2 Sheets, Sheet. 1.

F. M. Comstock,

Circular Knitter.

No. 107,454. Patented Sept. 20. 1870

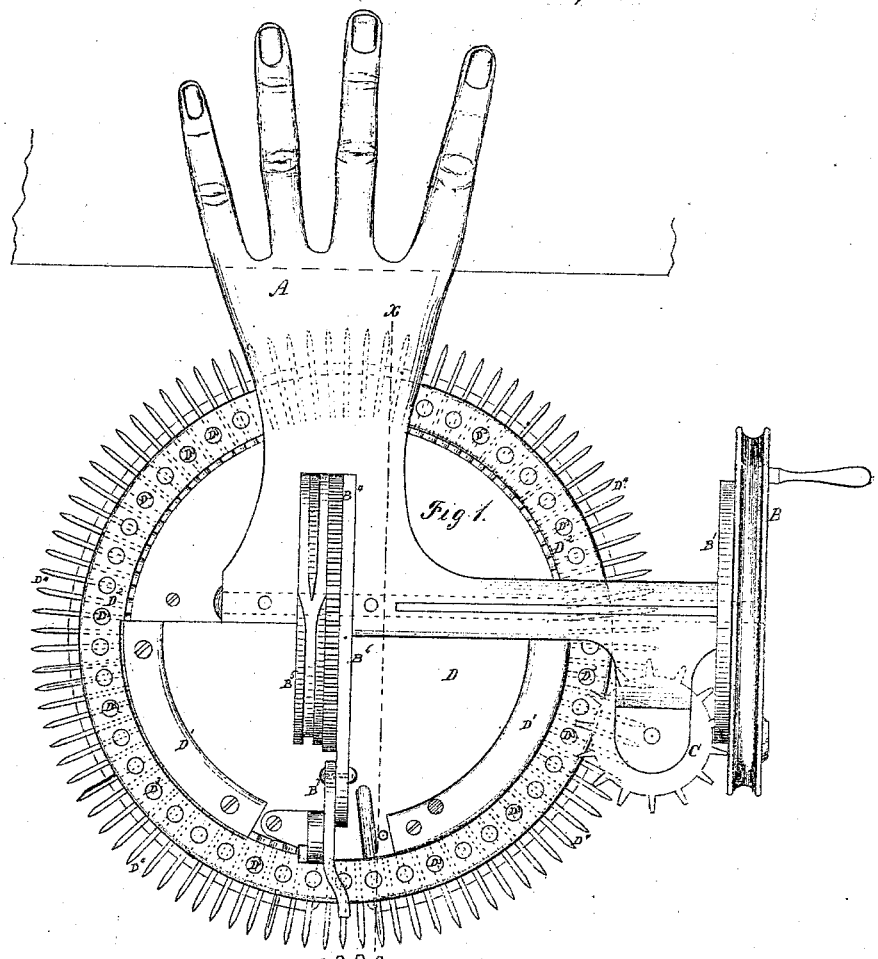

Fig. 1.

