

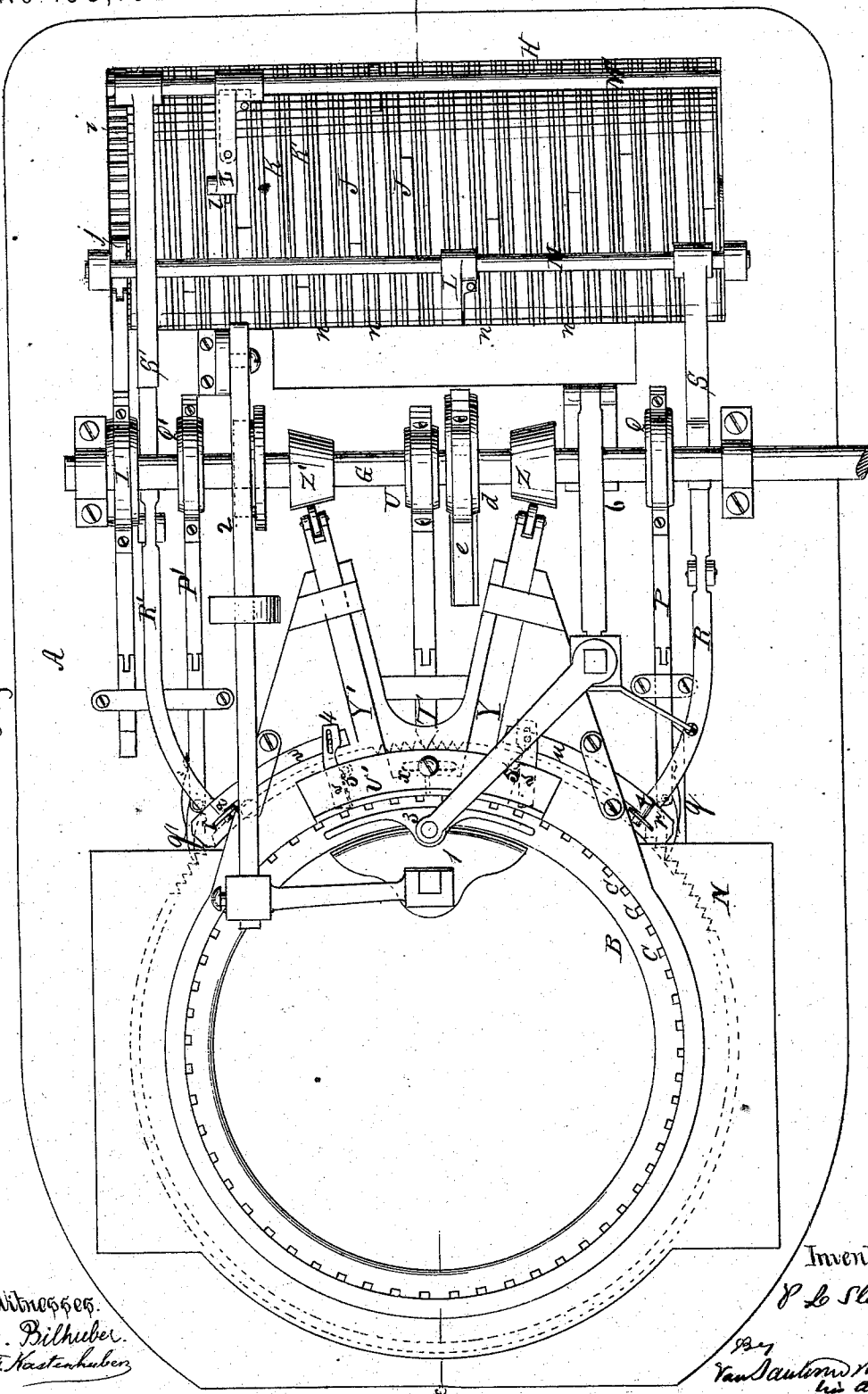
P. L. SLAYTON.
Knitting-Machines.

No. 158,185.

Patented Dec. 29, 1874.

Fig. 1.

