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C. H. PLATT & G. A. STANBERY.

Knitting-Machines.

No. 137,568. Patented April 8, 1873.

Fig. 1.

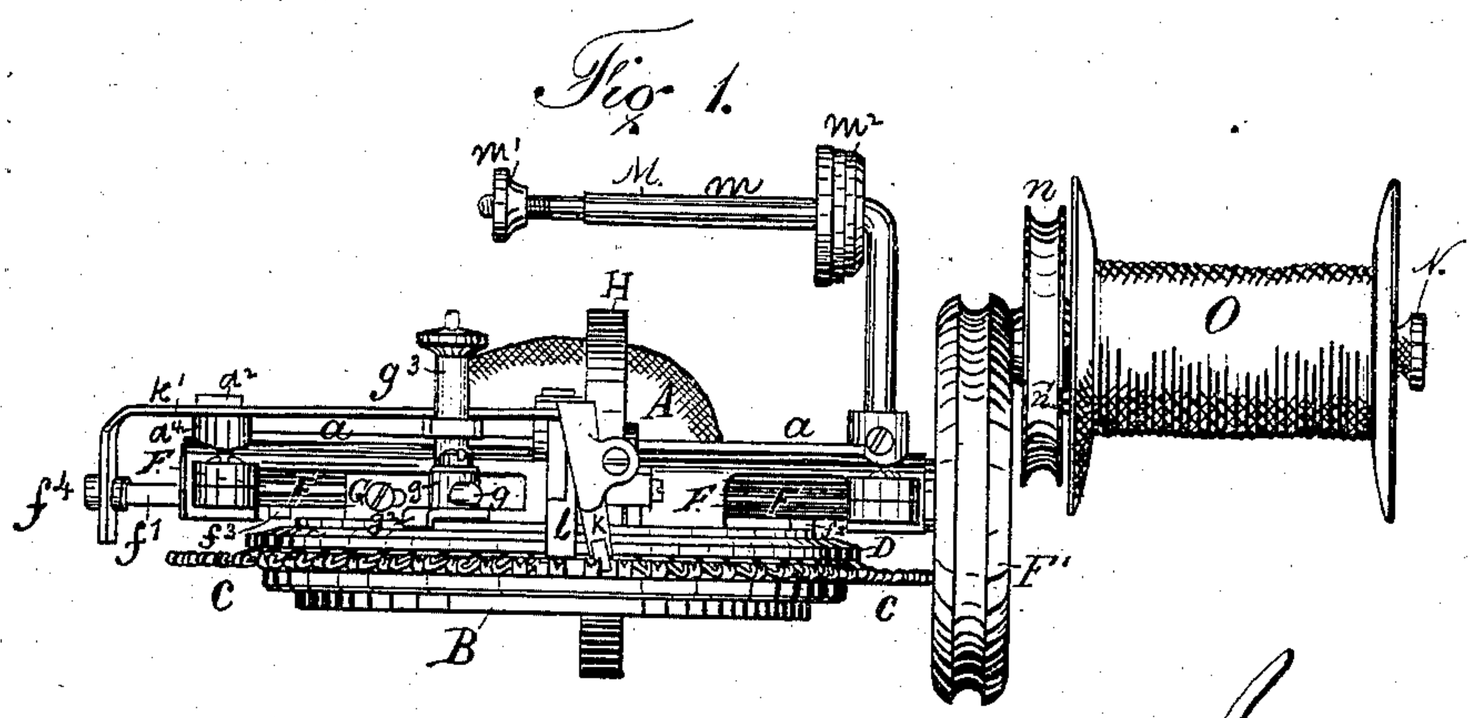


Fig. 11

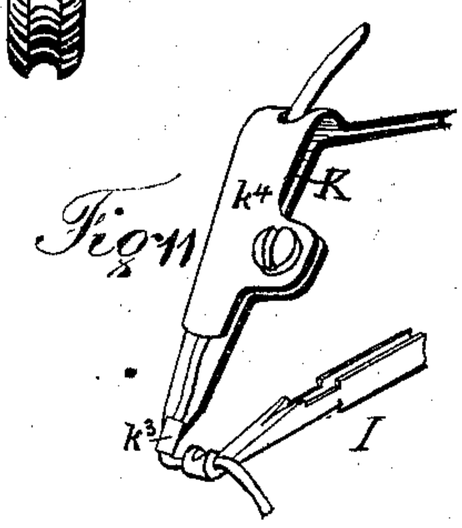


Fig. 13

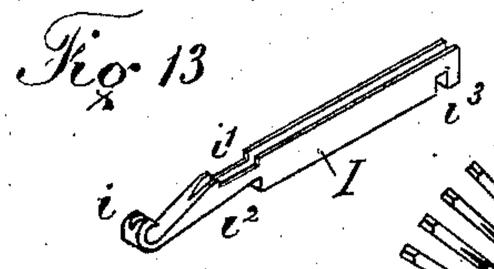


Fig. 2

