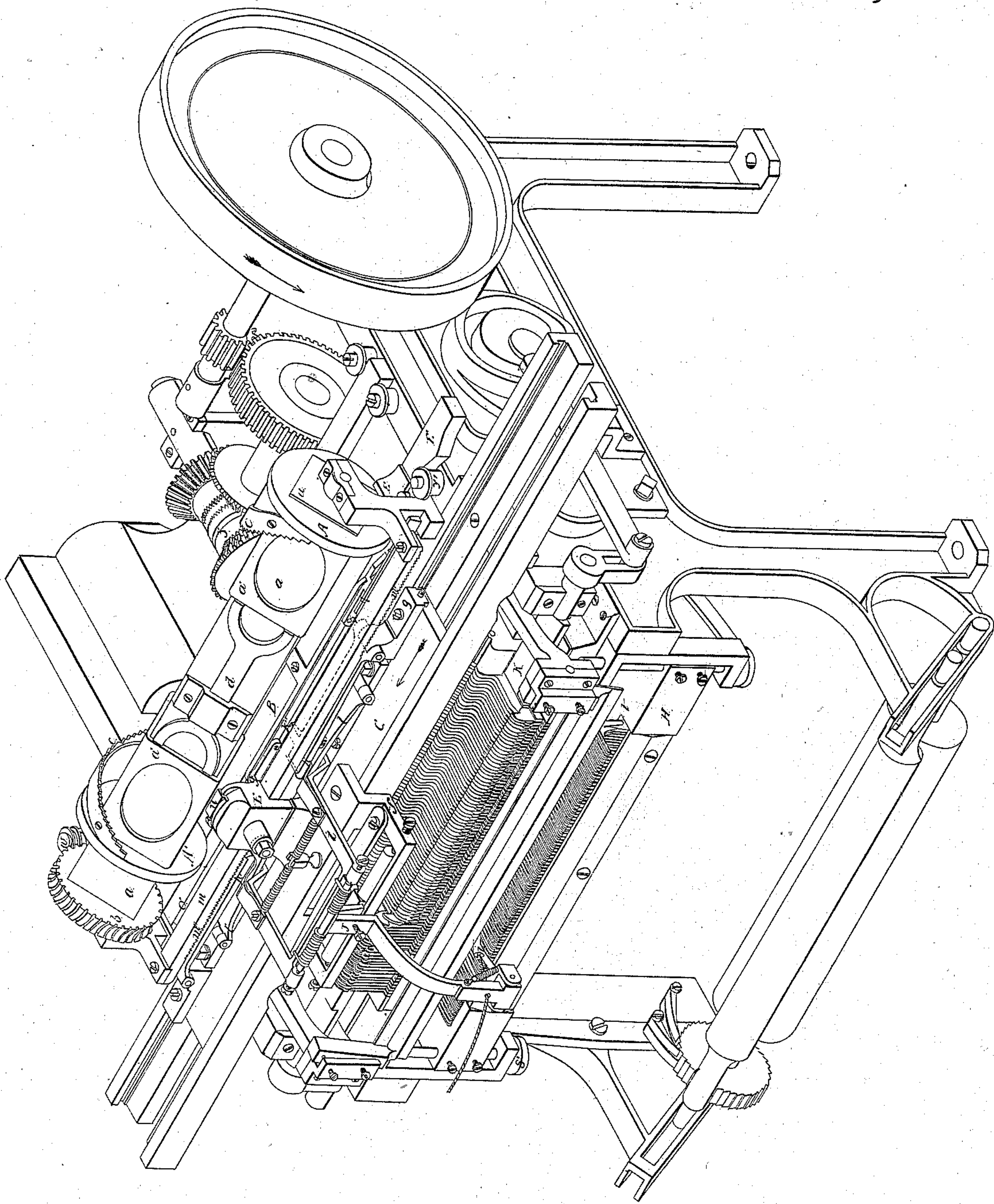


*H. Burt.
Knitting Mach.*

N^o 10,915.

Patented May 16, 1854.



UNITED STATES PATENT OFFICE.

HENRY BURT, OF NEWARK, NEW JERSEY, ASSIGNOR TO THE NEWARK PATENT HOSIERY COMPANY.