A



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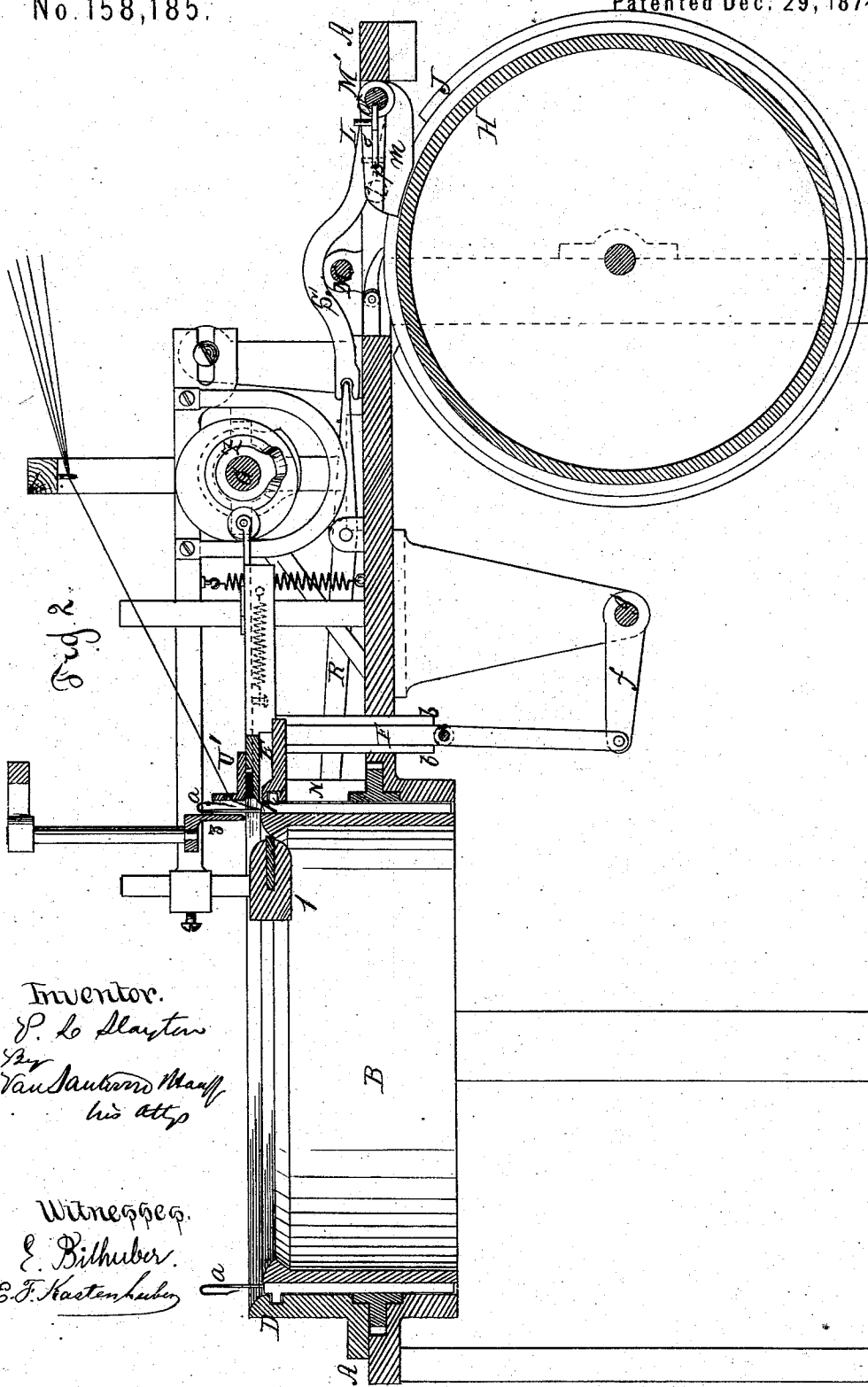
P. L. Slayton

