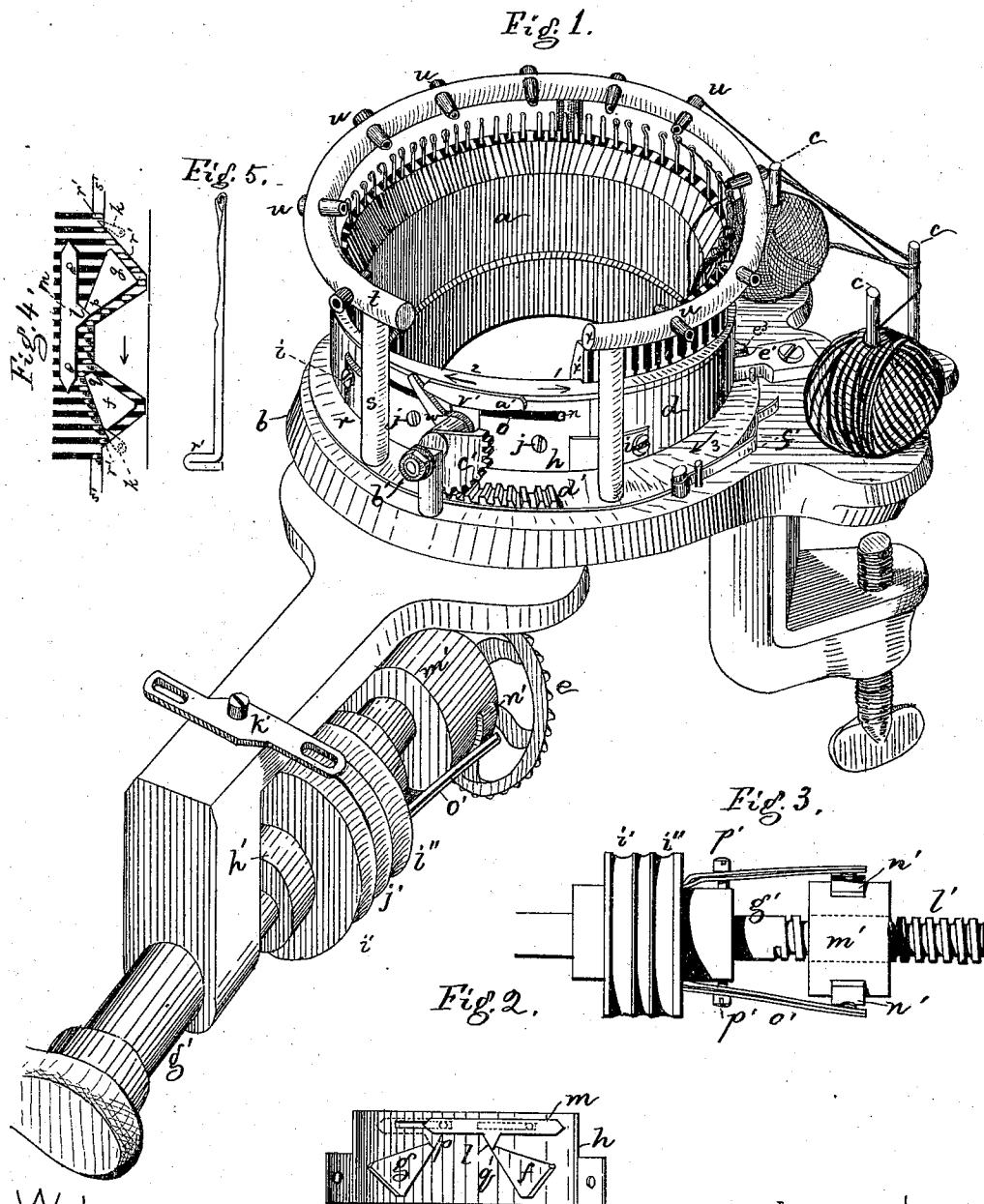


C. J. APPLETON.
KNITTING-MACHINE.

No. 174,345.

Patented March 7, 1876.



Witnesses.
L. H. Latham.
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UNITED STATES PATENT OFFICE.

CHARLES J. APPLETON, OF ELIZABETH, NEW JERSEY.

IMPROVEMENT IN KNITTING-MACHINES.