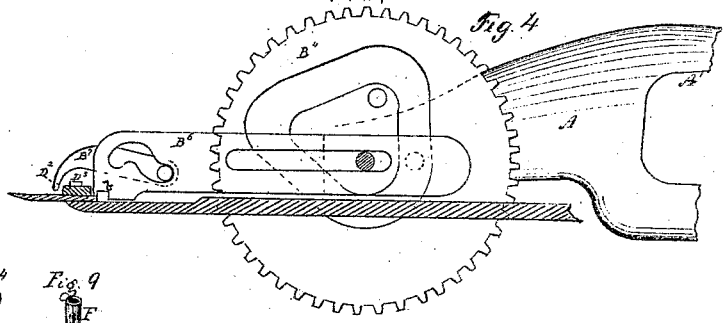

Fig. 4

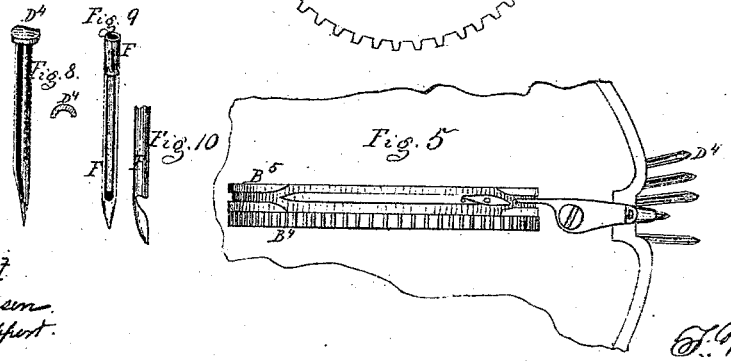

Fig. 8. Fig. 9 Fig. 10 Fig. 5

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2 Sheets. Sheet 2.