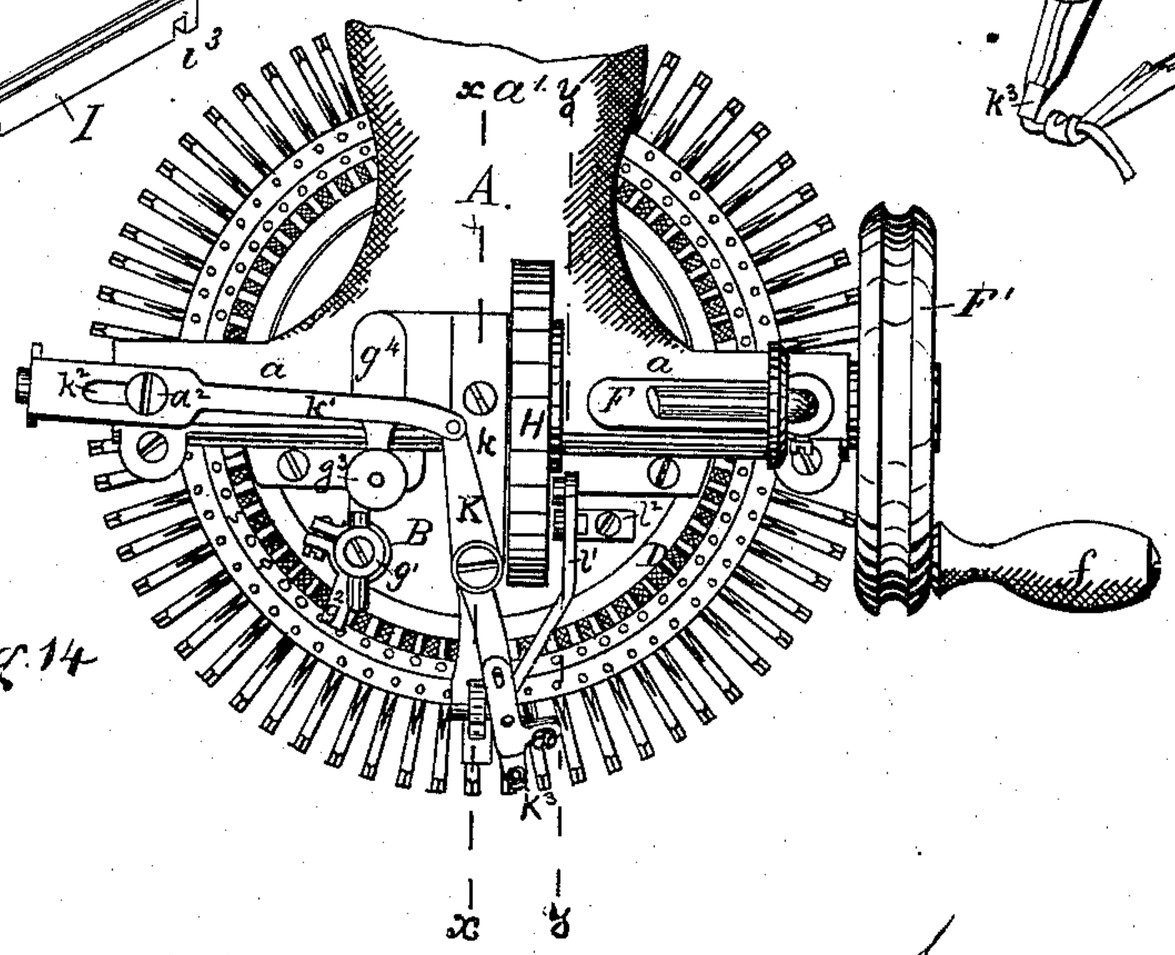
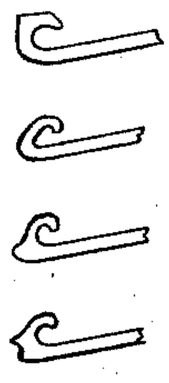


Fig. 14



Witnesses.
J. F. Knight
Donald Stuart

Inventor
Chas. H. Platt
George A. Stanbery
by A. McCallum
Atty

2 Sheets--Sheet 2.

C. H. PLATT & G. A. STANBERY.

Knitting-Machines.

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Fig. 7.