By
Van Dusen & Haff
his attys

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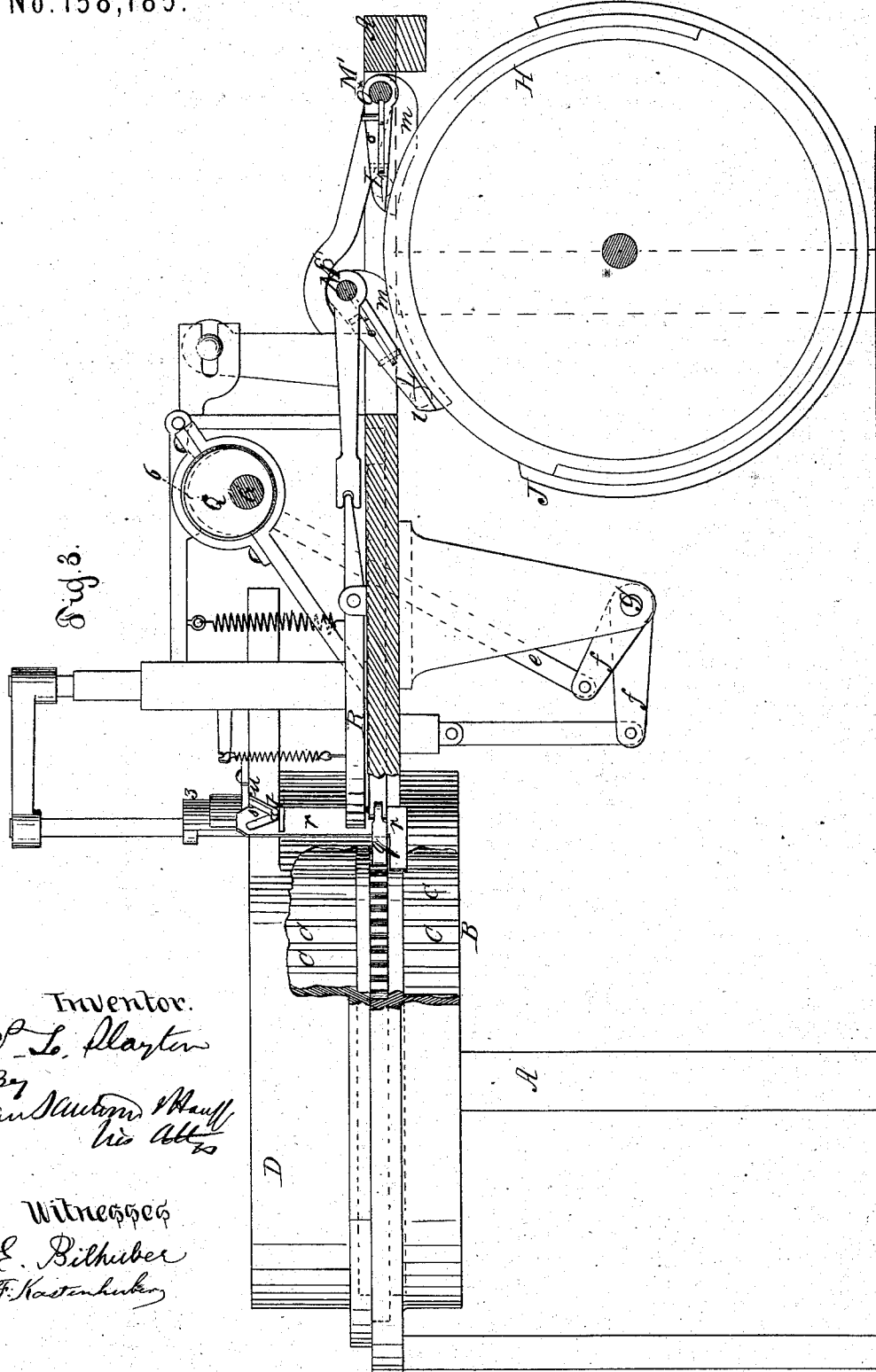
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UNITED STATES PATENT OFFICE.

PHINEAS L. SLAYTON, OF NEW YORK, N. Y., ASSIGNOR TO ALMET REED,
OF SAME PLACE.

IMPROVEMENT IN KNITTING-MACHINES.

Specification forming part of Letters Patent No. **158,185**, dated December 29, 1874; application filed
June 19, 1874.

To all whom it may concern:

Be it known that I, PHINEAS L. SLAYTON, of the city, county, and State of New York, have invented a new and useful Improvement in Knitting Machinery; and I do hereby declare the following to be a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawing forming part of this specification, in which drawing—

Figure 1 is a plan view of portions of a knitting-machine. Fig. 2 is a vertical section thereof, taken in the plane of the line *xx* of Fig. 1. Fig. 3 is a side elevation of Fig. 1, a portion of the frame being broken away to show the needle-ring, and part of the machine being shown in section.