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Fig. 2

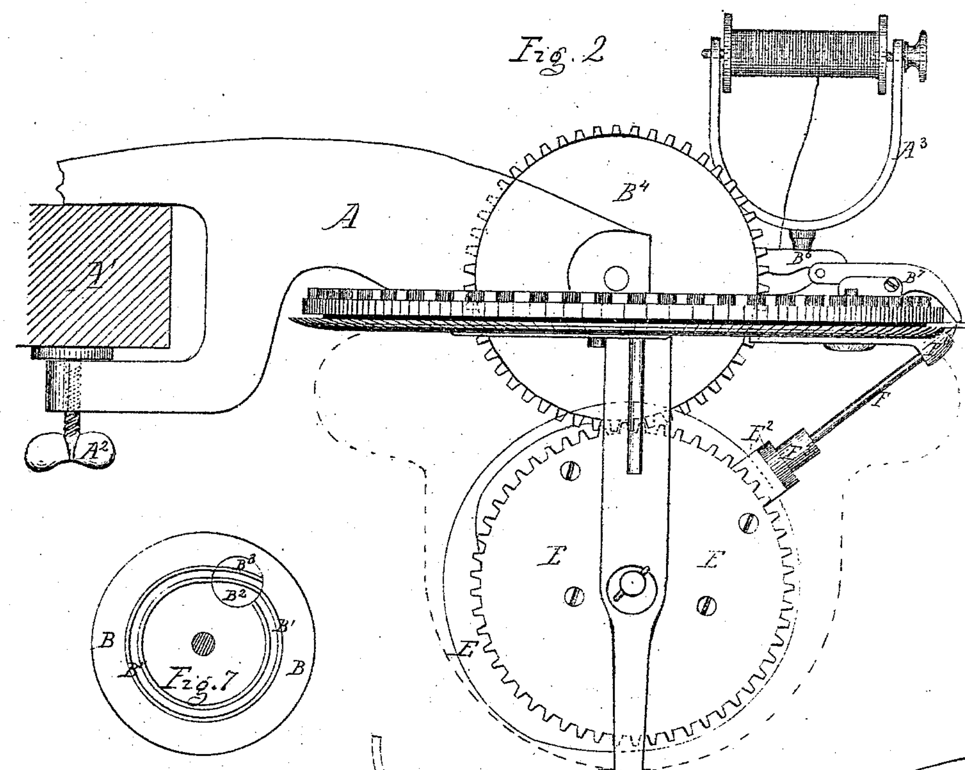


Fig. 7

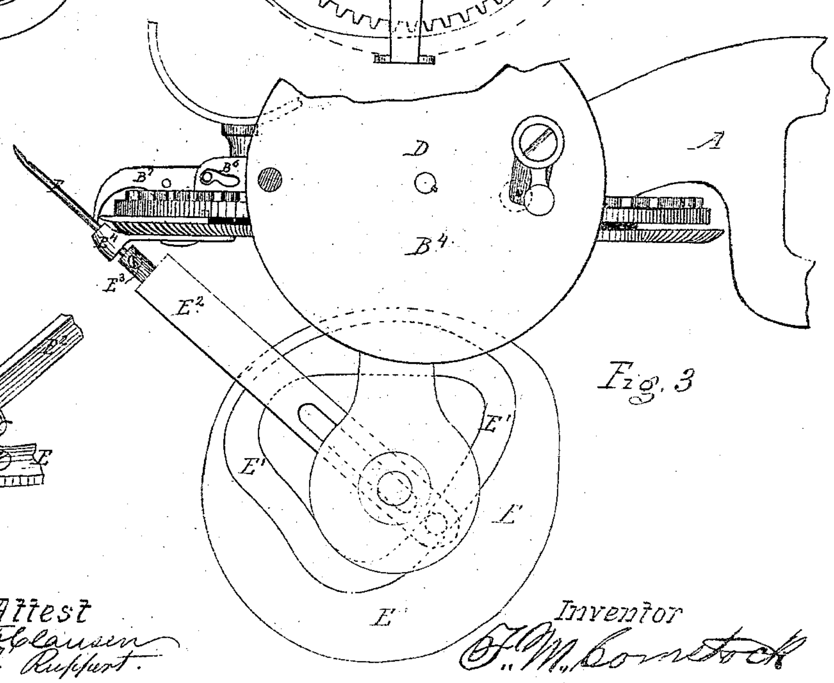
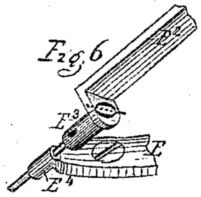


Fig. 3

Fig. 6



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UNITED STATES PATENT OFFICE.

FRANCIS M. COMSTOCK, OF CLEVELAND, OHIO, ASSIGNOR TO HIMSELF, GEORGE W. HOWE, AND DAVID M. SOMERVILLE.

IMPROVEMENT IN KNITTING-MACHINES.

Specification forming part of Letters Patent No. **107,454**, dated September 20, 1870.

To all whom it may concern:

Be it known that I, FRANCIS M. COMSTOCK, of Cleveland, in the county of Cuyahoga and in the State of Ohio, have invented a new and useful Improvement in Knitting-Machines; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawing, making part of this specification, in which—

Figure 1, Sheet 1, is a plan view of my improved machine, showing the driving mechanism, the feed-motion, the reversible arm for changing the position of the needle, the disk or wheel which carries the sliding pins, and the device for securing the machine to a bench or table when desirable. Fig. 2, Sheet 2, is a side elevation, showing a portion of the frame-work of the machine, the disk which holds the sliding pins, the gear-wheel which drives the needle-bar, the needle, and the pivoted lever which holds the yarn or thread while the loop is being formed. Fig. 3, Sheet 2, is an elevation of the opposite side of the machine, showing the cam-shaped groove for moving the needle, the sliding bar to which such needle is attached, the pivoted lever or hook for forming the loop, and the adjustable crank for changing the feed of the machine. Fig. 4, Sheet 2, is a vertical section on line *x x* of Fig. 1, showing a portion of the frame, the cam-wheel which moves the sliding pin and the loop-holder, the sliding pin, and means of operating the same. Fig. 5 is a bottom view of the machine, with the cam-wheel removed, showing a portion of the disk or wheel which carries the sliding pins, the lever or needle, or needle-holder, which is used to guide the needle and to change the position of the same for knitting different kind of goods, and the grooved wheel, with its adjustable tongue or switch for changing the position of the lever or needle-holder. Fig. 6, Sheet 2, is a perspective view of a part of the sliding lever which carries the needle, the pivoted needle-socket in the outer end of such lever, and the guide through which the needle passes. Fig. 7, Sheet 2, is a side elevation of the driving-wheel, having in its side a concentric groove, in which is arranged a reversible portion, for the purpose of changing the feeding mechanism so that it shall move in opposite directions. Fig. 8, Sheet 1, is a perspective view of one of the pins upon which the loop is formed. Fig. 9 is a perspective view of the needle, showing the cavity through its center, through which the yarn passes, and the eye near its point, through which it passes out of such cavity. Fig. 10 is a side view of the same.

Corresponding letters and figures refer to corresponding parts in the several figures.

This invention relates to knitting-machines; and it consists in the construction of the disk or wheel which carries the sliding pins which receive the loops of the stitch from the needle as they are formed thereon; and, second, in a keeper for retaining the stitch upon the sliding pins while the needle passes through the loop thereof; and, lastly, in the combination and arrangement of some of the parts of which the machine is composed, as will be more fully set forth hereafter.

