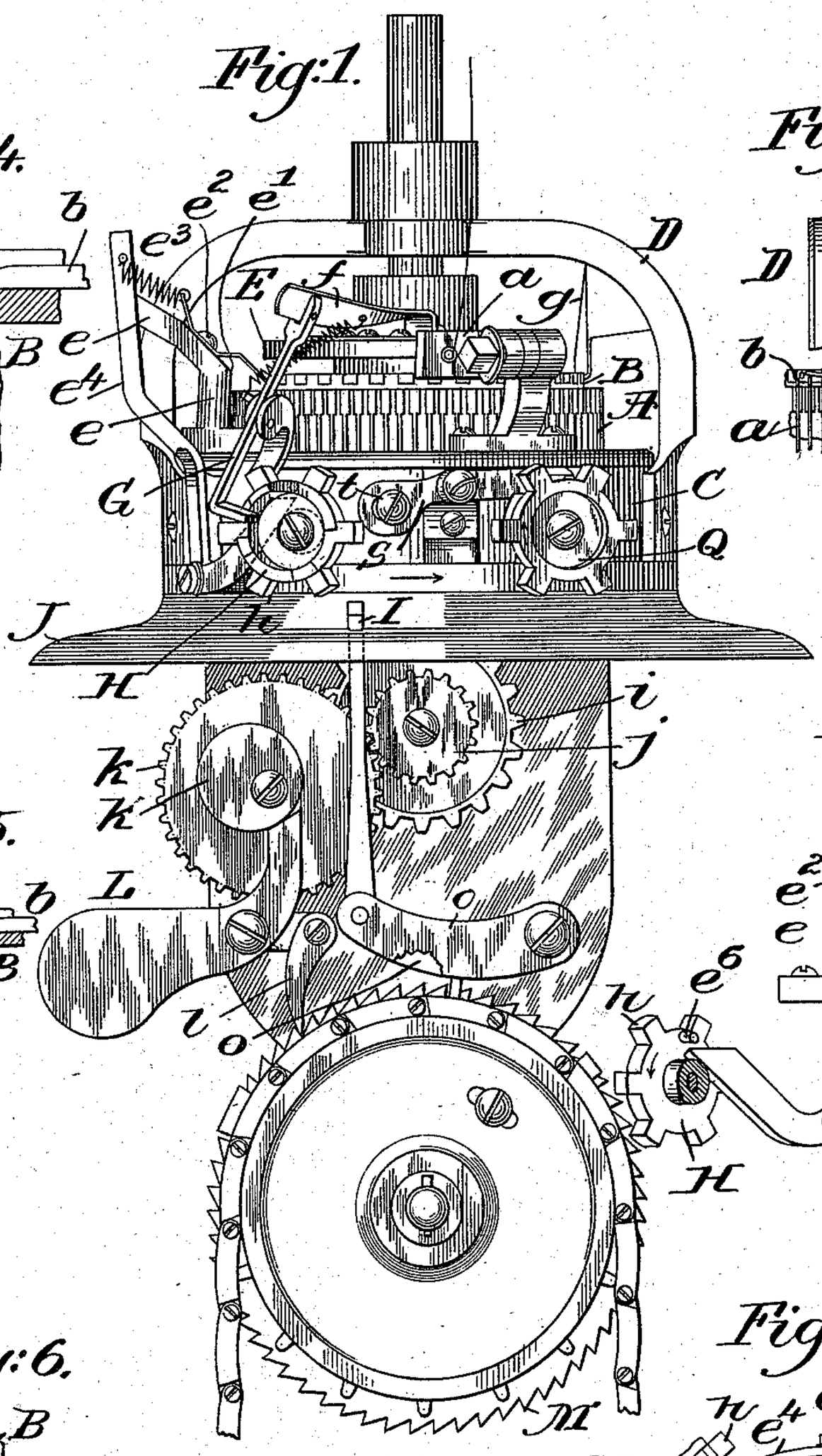


Fig: 4.

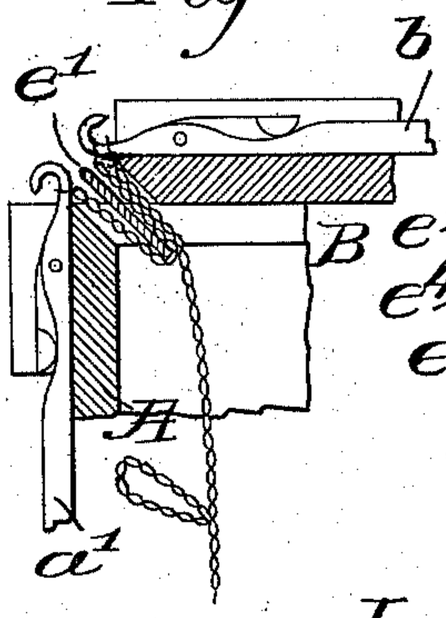


Fig: 7.