Specification forming part of Letters Patent No. **174,345**, dated March 7, 1876; application filed September 28, 1875.

To all whom it may concern:

Be it known that I, CHARLES J. APPLETON, of Elizabeth, in the county of Union and State of New Jersey, have invented an Improved Knitting-Machine, of which the following is a specification:

This invention relates to knitting-machines driven by hand or other power, and provided with independently acting latched needles, deriving their movements to catch the thread one after the other, each needle in descending drawing a portion of the thread through a loop held on its shank, thus forming a new loop within an old loop, the new loop held by the hook of the needle, and the latch passing through the old loop, which slips up over the top of the needle, and as the needle again rises for a new loop it passes up through the loop last drawn down, such loops passing below the ends of the latches of the needle, all in the ordinary manner.

This invention consists in the combination of a needle-bed, grooved to receive reciprocating needles, with a cam for actuating such needles, and with a carrier having two or more thread-guides, whereby independent threads may be presented to a given number of needles, and be knitted into a fabric composed of longitudinal stripes, each yarn-carrier for each stripe moving far enough in one direction to lap its thread over the needle containing the selvage-loop for the adjacent stripe, thereby connecting the selvages of two stripes on one or more needles; also, in the combination, with a movable cam-carrying cylinder or a plate and a stop, of a carrier shifter and a carrier, provided with one or more thread-guides; also, in the combination, with the driving-gear, fast and loose pulleys, stationary belt-guide, and friction devices, of a screw on the shaft adapted to fit the hub of the driving-gear, and to move the shaft and pulleys with reference to the stationary belt-guide, so as to shift the belts and reverse the movement of the cam-cylinder, substantially as described.

Figure 1 is a perspective view of a knitting-machine, in this instance a circular machine, provided with my improvements; Fig. 2, a view of the cams and switch, and their carrying-plate removed; Fig. 3, a detail of the re-

versing mechanism; Fig. 4, a detail to be hereafter referred to, and Fig. 5 represents a needle.

The needle-bed *a*, provided with grooves to receive the shanks of the needle, is adjustably connected with the frame *b*, provided with a projection and thumb-screw to secure it to a shelf or otherwise, and has also posts *c* to receive bobbins or spools containing yarn or thread, all as usual.

The needles shown are the usual latched needles, and they are operated by the reciprocating cam-cylinder *d*, moved through the toothed wheel *e*, engaging a rack on the lower part of the cylinder, and the cylinder on its inner side, for the most of its length, has a straight groove to receive the butts of the needles, all as usual, or in any well-known manner.

The needles are raised and lowered by cams *f* *g*, carried, preferably, at the inner side of a removable section, *h*, attached to the cam-cylinder by screws *i*, the cams being connected with the plate *k* by screws *j*, and these cams may be adjusted so as to be more or less inclined, as usual, to regulate the size of the loop.

Fig. 4 shows the position of the parts when the cam-cylinder has moved a little in the direction of arrow 2, Fig. 1; but when the cam-cylinder is rotated in the direction of the arrow 1, the butts *r'* of the needles pass from the usual straight groove *s'* in the cam-cylinder over a pivoted bridge, *k*, Fig. 4, the bridge then resting against cam *g* and up along the inclined top of the cam *g*, raising the needles. When the cam-cylinder commences moving in this direction, the point *l* of the switch *m*, provided with guiding-pins *n*, (see Fig. 1,) resting in slots *o* in plate *h*, is at the end *p* of cam *g*, (see dotted lines, Fig. 2, and full lines, Fig. 4,) and in such position the needle-butts will meet the point *l* of the switch, and move the switch horizontally into the position shown in Fig. 2, in full lines, where the point *l* meets the end *q* of the cam *f*, and the needle-butts then pass along down the lower side of the cam *f*, which action throws down the needles to draw the new through the old loops, and then the needles are moved upward into groove *s'*.

Fig. 2, full lines, show the switch and cams in the positions they will occupy when the cylinder commences its movement in the direction of arrow 2, Fig. 1. Fig. 4 showing the position of the bridge, it resting on cam *f* ready for the needle-butts to ride up the inclined upper side of cam *f*, and at the end of cam *f*, in Fig. 2, the butts meet point *l*, and shift the switch *m*, so that point *l* will meet end *p* of cam *g*, as in Fig. 4, and in dotted lines, Fig. 2, when the needle-butts will pass down the lower side of *g*. (See Fig. 4.) These cams are adapted to actuate the needles to knit properly when the cam-cylinder moves in either direction.