The object sought to be obtained by this invention is the production of a machine which in its operation shall be simple and easily understood, and that shall approach as nearly as possible to the method of forming stitches by the hand of the operator and the ordinary knitting-needle, and upon or with which tubular or plain web goods may be knit.

To enable others skilled in the art to make and use my invention, I will proceed to describe it with reference to the drawing, in which—

A refers to the frame-work of the machine, which may consist of any suitable device, A^1, for attaching it to the bench or table by means of a thumb-screw, A^2, or in any convenient manner.

The frame A is to be provided with suitable bearings for the shaft to which the crank or driving-pulley is attached to revolve in, as shown in Fig. 1, said frame being bolted or otherwise secured to the fixed disk upon which the sliding pins rest. A^3 refers to a spool-holder, which may be so constructed as to give the required tension to the yarn or thread as it passes from it. B refers to the driving-pulley, which is placed upon a horizontal shaft, which has its bearings in frame A, said shaft extending outward beyond the disk and sliding pins sufficiently far to admit between them

and the driving-pulley a feed-wheel, soon to be described. The periphery of this driving-wheel may have a groove formed in it to receive a round belt from any prime mover, or its surface may be so formed as to receive a flat belt from such motor.

Upon the inner face of this driving-pulley there is formed a concentric groove, B^1, in which there is placed a short shaft, B^2, which extends through the wheel B, its inner end being provided with a flange, which fits into a recess therein, and in which flange there is formed a groove, B^3, corresponding in size to that in the wheel.

Upon the outer end of said shaft there is placed a crank, which is held in position by means of a set-screw, and which is for the purpose of changing the position of that portion of the groove upon the face of the pulley B which is within the flange of the shaft to which such crank is attached, for the purpose of reversing the movements of the feeding mechanism of the machine, so that it may cause the ring which carries the sliding pins, which enter the loops after they have been formed by the needle, to be rotated in either direction.

B^4 refers to a gear-wheel, which is secured to the inner end of the shaft to which the driving-pulley is attached, it working in a slot formed in the frame A, and in or near the center of the disk D, a portion of the periphery of said wheel being provided with cogs, in order that it may communicate its motion to another wheel below it.

Another portion, B^5, of the periphery of this wheel has formed in it a groove, which receives the inner end of a lever or needle-guide, which imparts the lateral or horizontal motions to the needle, as shown in Fig. 5. This groove is eccentric or cam-shaped in form, it being formed by cutting away a portion of its outer flange, and attaching in its place a piece of metal, pointed at its ends, and so arranged as that when it comes in contact with the lever or needle-holder, above referred to, it shall cause said lever to be vibrated horizontally, and thus give the required motion to the needle, as will be more fully described hereinafter.

At one end of the piece of metal described as giving the cam-shape to the groove for moving the lever is placed a reversible guide or switch, which is held in position by a spring in the periphery of the wheel, or in any other convenient manner, but which is capable of being turned so as to guide the end of the lever through which the needle passes upon either side of the projecting pin upon which the loop of the stitch is retained, in order that tubular or flat web goods may be knit. The construction and arrangement of this groove and the reversible guide or switch are clearly shown in Fig. 4, and also their relation to the lever which guides the needle.

Upon or within the inner surface of the wheel B^4, or that face which is nearest the driving-pulley, there is formed a cam-shaped groove, which is for the purpose of giving motion to the sliding bar B^6, said bar being so constructed and arranged that a slot formed in it allows it to span the driving-shaft, and that a pin or stud which projects inwardly from its inner surface shall enter the groove in the wheel, and thus impart the reciprocating movement to the bar.

The outer end of this bar is provided with a curved or cam-shaped slot, in which works a stud or pin, which is attached to the inner end of lever or stitch-retainer B^7, so that as the said bar is moved horizontally a vertical vibration will be given to the ends of said stitch-retainer.