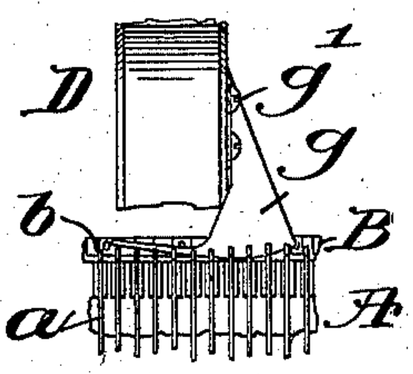


Fig: 5.

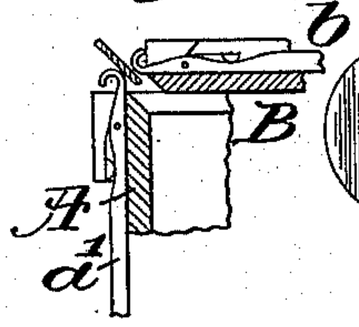


Fig: 2.

Fig: 6.

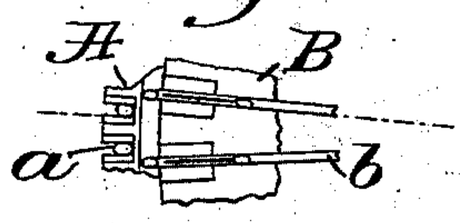
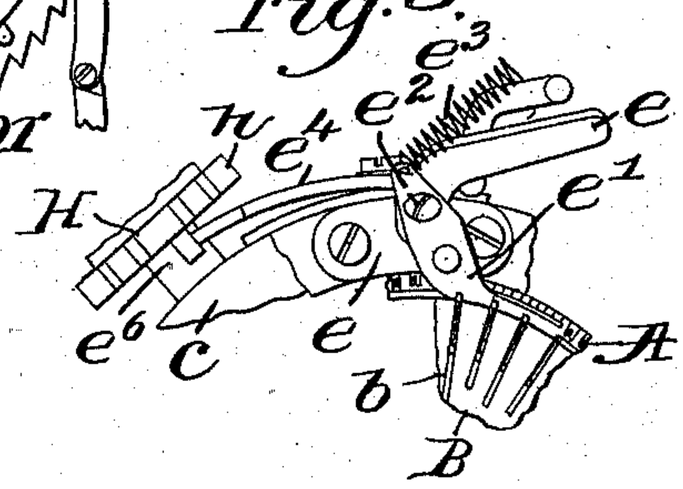


Fig: 3.



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Inventor:
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UNITED STATES PATENT OFFICE.

HENRY GARANT, OF LACONIA, NEW HAMPSHIRE, ASSIGNOR TO WARREN D. HUSE, OF SAME PLACE.

KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 559,327, dated April 28, 1896.

Application filed February 5, 1894. Serial No. 499,211. (No model.)

To all whom it may concern:

Be it known that I, HENRY GARANT, of Laconia, county of Belknap, State of New Hampshire, have invented an Improvement in Knitting-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relating to knitting-machines has for its object to provide a circular-knitting machine having cylinder and dial needles, with devices for the ready production of a welt of any desired length instead of two to four courses of loops, as most commonly practiced.

I have chosen to illustrate my invention as applied to a knitting-machine such as represented in United States Patent No. 239,169, dated March 22, 1881; but it will be understood that my invention is applicable, with but slight modifications, to other usual forms of circular-knitting machines having cylinder and dial needles.

My invention may be briefly described as containing as one member a device which will act on the fabric being knitted on one set of needles in a circular-knitting machine—as, for instance, on the cylinder-needles—while the dial-needles are held out of action, the said device taking up and keeping out of the way the knitted material to enter into the welt, said material being retained between the two sets of needles; but my invention is not limited to the use of said device only in connection with a welt portion being knitted on the cylinder-needles, and it will be obvious to those skilled in the art that the welt might be knitted on the dial-needles, the cylinder-needles being held out of action, provided the dial-needles are made to act earlier rather than later than the cylinder-needles and take yarn directly from the yarn-guide.

Figure 1, in side elevation, represents a sufficient portion of a circular-knitting machine with my invention added to enable the latter to be understood. Figs. 2 and 3 are details showing my attachment for taking up the slack of the welt; Figs. 4 and 5, sectional details showing parts of the needle-cylinder and the dial-bed, each with a needle, the fabric being also represented in Fig. 4. Fig. 6 is a plan view of part of the dial-bed and part of the needle-cylinder, each with two needles. Fig. 7 is a detail showing an auxiliary welt-slack controller, located nearly opposite the main welt-slack controller, for a purpose to be described.