IMPROVEMENT IN KNITTING-MACHINES.

Specification forming part of Letters Patent No. **10,915**, dated May 16, 1854.

To all whom it may concern:

Be it known that I, HENRY BURT, of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Knitting-Machines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being made to the annexed drawings, making a part of this specification, in which—

Figure I is an isometrical view of my machine. Figs. II, III, V, and VI are of parts in detail. Fig. IV is a vertical section on the line *xx* of Fig. III.

Similar letters refer to similar parts throughout.

My invention consists in certain improvements in knitting machinery, said improvements being based upon and applicable to a machine of like character for which Letters Patent were granted to me September 23, 1843. In the following, therefore, I shall refer to said patent for a description of such parts as are duplicated in the present invention.

My first improvement consists in a better method of constructing and operating the pattern cylinder or apparatus, by which any web may be woven of different widths and after a given design or pattern, such as may be required for stockings, shirts, &c. In the patent before referred to this part consists of a piece of mechanism operated from one side of the loom and extending out a considerable distance from it. This arrangement, besides being more complicated than the one I am about to describe, took up likewise much extra room. Both these defects are obviated by my present improvement; and in order to accomplish which I have altered the method of constructing the cylinder itself, whereby I am enabled to vary the pattern in the same without removing it from the machine or substituting another in its place, as formerly, and also to combine it more immediately with the loom. At A is seen the pattern-cylinder mounted upon an axis terminating in journals, which latter are supported upon proper standards, as shown. The cylinder thus lies horizontally over the frame and about one-third of the distance from its front edge.

The construction is as follows: First, there

is a square shaft (not so shaped of necessity, however) *a*, terminating in the journals before named. Upon one end is a wheel *b*, by which the shaft receives its motion from the other parts. The pattern-cylinder is in two parts A and A', which are both capable of sliding upon the shaft *a*. To form the pattern, the inner ends of the cylinder are cut away by a series of notches, as seen at *c*, and the depth of each notch is equal to the distance the needles are apart, for it is by the stops striking these edges that the extent of travel of the yarn-guide is governed, their office being the same as that set forth in the patent before named. Each half of the cylinder is capable of moving upon the shaft *a* independently, and to keep them firm they are secured to slides *a'*, moving freely over said shaft. By this arrangement different widths of cloth may be woven, but having the same pattern, for by setting the two pieces A A' at different distances apart on the shafts different widths of web, but of the pattern formed by the notches *c*, will be made. Two stops are used to keep the cylinders in a fixed position, and also to give them their motions on the shaft *a*. One of these stops is seen at *d*, being a piece lying flat against the side of the shaft, its ends touching the rim of the slides *a'*. This keeps the pieces apart. The other stops keep the cylinders up against the last-named piece, and also perform the office of moving the same back and forth on the shaft *a*. One only can be seen in the drawings. At *e* it is fast to the shifting-bar B, which lies immediately under the cylinders and parallel with them, the ends being supported upon the main frame. The stop *e* rises high enough to press against the side of the cylinder A. The other before named stands in like position near the other end of the shifting-bar and acts against the cylinder A'. If the shifting-bar be moved toward the left, the stop *e* will push A and also A' by the movement of the stop *d*, sliding along the shaft, and, vice versa, the opposite stop will move the cylinders back again by a like motion, acting from the opposite end of the shifting-bar. The manner in which the shifting-bar is actuated, as well as the production of the change of clutches and reversal of motion for effecting the making of the stitches, is the

same as set forth in my Letters Patent before referred to. Instead of the curves u^3 and t^3 in that said bar, an angular projection e' is employed in combination with a roller y' , as in said patent. The rack z' and dogs a^2 are dispensed with in the present machine, together with the parts thereby actuated.