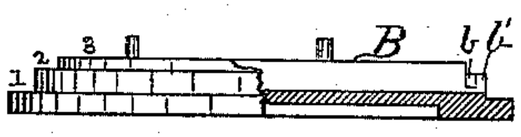
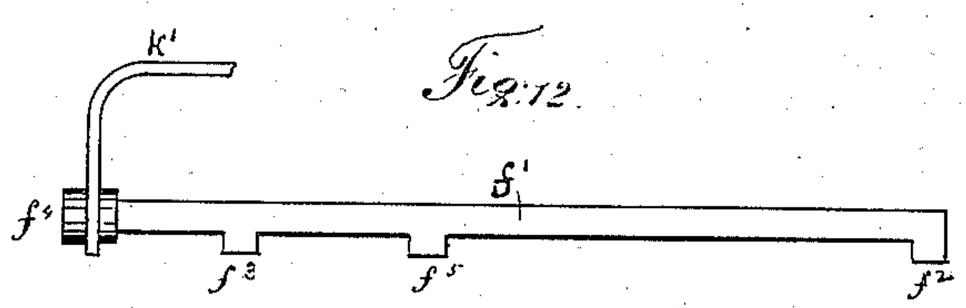


Fig. 12.



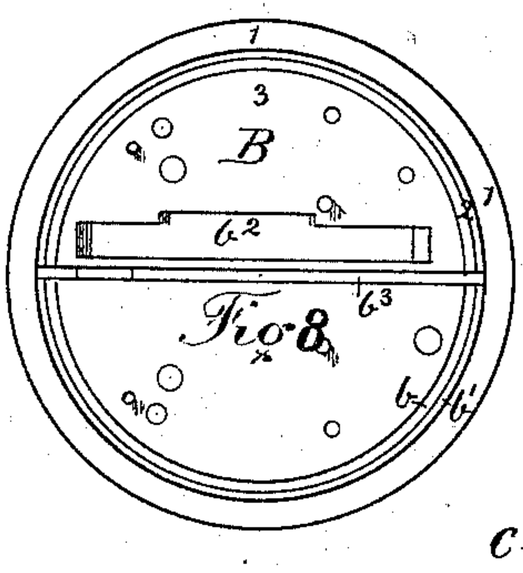
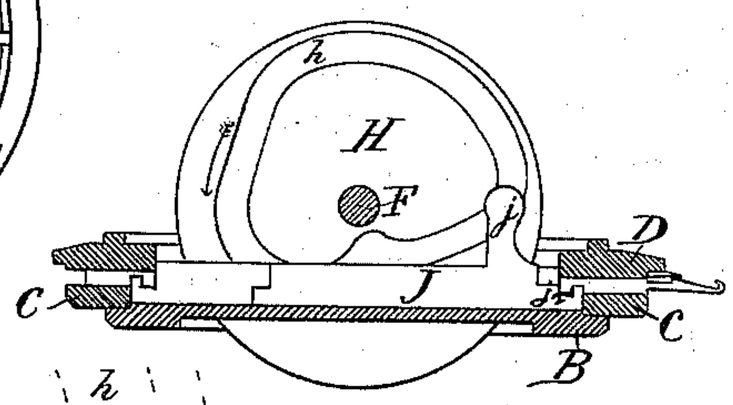


Fig. 8.

Fig. 3.



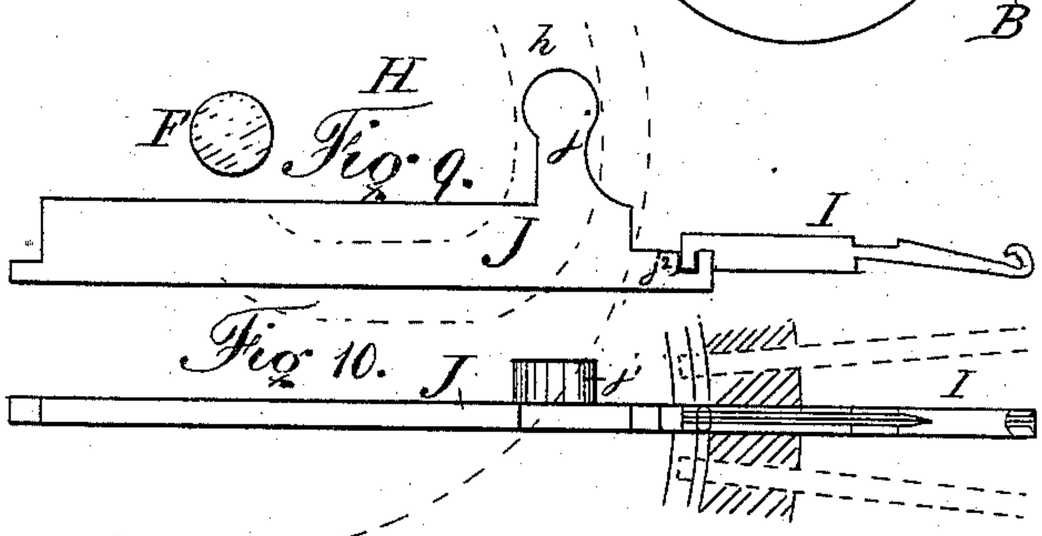


Fig. 9.