Referring to the drawings, A represents a rotatable cylinder adapted to receive and guide cylinder-needles; B, a bed for dial-needles; C, a rotating cam-cylinder to actuate the cylinder-needles; E, a rotating dial-plate, provided with suitable cams for actuating the dial-needles; J, the framework supporting the cam-cylinder and other parts, the usual teeth of the cam-cylinder engaging and rotating a bevel-tooth gear *i*, having a connected pinion *j*, which engages a pinion K, having attached to or forming part of it a cam *k*.

L is a pawl-carrier having a pawl *l* to engage and rotate a ratchet-wheel M, provided with a suitable barrel carrying a suitable pattern-chain.

O represents two like levers, which are acted upon by the said pattern-chain, and I are sliding pins or stops attached to said levers and guided in the base J of the frame.

H represents a cam-disk having radially-projecting peripheral teeth *h* and two cams at its face, which cams act upon a lever G, connected by a link *f* with the cams for controlling the extent of reciprocation or action of the dial-needles.

S represents a lever connected to a screw *t*, which enters the usual drawing-down cam of the cam-cylinder C, which cam regulates the length of loop as the fabric is being knitted, and Q represents another rotating cam, also mounted on a stud-screw carried by the cylinder, it having peripheral teeth or projections and also having on its rear side a cam which acts on the lever S to move the same when the length of loop is to be varied, as when a slack course or cutting-off course is to be knitted in the tubular web.

The parts so far referred to by letter are and may be all as indicated by like letters in United States Patent No. 239,169, dated March 22, 1881, and in this my invention the said parts will operate as therein fully described, and the cam H will control the positions of the usual dial-needle cams through the lever G

and link *f* to put said dial-needles into and out of operative position with relation to the cylinder-needles, and, especially when a welt is to be commenced, the said cams will be put into such position that the dial-needles will take the thread from the thread-guide for one course and draw the said thread through between the cylinder-needles and hold the said threads without casting off the loops then on the dial-needles, and thereafter, during the formation of the welt upon the cylinder-needles, the said dial-needles will not again take thread, but will be held back until the welt is of sufficient length, when the dial-needle cams will again be put into position to cause the dial-needles to be moved outwardly to again take thread and draw new loops through the old loops then held upon the shanks of the dial-needles.

Between the time that the dial-needles are drawn in and rendered inoperative, at least so far as their taking thread and casting their loops, the cylinder-needles will continue to take thread, and as the cylinder is rotated the yarn will be knitted to form a knit fabric to constitute the welt, and when the welt is of sufficient length, say from fourteen to sixteen courses, as may be desired, the dial-needle cams will be put into position to cause the dial-needles to be thrown out between the cylinder-needles and engage the thread going into the fabric at the point where the welt is to end, and unite the fabric made wholly on the cylinder-needles with the loops of fabric which during the knitting of the welt were held on the dial-needles, and thereafter both the dial and cylinder needles will continue in operation, as usual in the said machine, to knit a circular fabric, such knitting being continued until the pattern-cam H, by reason of its being rotated by the stop-pin I, shall demand the commencement of another welt, or the cam Q shall demand such a change of position of the parts, all as provided for in said patent, in order to effect the knitting of a slack course.

In accordance with my invention I desire to take care of the fabric and keep it out of the way of the needles while the machine is being rotated for, say, fourteen to sixteen courses, as when knitting a long welt, and to do this effectually I have provided the machine referred to, the operation of which is well understood and thoroughly described in said patent, with devices which I will now describe.

I have mounted in suitable manner upon the cam-cylinder a stand *e*, and which serves as a support for the main welt-controller *e'*, which in this present embodiment of my invention shown as a thin sheet-metal blade of substantially the shape best represented in Fig. 2, it being mounted upon a suitable pivot e^2 shown as a stud-screw, the outer end of the controller having attached to it a spring e^3, which in turn is attached to a lever e^4, represented as an elbow-lever pivoted at e^5 on the cam-cylinder C, the other end of said lever, as best represented in Fig. 2, being acted upon by a pin or projection, as e^6, constituting a cam attached to the rear side of the cam H, before described, and common to said patent, there being one such pin or projection e^6 for each of the high points or throws of the said cam H, the cam represented in the said patent having two high points.

To better aid in understanding the invention, I have marked the thread-guide *a* in Fig. 1 and the cylinder-needles as *a'* and the dial-needles as *b*.