Upon the under surface of this sliding bar there is formed a groove or recess, *b*, as shown in Fig. 4, which is designed to receive the heads upon the sliding pins and cause them to be withdrawn, so that the loop formed by the needle may be transferred to the sliding pin.

B^7 refers to the lever or stitch-retainer, above alluded to, it being pivoted to a bracket secured to the disk D, in such a manner that, as the sliding bar B^6 is moved, the slot in its outer end shall cause the inner end of the lever to be moved vertically, and, consequently, the same motion, in a reverse direction, to be imparted to its outer end, such outer end being depressed at the time when the needle is being raised to its most elevated position, thus insuring the retention of the stitch upon the pin until the needle has been raised to said elevated position.

C refers to a feeding-wheel, its bearings being in cars formed upon the frame A, and it being so arranged that some of the projections upon its periphery alternately pass into and span the groove upon the face of the driving-pulley, while those upon or near its opposite side pass between pins or projections upon or in the upper surface of the revolving ring D^2, soon to be described, and thus impart the required feed-movement to said ring.

When it is desirable to change the direction in which said ring moves, the reversible portion of the concentric groove in the face of the driving-pulley is changed, so as to produce such effect. When it is desirable to move the ring so as to carry more than one pin past the needle at any one time, for the purpose of knitting double goods, or for the purpose of widening the goods, additional cams or reversible portions are provided in said driving-wheel; or more than one groove may be formed in the one reversible portion, which will produce the same result.

D refers to a disk of metal, to which the frame A of the machine is attached, it being plain and smooth upon its upper surface, from its center outward to near its periphery, where it is reduced in thickness by turning off a portion thereof, so as to form a shoulder, against which the heads of the sliding pins rest while being carried around such reduced portion of said disk, their bodies at the same time rest-

ing upon the reduced portion and between it and the revolving ring.

D^1 D^1 refer to segmental guides or keepers, which are secured to the upper surface of the disk D, in such positions as to be just within the revolving ring, they being provided upon their under surfaces and at their outer edges with grooves or projections, which causes a portion of them to pass over a portion of the revolving ring, and thus form guides for it to revolve in and upon.

D^2 refers to the revolving ring, which carries the sliding pins, it consisting of an annular ring of metal, its under side being provided with grooves, radially arranged, so as to receive a portion of the size of such pins, in order that, as it rotates, the pin shall move with it. This ring is held in position by means of the guides D^1, above referred to, and has its upper surface provided with a series of pins or projections, D^3, which may be equal to one-half the number of the sliding pins; or the number may be varied according to circumstances.

D^4 refers to one of the sliding pins, its construction and form being clearly shown in Fig. 8, where it is shown as being beveled from one side, so as to form a point for passing readily through the loops after it is formed. Upon the inner end of these pins a head is formed, which projects from three sides thereof, but more upon the upper side than upon the others, for the purpose of enabling the sliding bar B^6 or the recess in its end to take firm hold of the pin, and thus move the same outward and inward at the proper times. Upon the under surface of these pins there is formed a groove for the point of the needle to enter, so that the needle will enter the stitch with facility.

E refers to a gear-wheel, which is held in bearings formed in a frame-work, which projects from the under side of the disk D, said wheel receiving its motion from the wheel B^4, it being provided with cogs upon its periphery for that purpose. Upon or within the face of this wheel there is formed a cam-shaped groove, E^1, which is so constructed as to give the required movement to the sliding bar which moves the needle.

E^2 refers to a sliding bar, which is provided with a slot for the purpose of receiving the shaft of the wheel E, and with a pin or projection upon its inner end to enter the cam-shaped groove in said wheel, in order that a reciprocating movement may be imparted thereto. To the outer end of this bar there is attached a pivoted needle-holder, which is so arranged with reference thereto that it is capable of moving laterally therein, in order that when the needle has been carried forward or upward to its most elevated position it may be moved laterally by the movement of the lever or needle-guide E^4, so that the sliding pin may be projected while the needle is being carried to its lowest position.

E^3 refers to the needle-holder, which, as above stated, is pivoted to the sliding bar E^2, it being held thereon by means of a pin passing through both, as shown in Fig. 3.