Fig. 10.

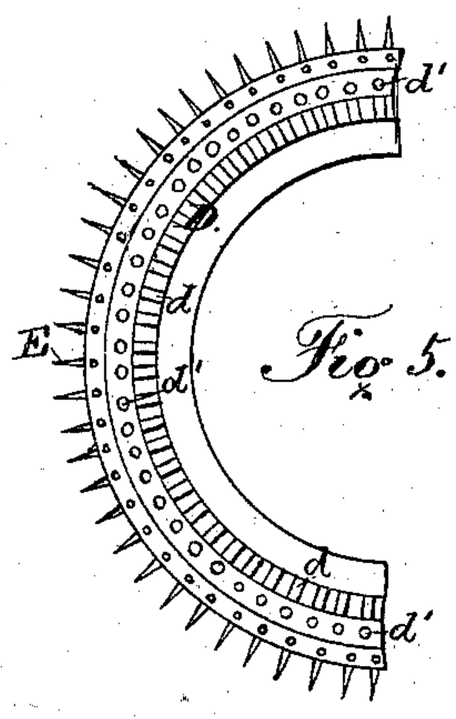
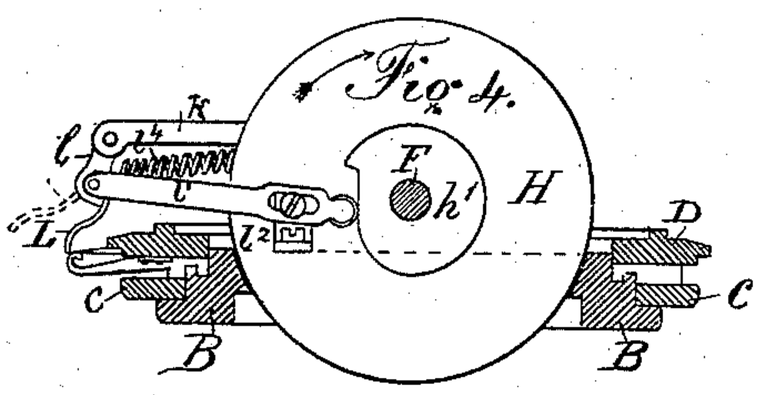


Fig. 5.

Fig. 4.



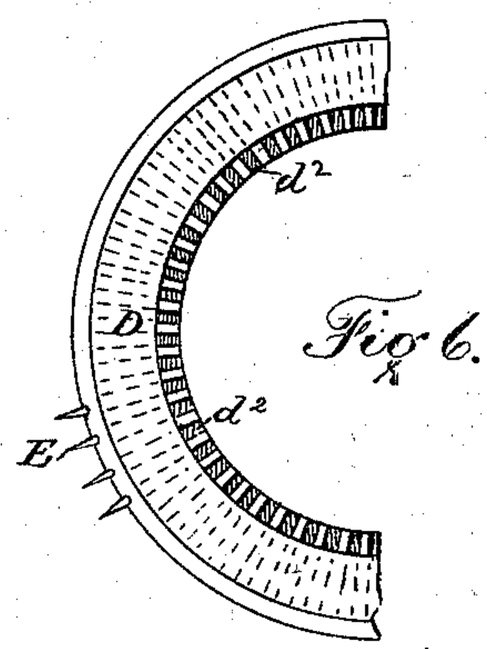


Fig. 6.

Witnesses
H. C. Knight
Donald Stuart

Inventors
Chas. H. Platt
George A. Stanbery
by A. McCallum
Atty

UNITED STATES PATENT OFFICE.

CORIN H. PLATT AND GEORGE A. STANBERY, OF NORWALK, OHIO.

IMPROVEMENT IN KNITTING-MACHINES.

Specification forming part of Letters Patent No. **137,568**, dated April 8, 1873; application filed March 7, 1873.

To all whom it may concern:

Be it known that we, C. H. PLATT and GEO. A. STANBERY, of Norwalk, in the county of Huron and State of Ohio, have invented certain new and useful Improvements in Knitting-Machines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawing, which forms part of this specification.