This invention relates to machinery for knitting caps and hats; and consists, among other things, in causing the needle-ring to oscillate to and fro by means of a double-threaded screw-wheel with spiral grooves, in which are arranged segmental bars, which can be set at different places in the grooves, as required for the work to be made, the screw-wheel having combined with it a pair of nuts or levers, which are carried along by its threads, the nuts or levers being mounted at one end on rock-shafts, respectively, with feather-keys, so that the shafts are rocked whenever the nuts or levers are lifted above the surface of the wheel, which is done whenever one of the segmental bars is found in their paths. The rocking of the shafts causes oscillations or changes in the direction of motion of the needle-ring automatically, so that the work produced by the changes is made up of a series of gores or pockets, combined together so as to produce a cap or hat body, which is afterward finished on a block or otherwise. The needles are provided with a separate thread for each, and the needle-ring is moved with an intermittent motion a distance of one needle at each movement, a series of needles being engaged simultaneously, the leading needle engaged in each operation being dropped and a fresh one taken up behind at each step of the rotation, so as to bring the work to an angle with the yarns.

The letter A designates the frame of the machine, and B a needle-ring, provided on its exterior with vertical grooves C, in which the needles *a a*, &c., can play longitudinally up and down as they are brought into action. The needles are provided with the usual flexible beards. The needle-ring is inclosed within a stationary guiding-frame, D, in such a manner that it can be moved or oscillated therein back and forth, as hereinafter explained, for the purpose of changing the direction of the knitting, and bringing successively different needles, as required, into action on either side.

The up-and-down movement of the needles takes place between the step-by-step movement of the needle-ring, and is accomplished by a horizontal grooved bar, E, secured to a vertical slide, F, working in guides *b b*, which slide F is operated from the driving-shaft G by means of an eccentric, *d*, and connecting-rod *e*, and the arms *f f*, mounted on a rocking shaft, *g*, the grooved bar E receiving in its groove the projections *h* of those needles which are presented to it by the needle-ring as it revolves in one direction or the other. The needle-ring is driven from an indicator screw-wheel, H, whose axis is supported horizontally in the lower part of the frame A, as shown in Figs. 2 and 3. One end of this wheel is provided with ratchet-teeth *i*, which are engaged by a pawl, *j*, operated by the eccentric I on the main shaft G, the arrangement being such that the wheel is fed or turned only one tooth at a time. The wheel H is grooved throughout with a double right-hand screw-thread, *k k'*, with a dovetail groove, which grooves receive segmental pattern-bars J of different lengths, their lengths and positions varying according to the work to be produced. The bars J must be arranged and timed so as to prevent any intermission in the work, and to allow only one nut or lever, L, at a time to throw its rock-shaft, as, if both shafts were rocked at once, the stitch would miss and the work drop.

These bars J are secured in the grooves at any desired positions by set-screws, and they project above the periphery of the wheel high enough to act upon the under sides of rollers

l l, secured at the ends of nuts or levers L L, which are mounted, with feather-keys, upon rock-shafts M M', respectively, so that the levers can travel longitudinally, but cannot turn on their shafts. From the under side of each lever L L there projects a swinging blade, m, which enters a narrow spiral groove, n, formed in the periphery of wheel H, parallel to and between the deeper grooves that receive the segmental bars J. The blades m serve to connect the nuts or levers L L to the screw-wheel H and cause them to move along on their rock-shafts M M' from one end of the wheel to the other, their blades being wider than the height of the pattern-bars J above the screw-wheel, so that, notwithstanding the lifting of the nuts or levers L by the said bars, the blades will continue in the grooves n, and the nuts or levers continue their traverse along the wheel H. The nuts or levers L L are keyed to their respective rock-shafts M M' by means of keys o, which are hinged to the sides of the levers L L, opposite horizontal slots p p, into which they enter, their ends passing into longitudinal grooves o* in the rock-shafts, which are exposed whenever the blades are shoved down in the grooves n, to cause the slots p and grooves o* to coincide. When either of the levers has traversed the length of the wheel its key o is swung out of the groove o*. Its blade is then raised out of its groove n, and the lever is then slid along its rock-shaft to the starting end of the wheel. The nuts or levers L L are thus connected to the screw-wheel, and compelled to move on their rock-shafts according to the pitch of the grooves n n, the rollers on the said levers rolling over the periphery of the wheel; but whenever one of the segmental pattern-bars J is found in the path of either of the levers, such lever is raised and its shaft rocked, and thereby one or the other of the driving-pawls q q', which give rotary motion to the needle-ring, is rendered inoperative, as hereinafter explained. Around the needle-ring B is secured a toothed ring, N, having V-shaped teeth; equal in number to the number of needle-grooves in the needle-ring.