This switch, it will be noticed, is moved only by the butts of the needles, no other devices being necessary.

The carrier *r* consists of a ring fitted to reciprocate on the plate *b*, and provided with posts *s* and a bar, *t*, to which are fitted a number of thread-guides, *u*, the number of thread-guides depending upon the width of the stripes to be knitted and joined at their selvages.

In this instance I have shown ten thread-guides, adapted to operate in connection with fifty needles, therefore I use one guide for each set of five needles, and the stripes or strips will consist of five longitudinal rows of knitted loops of the color of the thread or yarn carried by the guide; but in addition to presenting its thread to its own five needles, each thread-guide, at one of its extreme movements, moves far enough to allow its thread to be caught by the first needle of the adjacent set of five needles, and such thread is caught by the needle of the adjacent set, and the loop so taken is knitted by such needle, together with its own loop of a different color, this needle connecting the loops of the two strips or stripes, the longitudinal row of double loops, knitted by this needle, presenting two colors, and sort of a welt or cord. Should yarns of one color be used, the strips or stripes will be connected by a welt or cord formed by the double stitches.

Looking at Fig. 1, the thread-guides *u* are all at one side of the different sets of needles, to which they are to deliver threads, and each thread-guide rests, commencing at the end *x* of the needle-bed *a*, just beyond each fifth needle. One end of the projection *v* rests against one side of the arm *w* of the carrier-shifter, which it moved to the position shown in Fig. 1, at the completion of the movement of the cylinder in the direction of arrow 2. Motion being imparted to the cam-cylinder *d*, in the direction of arrow 1, the needles are caused to knit the thread laid into, or near their hooks when the carrier *r* and thread-guides were moved into the position shown in Fig. 1, and the cam-cylinder continues to rotate until the end *a'* of the projection *v* meets the opposite or left-hand side of the arm *w*, then the projection turns the carrier-shifter on its supporting-pin *b'*, and causes the

segmental and, in this instance, toothed sector *e'*, forming part of the carrier-shifter, to turn and carry with it, owing to its engagement with teeth *d'* thereon, the carrier *r*, moving it in the direction of the arrow 3, and causing the thread-guides to move each one, except the one at the end *x* of the bar *t*, for a sufficient distance to present their threads to their own set of five needles, and also to a sixth needle, which is the end needle of an adjacent set, and by this movement the selvages of the adjacent strips are connected on a single end-needle of one set, and a broad fabric is produced, whereas, if the thread-guides did not so present their threads to the needles of another set, the machine would produce only narrow bands or strips of knitted fabric: Just as the carrier *r* comes to its correct position, being moved by the projection *v* and carrier-shifter, a pin on the carrier (one being seen in Fig. 1) meets the stop *e'*, and at the same time a projecting-pin, *e'*, on the cam-cylinder *d* strikes the stop *e'*. The width of the strips knitted and joined together at their selvages may be more or less.

In some instances I propose to use threads alike as to quality and color for the manufacture of gloves, moving the carrier and thread-guides, substantially as above described, to form the hand portion, or a fabric for the hand or palm and wrist portion, and on reaching a point where fingers are needed I will change the movement of the thread-guides so that they will not move far enough to lap their threads on the needles of an adjacent set, and this action (the rest of the machine operating as usual) will produce narrow strips of fabric disconnected at the selvages, and suitable for fingers, such narrow strips being subsequently sewn together to form fingers. This change of action of the carrier to move the guides a less distance, and over one less needle, may be made by adjusting the pins placed on the carrier and adapted to engage the stop *e'*, so that the pins will engage the stops *e'* and stop the carrier as soon as the thread-guides lay their threads in the needles of their own set only. This provision of moving the thread-guides to connect, and at other times not to connect, also the selvages of the strips, permits a fabric to be knitted, composed of portions more or less wide, connected by means of narrow strips.

By using a number of thread-guides, with a thread for each, as described, I am enabled to knit rapidly a fabric composed of strips or stripes of contrasting colors, each strip being knitted by a single and unbroken thread.