E^4 refers to the needle-guide, it being pivoted to the under side of the disk D, its inner end entering the cam-shaped groove in the periphery of the wheel B^4, and its outer end being provided with a socket, through which the needle passes. This lever or guide is so arranged that as its inner end is moved by the cam-shaped groove in which it works its outer end is caused to give the lateral movement to the needle above described.

F refers to the needle, its construction or form being shown at Figs. 9 and 10, where it is shown as being provided with a solid shank for securing it within the holder E^3, and as being provided with a tubular body, which extends from such shank to near its point, through which the yarn or thread passes.

Near the point of the needle there is formed an aperture, from which the yarn passes in use, and there is also an aperture, through which the yarn enters, near the shank; or it may enter at the outer end of the shank, if preferred.

As a consequence of this construction of the needle, I am enabled to conduct the yarn or thread to be knit to the point where the stitch is formed without subjecting the same to wear or abrasion in consequence of its friction with other parts of the machine or the goods that have been knit. The outer end of said needle is reduced to a point, for the purpose of facilitating its entrance into the stitch or loop.

The gearing upon the bottom side of the disk I propose to cover with any suitable cap, so as to prevent the dust or dirt from collecting thereon, and also to prevent any oil, should any be applied thereto, from coming in contact with goods which are being knit.

The operation of this machine will be as follows: The parts having been constructed and arranged substantially as herein described, the yarn or material to be knit is to be wound upon the spool, which is placed in the spool-holder A^3, the end of such yarn being carried to the aperture in the rear end of the needle, through which it is made to pass, and thence through said tubular needle to and out of the aperture near its point. A loop is now formed and placed around one of the sliding pins, when the machine is ready to be rotated by the application of power to its driving-wheel, the motion of which, supposing the parts to be in the position shown in Fig. 3, will cause the needle to be carried to one side of the advancing pin, and then withdrawn by the action of the cam-shaped groove in wheel E acting upon the bar E^2.

While the needle is in its lowest position the reversible portion of the concentric groove in the driving-wheel comes in contact with one of the projections on the feed-wheel C, and causes it to be partially rotated, so that a projection upon its opposite side may come in contact with one of the projections or pins upon the ring D^2, which will cause it to move so far

as to bring another pin directly over the needle, at which time the sliding bar B^6 grasps the head of said sliding pin, and carries it to its position within the surface of the disk D far enough to allow the needle in its upward movement to pass the point of such pin.

The retracting movement of the pin causes it to carry the stitch with it past the end of the stitch retainer, when the outer end of said stitch-retainer is depressed by the action of the cam-shaped slot in the end of the sliding bar B^6, and retains the stitch upon the pin while the needle is again rising to its highest point, passes through it, and as the needle is about descending again the pin is further vibrated and the retainer raised to release the old stitch from its position upon the pin, and places it entirely under the control of the needle, it being already around the same. By a continued movement of the driving-wheel the movements above described will be continued or repeated as long as desired.

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

1. The disk or wheel which carries the sliding pins, when provided with a radially-grooved ring for holding the pins in position, and a recess into which the pins pass when being withdrawn, to allow of the passage of the needle past their points, substantially as and for the purpose set forth.

2. The combination, with pins on which the stitches are formed, of a stitch-retainer, substantially as described, when operating as and for the purpose set forth.

3. The driving-wheel provided with the reversible portion, combined with the feed-wheel and the revolving ring, having pins or projections upon its upper surface, all substantially as and for the purpose set forth.

4. The combination and arrangement of the cam-wheel, the sliding lever, and the stitch-retainer, when constructed and operating substantially as and for the purpose set forth.

5. The needle and its oscillating guide operating in connection with the stitch-retaining pins, substantially as and for the purpose set forth.

6. The reciprocating vibratory needle, in combination with the stitch-retainer and the sliding pins, substantially as and for the purpose described.

7. The combination, with the supporting-disk, of the reciprocating stitch-holding pins, constructed and operating substantially as and for the purpose set forth.

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

F. M. COMSTOCK.

Witnesses:

B. EDW. J. EILS,

A. RUPPERT.