The needle-ring is driven one way or the other by means of spring-pawls q q', attached at the ends of levers P P', which are actuated, respectively, by eccentrics Q Q' on the main shaft G. The mechanism is so arranged that only one of the spring-pawls—viz., q or q'—is allowed to act upon the needle-ring at the same time. This is accomplished by aprons r r', arranged to slide vertically in the frame into such positions that when they are raised they interpose themselves between the V-shaped teeth on the needle-ring and the driving-pawls, the springs allowing the pawls to yield outwardly far enough to cause the pawl to move outside of the V-shaped teeth. The aprons r r' are raised by levers R R' through the action of rocking arms S S', which latter are rigidly secured upon the rock-shafts M M'. The mechanism is so arranged, and operated

by means of the segmental pattern-bars, that only one of the pawls, q or q', is allowed to act at the same time upon the needle-ring, the other pawl being kept meanwhile out of action by means of its apron so long as its appropriate lever L is kept raised by the interposition of a segmental pattern-bar on the screw-wheel.

In order to hold the needle-ring stationary while the needles are being raised and lowered and the stitches are in the process of formation, and to prevent the ring from being thrown more than the distance of one tooth when the machine is running at a high speed, I employ a detent, T, which is formed so as to enter between adjacent teeth on the exterior of the needle-ring, so as to hold the ring firmly, said detent being formed at one end of a bar, whose other end is actuated by an eccentric, U, on the main shaft G, the motion of said eccentric being just enough to pass by the point of a tooth to the bottom of the next space.

Each needle of the series actually engaged is supplied with its own thread, which is conducted through its appropriate hole in a yarn-guide, U, arranged in front of the needles engaged.

The yarn-guide has as many holes through it as there are threads used, and each hole stands half-way between two adjacent needles at the proper height and distance for the threads to pass through the work.

I make the yarn-guide either stationary or movable. In the example shown in Fig. 1 it is stationary, and is fastened to the frame by a set-screw, x. It covers the pressers Y Y', and its front edge stands as far forward toward the needle-ring as the needles will allow without interfering with them. In order to make it equivalent to a yarn-guide having lateral motion, I place at the outer end of each presser a vibrating plate, v, attached by hinge joints to the pressers, as indicated by the numeral 5. These plates v v can be swung around, so that their front ends come flush with the front edge of the pressers, having a like curvature. They are swung around to that position, the one or the other, by means of flat slides u u, that are pivoted to the plates v, and are connected to the aprons r r', respectively, by pins t, which work in diagonal slots s, made in the apron, so that when the aprons rise or fall the slides are moved in or out, thereby causing the plates v to close on the ends of the pressers or to open.

By this construction of the pressers I am able to compensate for making the yarn-guide stationary. This extension is given to the presser on the side of the direction of motion of the needle-ring, and I am able thereby to extend the presser, for the time being, on the leading side of the needle-ring, so as to bring its outer edge in that direction past the place of the leading needle, and thereby enable it to make its stitch, and to insure its proper action before it casts its stitch.

It will be observed that the closing of the extension-plate *v* on either side is effected by the descent of the apron *r* or *r'*, which descent allows the engagement of one or the other of the pawls *q* or *q'* with the needle-ring, for the purpose of rotating it, the arrangement being such, for example, that when the apron *r* is down, and the pawl *q* in action, the extension-plate *v*, which is toward the right in Fig. 1, and which also appears in Fig. 3, will be closed, the needle-ring being driven then in that direction.

As I have before remarked, I also make the yarn-guide movable, and in that case I provide a slot (indicated in dotted outline in Fig. 1) in it of the proper curvature to allow it to be moved to and fro on the set-screw *x*, and connect it to one or other of the aprons *r* or *r'* by means of one of the slides *u*, which I connect with the yarn-guide, so that the latter will move with the slide. It is evident that the yarn-guide need be connected only to one of the aprons in order to receive motion in either direction, since when one apron—*r*, for instance—is moved down, the other is simultaneously moved up, and therefore both motions of the yarn-guide can be got from one apron. When I make the yarn-guide movable I make the pressers *Y Y'* wide enough to act on the desired extent of needles engaged, the yarn-guide being moved to one side, in the direction opposite to that in which the needles are moving, so that it extends its yarn diagonally across the needles, in a good position to enable the barbs to seize the yarns. The flexible beards of the needles are closed, as soon as the needles have seized the yarns, by means of the spring-pressers *Y Y'*, which are arranged to slide in grooves in the frame *A*, and are operated by means of the cams *Z Z'* on the shaft *G*, which are so timed as to close the needles at the proper time, and long enough to allow the old stitches to pass over the ends of the needles when the pressers are withdrawn by their springs.