Our invention relates to improvements in the construction and operation of knitting-machines, whereby the working mechanisms are in a great measure simplified, the number of parts and mechanical devices reduced, and the friction lessened, while at the same time a great reduction in the cost of manufacture is effected and a more durable and effective machine produced.

The invention consists, first, in the combination, with the needle-bar, of the base-ring or supporting-disk provided with an annular key-ring and with certain grooves, as hereinafter described, so as to securely hold the needles in place when not in operation, yet permit each needle in its turn to be carried back and forth by the needle-bar to perform its function of completing a stitch and forming a new loop, as hereinafter more fully set forth; secondly, in the construction and arrangement of the needle-bearing ring and the upper traveling-ring to which it is secured and the base or supporting-disk on which they are seated and revolve, so that all danger of soiling the yarn through the needles coming in contact with the oil used for lubrication is obviated; thirdly, in certain mechanism operating in combination with the comb tooth or stripper for retaining the loop thereon while the needle is passing backward through it; fourthly, in a new and improved combination of devices, consisting of the movable or reciprocating needle, stationary comb-tooth or stripper and stitch-retainer, by means of which a stitch is completed and a new loop formed by a single passage or reciprocation of the needle, and all danger of dropping a stitch obviated; fifthly, in a new and improved combination of devices for automatically reversing the yarn-carrier, which lays or deposits the yarn directly in the hook of the needle before the latter begins to operate to form the loop, so as to cause it to reverse when the operating-needle next adjacent to the web is on its return or forward stroke and before it gets out to its final throw, so that a loop is formed thereon in the act of reversing, and the web may thus be widened, as desired; sixthly, in the new and improved form of needle hereinafter set forth; and, lastly, in a new and improved device for winding bobbins as an attachment to a knitting-machine of the description herein specified.

In the accompanying drawing, Figure 1 is an elevation of our improved knitting-machine. Fig. 2 is a plan view of the same. Fig. 3 is a vertical section on the line *x x*. Fig. 4 is a vertical section on the line *y y*. Figs. 5 and 6 show the upper and under sides of the upper or traveling ring. Figs. 7 and 8 are plan and sectional views of the base or supporting disk. Fig. 9 is a side elevation of the needle-bar detached. Fig. 10 is a plan view of the same. Fig. 11 is a detached view of a portion of the yarn-carrier. Fig. 12 is a side elevation of the reversing feather. Fig. 13 shows one of the needles detached, and Fig. 14 represents a number of needle-points of different forms.

A represents the supporting-frame, one portion of which, *a*, extends diametrically across the machine and forms the bearings of the main or driving shaft and the support for the principal operating mechanisms. The other portion, *a'*, consists of a horizontally-projecting screw-clamp, which may be of any convenient form suitable for securing the machine to the table of a sewing-machine or to the ledge of any convenient working bench or table. B is the base-plate or disk which forms the seat for the upper or rotating rings. It is rigidly secured to the frame A, and with the latter constitutes the entire superstructure by which the other parts of the machine are supported and on which they are made to operate. As shown by Figs. 7 and 8, the base-plate B consists of a circular disk of metal having three annular seats or faces, 1 2 3, on its upper side, the lower one of which, 1, forms the seat for the upper rotating rings. The