My second improvement consists in the carriage, yarn-guide, and the shifting and stop motions operated in connection therewith and with the pattern-cylinder. The carriage is shown at C and is moved back and forth along its ways, as described in the patent before referred to. A frame projects from it at f , to which the roller or slur-cock for depressing the jacks and sinkers is affixed. The carriage C has a second carriage upon it of smaller dimensions, which plays in a groove cut near its inner edge and as seen at g . This latter carriage holds the clutch arrangement for suddenly arresting the yarn-guide directly between any two given needles the moment the dog n strikes against the notches c in the pattern-cylinder. The yarn-guide is shown at i , attached to the second carriage g by the frame-work i' , thus following the movements of said carriage. The guide is connected to the frame i' by a bent arm j , hinged at the upper end, in connection with a spring, which tends to keep the arm pressing toward the frame. This, in connection with a set-screw near j , serves to adjust the distance the point of the yarn-guide i must stand with respect to the sinkers. The yarn-guide itself consists of a short arm hinged to the lower end of j and projecting horizontally toward the front of the frame, a spring serving to keep it in this position. The point through which the yarn passes is narrow and wedge-shaped at the sides. This is to give a good finish to the selvage, for which purpose it is necessary that the yarn be carried down and made to pass under the barb of that needle opposite to which the guide is stopped. This is accomplished by the movement of the presser-bar, which strikes upon the top of i as the bar comes down and forces the point between the needles before the bar strikes the barbs of the same and keeps the point in that position until the needles have retreated sufficiently to take the yarn under the barbs. Thus the last loop is sure to be formed over the precise needle indicated by the action of the pattern-cylinder. In order that the yarn-guide may always lead or be in advance of the slur-roller, the two are secured to the different carriages. Thus in laying a strand of yarn on the needles the slur follows immediately after and depresses the sinkers, thus forming the loops up to the point where the clutch is struck by the pattern-cylinder, which immediately arrests the yarn-guide and stops the carriage g . The first carriage, however, continues to move on, carrying the slur past to the other side of the yarn-guide, when the latter is in order for advancing before it to lay another course, and

this brings me to a description of the clutch motions. Upon the second carriage g there are two pairs of levers, said levers being hung at the ends of the carriage and pointing inward, k k' and l l' in the several figures. The levers k k' terminate in hooks pointing upward. This enables them to engage in the teeth of a rack cut on the under surface of a permanent rail m , lying just above and parallel to the levers, as seen at m' m'' , so that when one of the hooks is engaged it instantly arrests all further movement of the carriage g , and thus stops the travel of the yarn-guide. The distance from point to point of the notches m' m'' is exactly equal to the space occupied from one needle to the next, and the points are also so arranged with respect to the needles as to insure the stopping of the point of the yarn-guide directly over the space left between them, in order that when the presser-bar comes down it will insure the passage of the yarn-guide between, as otherwise the needles would frequently be broken. The use of the levers l l' is to secure the position of the slur-roller to one side or the other of the yarn-guide at the time of performing the shifting motions. In Fig. II the end of the lever l is seen to rest on the top of a square piece n''' , while the end of the other lever l' abuts against the side of that piece. The piece n''' is fixed upon the principal carriage C, and is directly opposite to the slur-roller on f , its position being seen at n''' , Fig. IV. The two carriages are supposed to be crossing the frame in the direction of the arrow on Fig. II. As soon as they have traveled the proper distance, the lever k' is suddenly engaged with the rack m' by a mechanism yet to be described, and at once stops the carriage g . The throwing up of k' causes the raising of the lever l' by means of a coupling-screw k''' and lifts its end clear of the stop n''' , by which means the carriage C may continue to travel on, which it must do for a short distance. The end of the lever l , which lies upon the top of n''' drops down as soon as that has passed from under and takes the position formerly occupied by l' . The slur-roller is thus transferred to the other side of the yarn-guide, the distance being measured by the width of the stop n''' . The continued motion of the carriage C after the travel of the yarn-guides has been stopped is for effecting other operations besides carrying the slur-roller from side to side, as by this also all the shifting motions are produced. The carriage C is made to travel back and forth by means of a rack on its under side connected with a pinion on the end of the cross-shaft, as set forth in the patent before mentioned. The shifting-bar, however, in the present-described machine has its first motion given directly by the pattern-cylinder, and that again is actuated by the movements of the carriage C. Upon the center of the carriage C there is a strong standard E. (Shown in all the figures.) This supports on its inner side a three-armed