The driving-shaft *g'* has attached to it a hub, *h'*, having two fixed pulleys, *i'*, *i''*, and turning on the hub loosely is a pulley, *j'*. A straight belt passes about the pulley *i'*, and a crossed belt from the same motor-shaft passes over pulley *j'*, and one side of each belt is guided by one of the openings in the stationary belt-shifter *k'*, one of such openings being opposite the loose and the other opposite the

fast pulley. The end of shaft g' is provided with a screw-thread, l' , and it fits a screw-thread in the hub m' of the driving-wheel e .

Friction devices n' , two or more, and of any suitable construction, are connected with arms o' attached to the hub h' , and the force of the pressure of the friction devices on the hub m' is regulated by screws p' . The thread-guides might move over more than one needle of an adjacent set, and thicken the fabric and increase the size of the welt. The wheel c and hub m' are held against longitudinal movement in the direction of the shaft.

I intend to drive this machine by power and by the plain or crossed belt, according to which one is in action. Suppose the straight belt on pulley i' to be in action, then the crossed belt will rest on the loose pulley j' , and the cam-cylinder will be moved in direction of arrow 2 until a stop on the cam-cylinder strikes stop e^1 , then the cylinder cam no longer rotates, nor can the wheel c and hub m' connected therewith, but the pulleys and hub h' continue to move, the friction devices slipping about hub m' , and during this time the shaft g' , through its screw l' , acting on the screw-thread in the hub m' , which cannot move longitudinally, forces the shaft g' and pulley $i' i'' j'$, passing the pulley i' through the plain belt held by the end of the stationary belt-guide, and placing the loose pulley j' into the plain belt, and the same movement passes the loose pulley through the crossed belt then resting on it, and brings the fast pulley i'' into it, and then the machine will be reversed. With the reversal of the motion of the shaft h' , the cylinder not being held against rotation in the direction of arrow 1, will quickly rotate until a stop on the cylinder again meets the stop e^2 , when the cylinder will again be stopped, and the longitudinal movement of the shaft and pulleys will be the reverse of that just described.

This mechanism might be applied to reverse the action of other than knitting-machines, but it is specially applicable to the machine described in order to drive it by power. The products of this machine, as above described, will form the subject-matter of other applications.

To make ribbed goods, I place within the main vertical and cylindrical needle-bed a set of ribbing-needles, substantially as shown in United States Patent No. 13,561, or with a flat bed. I will use a similar shaped bed for the ribbing-needles.

In this application I do not claim the movable switch operated by the butts of the nee-

dles; nor do I claim the combination of such a movable switch, with the needle elevating and depressing cams, as such features and combinations form the subject of another application filed by me in the Patent Office October 28, 1875.

I claim—

1. A needle-bed, adapted to receive reciprocating-needles, and cams and a movable switch to actuate such needles at each reciprocation of the cam-cylinder, in combination with a carrier, connected with and operated by the cylinders, and provided with two or more thread-guides, whereby independent threads may be delivered automatically and simultaneously to sets of two or more needles, and be knitted into a fabric composed of strips with selvage edges knitted together, substantially as described.

2. The combination of a grooved bed adapted to receive reciprocating needles and a reciprocating cam-cylinder, provided with two needle depressing and elevating cams, and a reciprocating switch, with a carrier, connected with and operated by the cylinder, and provided with two or more thread-guides adapted to present threads automatically and simultaneously to adjacent needles of adjacent sets, to knit narrow strips of fabric with selvage edges, substantially as described.

3. The combination, with the cam-cylinder stop v' and carrier for the thread-guides, of a vibrating carrier-shifter moved by the stop on the cylinder at the end of each reciprocation of the cylinder, substantially as described.

4. The combination of the cam-cylinder and its driving-gear and hub, with a screw-shaft, fast and loose pulleys, friction devices and stationary belt-guides, whereby a straight and crossed belt may operate to reverse the motion of the cam-cylinder, substantially as described.

5. The cam-cylinder and its stop, adapted to meet a stop, e^1 , in combination with the driving-gear e , hub, friction device, and driven shaft, whereby when the cylinder arrives at one extreme of its motion the driven shaft may continue its motion without injury to the machine.

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

CHARLES J. APPLETON.

Witnesses:

S. J. GORDON,
JOHN W. RIPLEY.