middle face 2 is cut with an annular groove, b, so as to form an annular key-ring, b^1, for the purpose of holding the needles in position, as hereinafter more fully set forth. To the third or upper face the frame A and other parts of the machine are secured. b^2 is a slot cut transversely through the disk B, so as to permit of the revolution of the cam-wheel; and b^3 is a narrow groove cut diametrically across the disk, and of greater depth than the annular groove b in face 2. In this groove b^3 the needle-bar is made to reciprocate back and forth, as hereinafter set forth. C is a metallic ring having perfectly smooth upper and under surfaces, the latter resting on the face 1 of the base or supporting-disk, while its upper side or face forms the seat or bearing for the needles, and on which they play back and forth when in operation. D is the upper or traveling ring, riveted to the needle-bearing ring C, so that both rotate together upon the lower or base plate B. The ring D is provided on its upper face with a circle of teeth or cogs, d, arranged radially. It is also pierced with a circle of holes, d^1, corresponding in number to the cogs d. E represents the comb-teeth or strippers projecting from the outer periphery of the ring D, to which they are rigidly secured in any convenient manner, so that, if required, they may be removed therefrom; or they may form part of the ring, as desired. These teeth E are arranged radially, and correspond in number with the cogs d and pin-holes d^1, occupying the position of radiuses, drawn from the center of the disk B through the space between the pin-holes d^1. On the under side of the ring D is a ring or band, d^2, which occupies the space between the rings C and D. This ring d^2 is grooved radially so as to permit of the passage of the needles back and forth through the grooves, the latter being arranged in the same radiuses as the comb-teeth, with which they also correspond in number. F is the driving-shaft, journaled in bearings in the portion a of frame A, which also forms a cover for the protection of the shaft. The ends of the shaft extend beyond or overhang the rotating or traveling ring D. On one end the shaft carries a band-wheel, F′, arranged so that the machine may be operated by power derived from the treadle and fly-wheel of a sewing-machine, or from other sources, but, when desired, the machine may be operated by hand, the wheel F′ being provided with a removable handle, f, for that purpose. The driving-shaft is formed with a groove, which extends nearly its entire length. In this groove a sliding key or feather, f^1, is inserted, the latter being provided with two teeth or cogs, f^2 f^3, one at each end, one or the other of which engages with the cogs d of the ring D, and through the revolution of the shaft thereby causes the ring D to rotate to the right or left, as desired—to the left when the tooth f^2 engages with the cogs d, to the right when f^3 is in gear. This reversing-feather may be operated by hand, its outer end extending beyond the shaft so as to form a handle, as shown in Fig 1 at f^4 for that purpose, or it may be operated automatically by means of the following devices: The driving-shaft F is provided with a sleeve, G, on the inner side of which a cam-groove is formed, so as to permit the projection or tooth f^5 on the feather to turn freely therein while the machine is operating in one direction. g is a horizontal arm or lever, the inner end of which is pivoted to the sleeve G and the other passed through a vertical shaft, g^1, which is journaled in the base-plate B. To this shaft g^1 an arm, g^2, is clamped, which extends outwardly over the cogs d, the end being turned down over the pin-holes d^1. When it is desired to reverse the direction of the rotating rings a pin is inserted in one of the holes d^1 at the desired reversing point. When the ring D is fed up to this point the pin comes in contact with the overhanging end of arm g^2, thereby causing the shaft g^1 to turn, and through the lever g cause the sleeve G to slide on the driving-shaft until it engages with the feather-tooth f^5, thereby causing the feather to slide within the shaft until the cog or tooth f^2 or f^3, previously gearing with the cogs d, is liberated and the other thrown into gear. By inserting the reversing-pins at the proper point the teeth of the feather are in this way alternately brought into gear with the cogs d of ring D, and the operation of reversing the ring D is performed automatically, the latter rotating first in one direction and then in the opposite to produce a straight or plain web with selvages. By removing the pins the knitting-rings will operate continuously in one direction, thereby producing an endless or tubular web. The movement of the lever g is regulated by means of a shaft carried in a sleeve, g^3, secured by an arm, g^4, to the frame A. The upper end of this shaft is cut with a screw-thread, and by means of a screw-nut it may be raised or lowered so as to clear or impinge upon a knife-edge formed on the shaft g^1. H is a cam-wheel, keyed centrally to the driving-shaft so as to revolve through the slot b^2 of the base-plate. Figs. 3 and 4 show opposite sides of this wheel. The side shown by Fig. 3 is provided with a cam-groove, h, by means of which a reciprocating motion is imparted to the needle-bar. The other side is provided with a cam-disk, h^1, for the purpose of imparting motion to the stitch-retainer.

The operation of the needle-bar and stitch-retainer will be more fully described hereafter. I, Fig. 13, represents one of the needles having a hooked point, i, the extremity of which is of a form suitable for removing the loop or stitch from the comb-tooth as the needle passes forward beneath it. A variety of different-shaped needle-points are shown by Fig. 14, either of which may be used as found most desirable. A notch, i^1, is formed on the upper surface of the needle, for the purpose of receiving and holding the loop in proper position to be transferred to the comb-tooth on the

backward throw of the needle. This notch may be of any form suitable for the purpose, or it may be dispensed with and the needle roughened sufficiently at that point so as to retain the yarn in proper position. The upper side of the needle is also grooved longitudinally, the groove being of greater depth than the depth of the notch or roughened part, and continued through the upper surface of the point. i^2 is a notch formed in the under surface of the needle, beginning at the point and terminating on a line with the rear end of the upper notch i^1, thereby materially lessening the thickness of the needle at this point, so that a much smaller loop may be secured and finer work produced than with needles without this provision. i^3 is a groove formed transversely across the under surface of the needle at the rear end, by means of which it is securely held on its seat when not in operation—that is, when not moved back and forth by the needle-bar in the process of knitting. These needles correspond in number with the comb-teeth E. They are placed in position one at a time by passing the rear end through the groove on the under side of ring D, which is immediately in front of the groove b^3 of the base-plate; then, by revolving the driving-shaft one turn, the needle thus inserted will be carried past the groove b^3, the annular key-ring b^1 of the base-plate fitting the groove i^3 of the needle, and thereby holding it securely in position. The turning of the shaft has in the meantime brought the next adjacent groove in the ring D immediately in front of the groove b^3, and another needle may be inserted as before, and so on until all have in this manner been placed in position.