lever $n\ n'\ n''$, having its fulcrum in the arm n . The lever n is set in a recess in the stand E , the sides of which form stops to limit the motion of the lever, which motion is required to be very small. The extreme ends of the arms $n'\ n''$ terminate under the stop-levers k and k' , so that the latter may rest upon and be supported by said arms. As the carriage C travels back and forth it brings the top of the lever n against the edges of the pattern-cylinder. This throws the lever over to one side as far as permitted by the recess in E , and by this means the stop-levers k or k' are thrown up and made to engage in the teeth in the rail m by the action of the levers n' or n'' , as clearly seen in Fig. II, and thus the yarn-guide is arrested by stopping the second carriage g , as before described. The carriage C , however, continues to move on. The lever n , now pressing against one edge of the pattern-cylinder, pushes that along, and thus moves the shifting-bar B by the action of the stops e , before described.

The operations now effected by the shifting-bar for reversing the motion and bringing the several clutches into play are the same as set forth in my patent before named. When the shifting-bar B has been moved so far that the projection E' has just passed the center of the roller Y' , it gives a sudden spring, tending to continue the motion onward, but is restrained until the motions for completing the stitch for the last course are performed. This short movement causes the edge of the pattern-cylinder to leave the lever n , and thus the stop-lever k would be released from the stop-rail m by the dropping down of the sustaining-arm n' or n'' . The stop-levers, however, must not be disengaged until the very moment before the carriage C is about to return, as otherwise the yarn-guide would be liable to shift its position, and thus cause a derangement or breakage of the machine. To keep the stop-levers $k\ k'$ up, there is a contrivance working in connection with the shifting-bar and said levers.

At $o\ o'$, Figs. I and III, are two flat rails called "latches," lying between the shifting-bar and stop-levers and parallel to them. These rails are pivoted on their lower sides, so that they may rock back and forth. They stand, when not engaged, in an inclined position, kept so by springs attached to the studs p , as seen in Fig. III. These rails are made to stand up in a vertical position by the action of cams upon the shifting-bar, and when either of them is in such position its upper edge comes directly under a pin h'' , projecting from the levers $k\ k'$, so that whenever the dog-lever n is released from pressing against the pattern-cylinder the edge of one of these rails is always under its appropriate pin h'' , and thus prevents the stop-lever from being disengaged from the rack m . These rails are brought into action as follows: Upon the side of the shifting-bar B there are two pieces of metal having each two inclined

planes, one on the upper and one on the lower side. These pieces are seen at $q\ q'$ in the several figures. As the shifting-bar is moved along—say in the direction of the arrow, Fig. III—the upper inclined plane (seen at r) is brought to bear against a pin projecting from the rail o' at r' . The ascent of the pin up the inclined plane effects the setting up of the rail o' , and is thus engaged under the proper stop-lever. The pin r' rests upon the flat surface q' until the stitch is completed. As soon as this is accomplished the shifting-bar springs forward to the extent of its motion and engages the reversing-clutch. This carries the piece q' clear of the pin r' , and thus relieving the stop-lever at the same instant by the action of the spring on p , the pin being then in the position of the one seen at r'' . While the shifting-bar is moving along, the piece q will pass over the pin r'' . In order to do this, it is hinged by an arm, as seen at s , Figs. I and III, so that as the pin r'' strikes against the inclined plane on the under side the piece q is lifted up, dropping in place again as soon as the pin r'' clears it on the other side. Thus the pins r' and r'' are brought into position to mount the upper inclined planes r at the finishing of each course.

My next improvement consists in what I call the "hook-bar." This is a part for drawing down the loops of each course as fast as finished and also to carry them back upon the shank of the needles out of the barbs before the laying of a fresh strand of yarn. The hook-bar is seen at H , Fig. I, on the front of the frame and immediately under the row of needles. The bar has a movement vertically, being guided at its ends by guide-rods to which it is attached by screws, whereby the exact set of the bar and hooks can be made. The bar is raised by two arms or levers s' , the opposite ends of which extend back to the cam-shaft by which it is worked. In descending this bar drops by gravity. At t , Figs. V and VI, is represented the hooks in full size. These are thin pieces of metal similar to the sinkers, and are shaped as seen in Fig. V. The hooks are set in the bar so as to stand vertically between the needles, there being one hook to each needle and the top end standing alongside of the lower end or tail of the sinker. There must therefore be sufficient space between the needles to receive the two pieces of metal.