The inner or active end of the welt-controller *e'* normally occupies a position just in the space between the edges of the dial-needle bed and the needle-cylinder, as represented in Fig. 5, and during the rotation of the needle-cylinder follows along in said space between the retracted needles, the said controller being located sufficiently behind the knitting-cams as to prevent said controller being struck by the needles as they are reciprocated to knit. The controller when in its normal position, or when the lever e^4 is not acted upon by the pin e^6, barely touches the knitted fabric, just enough to prevent the loops surrounding the cylinder-needles from rising with the said needles; but as soon as the change of position of the dial-cams has been effected, as provided for in said patent, to commence the formation of the welt one of the projections e^6 moves the lever e^4, strains the spring e^3, and causes the controller to bear down upon the fabric then being knitted by the cylinder-needles alone, the spring causing said controller to follow along down with and take up the slack of the fabric being produced for the welt, as in Fig. 4, such fabric being for from fourteen to sixteen or more courses, as desired, the number of courses of the welt being determined by leaving the cam H still for the desired number of rotations of the cam-cylinder, when through the pattern chain or surface, as provided for in said patent, the said cam H will be moved to again bring both sets of needles into operation and unite both ends of the fabric constituting the welt into the body of the fabric.

One important feature of this invention resides in the spring, which so acts upon the controller *e'* as to cause it to follow up and control the slack in the material for the welt as course after course is being knitted.

Believing myself to be the first to insert a thin blade or finger into the space between a rotating dial-needle bed and a rotating cylinder-needle bed to automatically control the slack fabric produced on one set of circular needles while the other set holds the loops and remains inactive so far as knitting is concerned, this invention is not limited to the exact shape shown for the said controller, nor to the exact devices represented for actuating the same and causing it to act upon and take care of the slack of the welt no matter how many courses entering into the same, as it

will be obvious to those skilled in the art that many different forms of my invention might be devised by only the exercise of mechanical skill and without the exercise of invention.

In practice in some classes of goods to effectually guard against the possible entanglement of the welt, formed, as described, with the dial-needles as the latter in the rotation of the cylinder-needle cams and dial-needle cams revolve and the needles are thrown out at a point ahead of the thread-guide *a* in the direction of rotation of the said cam-cylinder, I have interposed in the space between the said needle-bed and dial-bed an auxiliary welt-slack controller *g*, (represented best in Fig. 7, it being also shown in Fig. 1,) it consisting of a thin sheet-metal finger attached, as represented, by suitable screws *g'* to the yoke D, its upper edge being located below the plane in which the rear sides of the dial-needles reciprocate, the cylinder-needles at the point where the said auxiliary welt-slack controller is located being down, they rising shortly after the said auxiliary controller passes them, the dial-needles in the meantime having been thrown farther out, so that they act as a guard to prevent the work hanging on the cylinder-needles from being raised about the cylinder-needles as the latter pass between the dial-needles. This auxiliary welt-slack controller is located, preferably, substantially diametrically opposite the main welt-slack controller.

While I prefer to use for the best results the two controllers, yet I do not desire to limit my invention at all times to the employment of both, as in some slack classes of work the main welt-slack controller will be sufficient.

The lever e^4 and spring constitute suitable intermediate mechanism between the cam e^6 and the main welt-slack controller.

In this my invention it will be seen that it is possible with a single slack-controller to act upon and take up the slack in the welt being knitted between two sets of needles kept in continuous rotation, one set acting, however, only to knit, the other set holding the loops. In my invention I do not employ a series of fingers, which are projected through between the individual needles of one series of needles, said series of fingers acting merely as dogs to engage and feed the fabric, as represented in United States Patent No. 408,272.

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

1. The combination with a knitting-machine having a series of cylinder-needles and a series of dial-needles, of a welt-slack controller interposed between the cylinder-needle bed and the dial-bed to bear upon and take up the slack in the fabric being knitted upon one set of needles for the production of a welt, actuating devices for said welt-slack controller, and a cam to determine its movements, substantially as described.

2. A needle-bed, a dial-bed adapted to receive cylinder-needles and dial-needles, actuating devices for said needles, a cam to control the positions of the dial-needle cams to render them inactive as to knitting while a welt is being formed, combined with a welt-slack controller interposed between the said needle-bed and dial-bed to act upon the fabric being knitted on one set of said needles, as described, a spring, and devices to strain said spring and cause said welt-slack controller to operate continuously upon the fabric being knitted for the production of a long welt to take care of the slack therein, substantially as described.

3. The combination with a knitting-machine having a series of cylinder-needles and a series of dial-needles, of a welt-slack controller interposed between the cylinder-needle bed and the dial-needle bed to bear upon and take up the slack in the fabric being knitted upon one set of needles for the production of a welt, actuating devices for said welt-slack controller, a cam to determine its movements, and an auxiliary welt-slack controller, to operate, substantially as described.

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

HENRY GARANT.

Witnesses:
EDGAR C. COVELL,
MABEL E. PLUMMER.