It will be readily seen that all the needles are securely held in position by the annular key-ring b^1, except the one immediately in front of the groove b^3, and that, as the ring D rotates, each needle in its turn is brought to this position, where it is liberated from the key-ring and presented to the needle-bar for operation; or, when desired, to be withdrawn from the machine.

J represents the needle-bar, consisting of a narrow slip of metal made so as to slide back and forth in the groove b^3. It is provided with an upwardly-projecting arm, j, which carries a short laterally-projecting spindle, on which a friction-roller, j^1, revolves. The friction-roller is inserted in the cam-groove h of the wheel H, and by the revolution of the latter and the operation of the cam a reciprocating motion is imparted to the needle-bar. A notch, j^2, is cut in or near the forward end of the needle-bar corresponding with the groove b of the base-ring, so that the end or point of the bar corresponds in shape with the key-ring b^1; and when the bar is brought forward this end or point occupies the space in the key-ring made vacant by cutting the groove b^3 through it, so that when a needle is brought opposite to the groove it is keyed by the end of the bar instead of by the ring, and may then be drawn back and pushed forward again by the needle-bar, after which it is again released and transferred to the key-ring as the ring D carries it past and brings the next needle opposite to the groove. K is the yarn-carrier. As shown by Fig. 2, it consists of a thin strip of metal in the form of a lever, pivoted near its center to an arm, k, which is secured to the frame A, and projects horizontally therefrom at right angles to the driving-shaft. The inner end of the yarn-carrier is pivoted to a sliding bar, k^1, which extends horizontally above and in a line with the shaft. This bar k^1 projects beyond the shaft, and its end is bent downward and forked or slotted, so as to fit in a groove formed on the end of the feather. It is supported by a boss or projection, a^4, on the end of the frame a, and held in position by a screw-bolt, a^2, which passes through a long slot, k^2, formed near its inner end, the slot permitting it to slide back and forth with the feather.

In this way the feather carries the bar k^1 along with it by means of the forked end engaging with the groove before referred to, and the motion of the lever k thus imparted necessarily reverses the position of the yarn-carrier.

It will thus be seen that when the feather operates to reverse the direction of the feed, the yarn-carrier is also reversed, whether the former is operated by hand or automatically.

The position which the yarn-carrier bears with relation to the position of the needle in the act of reversing is important, and will be more fully described further on.

The end of the yarn-carrier which delivers the yarn is bent downward over the end of the arm k, which it overhangs, and terminates in an open thimble, k^3, through which the yarn is delivered directly into the hook of the needle. k^4 is a tension-spring secured to the yarn-carrier, through and beneath which the yarn is carried to the thimble k^3. L represents the stitch-retainer—a slip of metal bent downward at the end and secured to a rocking arm, l, which is pivoted to the end of arm k. l^1 is a bent sliding rod or bar, the outer end of which is pivoted to one side of the rocker l. Near its inner end it is provided with a long slot, through which a screw-bolt passes, the latter being supported by a bracket, l^2, secured to the upper face of the base-plate or disk B. The screw-bolt retains the rod l^1 in position without interfering with its motion. On the inner end of rod l^1 is a short spindle carrying a friction-roller, which engages with the cam-disk h^1 on wheel H, and by the revolution of the latter and the operation of the cam and connecting-rod l^1 and rocker l, an oscillating or vibrating motion is imparted to the stitch-retainer, thereby causing it to approach and retreat from the comb-tooth or stripper that may be in a line with it. l^4 is a spiral spring, one end of which is secured to the rocker-arm l, and the other to the arm k, by means of which the stitch-retainer is firmly held against the point of the

comb-tooth or stripper while the needle draws the yarn through the loop on the latter, as hereinafter more fully set forth. M is the bobbin-carrier, which is secured to the side of the frame *a*, the horizontal portion *m* being the spindle on which the spool or yarn bobbin turns. The end of the spindle is provided with a screw-thread and a nut, *m'*. *m''* are washers of felt or rubber, by means of which and the nut *m'* any desired degree of tension may be given to the yarn as fed from the spool. Attached to the machine, as shown by Fig. 1, is a bobbin-winder, consisting of a spindle, N, and band-wheel *n*, the latter having a pin, *n'*, which fits in a hole formed in the head of the bobbin, thereby causing it to turn with the band-wheel when the latter is operated.