The operation of the whole machine will now be as follows: The web is first started, as in ordinary knitting-machines. The yarn feeding through the eye in the guide i is being laid upon the shanks of the needles just behind the points of the barbs. The carriage C is traveling in the direction of the arrow on it in Fig. I. The carriages C and g keep on in unison until the dog of the lever n strikes against the end A' of the pattern-cylinder. This throws up the stop-lever k' , so that it engages in the rack m'' , which instantly arrests the motion of the carriage g

and stops the yarn-guide accurately between the proper needles, as before described. The carriage C, however, keeps on, pushing along with it the pattern-cylinder, which slides along its shaft *a*. The shifting-bar is thus moved along sufficiently to disengage the clutches *z* on the cross-shaft and throw into gear the cam-shaft, which is accomplished in the manner described in my patent before referred to. The first movement produced by the cam-shaft is to throw down the presser-bar J, so that it will stand just over the barbs of the needles, but not so as to touch them. In coming to this position it presses down between the needles the point of the yarn-guide *i*, so as to carry the yarn below the last needle beyond which it stands. The needles now begin to retreat within the machine, and in doing so receive the last laid loop, which is still held within the throat of the sinkers under the barbs. The presser-bar now descends still farther and closes the barbs by bringing their points down within the eyes. This done, the sinkers are all raised by the elevating-bar K clear of the loops, the needles still retreating. Meantime the loops of the last course to which the web hangs are being pushed along, or rather the needles are being withdrawn through them, the web being kept in place by resting against the hooks *t* then in the position as seen in Fig. V. The needles continue to move on until their doubled ends have passed back of the edges of the hooks, which effects the complete discharge of the loops of the previous course, the web now hanging by those of the last row which are at this moment forced up to the bent head of the needle still under the barbs. The hook-bar H is now allowed to descend until the hooks take within them every loop of the last course, the bar now being suspended on said loops in the manner shown in Fig. VI. The weight of the bar is such as to bring every loop properly down and tighten the web, so as to give the proper firmness to the same. This course of loops must now be taken out from under the barbs and pushed back on the shanks far enough to allow of the laying of the next course of yarn before them, as well known. The presser-bar having risen sufficiently to allow the barbs to spring up, the needles are advanced, the loops being

held in place by the hold of the hooks *t* until they are far enough back upon the shanks. The bar H then rises, carrying the hooks all clear. The presser-bar J and the bar K for lifting the sinkers also return to their former positions. During the latter half of the revolution of the cam-shaft the worm-wheel *w*, Fig. I, is set in motion and turns the pattern-cylinder onward the proper distance to vary the distance of travel of the yarn-guide, as before described. The shifting-bar B is now liberated and moved on, thereby disengaging the cam-shaft and engaging the cross-shaft, which moves the carriage. By this movement, also, the piece *q'* moves past the pin *r'* and frees the stop-lever *k'* in the manner before described, so that the carriages are both free to travel back to the opposite side, and thus the courses continue to be laid and a web of the desired pattern formed, as before named.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The improved method of constructing the pattern-cylinder—that is to say, by dividing the same into two parts—so as to be capable of sliding to or from each other on the supporting-shaft, whereby variations in the width of the web may be effected, but having the same pattern.

2. Combining the pattern-cylinder directly with the shifting-bar, carriages, and yarn-guide, as described, whereby I am enabled to economize space and produce a better action in the machine.

3. The improved construction of the carriage and stop-motions by the addition of a second carriage, on which the stop-levers and yarn-guide are fixed, in combination with the shifting-bar, as set forth.

4. Attaching the point of the yarn-guide by a hinge and so shaping it that it may be pressed down between the needles to form the selvage, as described.

5. The hook-bar H and its hooks, in combination with the needles and sinkers, substantially as set forth herein.

HENRY BURT.

Witnesses:

S. H. MAYNARD,
I. P. PIRSSON.