The work is gently stroked downward by an eccentric motion from the segmental spring-wiper 1, working inside the needle-ring. The said segmental wiper 1 is faced with rubber, and is operated by means of the cam 2 on the main shaft. So soon as the wiper 1 pulls a little on the cloth, a spring-holder, 3, which is operated by means of a cam, 6, on the main shaft, comes down on the newly-formed stitches, and remains there until the grooved bar *E* rises, when it is raised also out of the way, and gives the needle-ring a chance to shift.

Each needle in the series engaged makes a stitch of its own with a separate thread, and in making caps of ordinary size I employ from twenty-five to forty needles; but I do not restrict myself to any number of needles. The needle-ring is caused to move or feed first in one direction, presenting a sufficient number of the needles to be simultaneously raised and lowered by the bar *E*, according to the width of the work to be done, one needle being

dropped on the leading side at each feed or movement, and a fresh needle taken up at the other side, and when the proper length of work has been knitted in that direction the movement or feed of the needle-ring is automatically changed by means of the screw-wheel and its segmental pattern-bars, as before explained, and in this manner the needle-ring is made to operate continuously from left to right, and from right to left, for periods which are determined by the relative lengths and arrangements of the said bars, the result being that the work is composed of a series of connected gores, arranged in zigzag order with respect to each other, but so as to complete the cap or hat, except on the short terminal lines where the work began and ended, and where a small gap is left, opening on the edge of the cap or hat, which is afterward closed up by connecting the stitches, or in any convenient manner.

The succession of gores enables me to produce cap or hat bodies of various styles, including Scotch caps, so called, with the part known as the "bell" more or less protruding, as required by the manufacturer, the band being widened by knitting at one side to form a front, if desired.

Before the machine is put in operation the segmental pattern-bars are arranged in proper order upon the screw-wheel, and the needle-ring is provided with as many needles, set adjacent to each other, as may be required. The needles are raised by the grooved bar *E*, thus enabling them to seize the yarns, and the descent of the bar *E* is just sufficient to cause each needle engaged to draw out as much yarn as is required to make the stitch. The bar then rises, and is allowed to rest a moment while the needle-ring advances to the right or left, and causes the leading needle in the series to drop out of the groove in the bar, and a fresh needle at the rear end to enter the groove of the bar, the yarns being brought sidewise to the series of needles which are engaged, as above explained.

Instead of the driving-pawl *j* and ratchet-teeth *i* for driving the screw-wheel, I can employ a toothed segment measuring about one-fifth of a circle, fixed on the end of the main shaft *G*, and arrange that it shall, as it revolves, engage a pinion on a shaft provided with a worm-wheel, which meshes with the teeth *i* on the screw-wheel, in such a manner that the segment will cause the said shaft to have one entire revolution during each engagement of the segment with the pinion, and the screw-wheel be moved one tooth.

I can arrange the pattern-bars *J* so that the knitting shall proceed straight across, in parallel rows, from edge to edge of the work, using whatever needles are required, thereby producing a semi-spherical cap or hat body, which is afterward blocked and finished to bring it to the shape required.

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

1. The combination of the screw-wheel H, provided with a double right-hand thread, and the adjustable pattern-bars J, constructed and arranged substantially as described.

2. The double-threaded screw-wheel H and adjustable segmental pattern-bars J, in combination with the nuts or levers L L and rock-shafts M M', substantially as and for the purpose described.

3. The combination of the double-threaded screw-wheel H, pattern-bars J, rock-shafts M M', and the aprons *r r'*, operated from said shafts, with the needle-ring B, substantially

as described, so that the direction of the motion of the needle-ring is changed automatically by means of the screw-wheel.

4. The combination of the driving-pawls *q q'*, by which the needle-ring derives motion from the main shaft G, with the screw-wheel H, the levers R R', and aprons *r r'*, substantially as described.

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Witnesses:

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