To attach this winding device, the handle *f* is unscrewed and removed from the wheel F'. The bobbin is then placed on the spindle N. The band-wheel *n* is then placed loosely in position on the spindle, and secured to the bobbin. The spindle is then screwed onto the wheel F' in place of the handle, when the device is ready for operation.

We do not claim this bobbin-winder in this patent, reserving it for a future application.

By the arrangement of the rotating rings with the stationary disk or base-plate heretofore described, it will be seen that the former being of greater diameter than the latter the seat on which the rings rotate is completely overhung by the needles, from which it will be obvious that those portions of the rotating rings and the disk, which are in frictional contact, and therefore require lubrication, are completely protected from contact with the needle, so that all danger of soiling the yarn through the needles coming in contact with the oil used for lubrication is obviated.

Having thus described the construction of the several mechanisms embodied in our improved machine, we will now proceed to describe the operation of knitting as accomplished by it.

The needles having been placed in position in the manner before described, the yarn from the bobbin is led through and under the tension-plate, and through the eye or thimble on the end of the carrier. The operator then sets up the work by throwing a loop of the yarn on the end of a needle and pressing it back until it rests in the notch or roughened part of the upper surface of the needle, the end of the yarn downward. He then forms a similar loop on the next adjacent needle, and so on, as many of these continuous loops, one on each needle, according to the width of web to be knitted, the end of the yarn being secured to the last needle of the series to be used in knitting. The machine is then adjusted so as to bring the needle having the loop first set up directly opposite the groove b^3, in which position it will be released from the key-ring and taken hold of by the end of the needle-bar, as before set forth.

The yarn-carrier, by its relative position, will have led or laid the yarn across and directly into the hook of the needle. The machine is then set in motion, when the needle-bar, by the operation of the cam-wheel, will travel back and forth in the groove, carrying the needle along with it. As the needle retreats the loop previously formed on it is taken up by the comb-tooth or stripper, the point of the latter projecting into the longitudinal groove of the needle for that purpose. At the same time the stitch-retainer is brought down on the point of the comb-tooth and holds the loop on the tooth, while the needle, continuing in its backward course, draws the yarn through the old loop, thereby forming a new one. As the needle begins its forward motion the stitch-retainer also moves upward and outward from the end of the tooth or stripper, and as the needle is pushed forward by the needle-bar its point removes the loop from the tooth and passes it under the needle to form the web. In this way the first stitch is completed, while the needle, continuing in its forward course, places the second loop on the point of the tooth or stripper, or in position to be transferred to the stripper when the needle is again operated in its turn. When the first needle has been thus operated and brought back to its original position the revolving of the shaft will have brought the tooth or cog on the end of the feather into gear with another of the cogs of the ring D, and the continued revolution of the shaft will thereby cause the ring to rotate so as to carry the first needle past the groove and secure it on the key-ring, while, at the same time, the next needle will be brought into position for operation like the first.

The ring D, it will be observed, remains stationary during the operation of the needles, so that by each revolution of the shaft one needle is first brought into position and then operated so as to complete one stitch and form a new loop.

When a straight web is to be knitted pins are inserted in the pin-holes d^1 at the proper points on the ring D, so that when the end of the web is reached the arm g^2 of the reversing device will come in contact with the pin, when, by the operation of the feather, as before described, the ring D is brought in gear with the opposite feather-tooth and rotated in the opposite direction. At the same time, and as the ring begins to rotate, the yarn-carrier, by the mechanism heretofore described, is thrown over to the other side of the next adjacent operating-needle, laying the yarn in the hooks of the needles, as before, in advance of the operating-needle. When it is desired to widen the web, the reversing-pins are moved to the next hole in the series, or, as will be found more convenient, the operator can use a long pin held in the hand to be inserted in the holes at the right moment. When the end of the web is reached the needle next adjacent to the work is allowed to carry back the yarn

before the machine is reversed, so that the yarn-carrier will reverse when the needle is on its return or forward stroke, and before it gets out to its final throw. In this way a loop is formed on the needle and the web widened automatically.

By operating the reversing mechanism in the manner previously described the web may in this way be extended to any required width without requiring to set up additional loops by hand.

Tubular work is knitted by removing the pins, and thereby permitting the ring D to rotate continuously in one direction.

The length of loop is determined by the distance which the needle is made to travel back in rear of the shoulder of the comb-tooth, and by adjusting the length of stroke of the needle-bar the web may be made close or loose, as desired.

Having thus described the construction and operation of our improved knitting-machine, what we claim as our invention is—

1. The disk B, having the annular key-ring b^1 and grooves b b^3, operating in combination with the needle-bar J, substantially as and for the purpose specified.

2. The needle-bearing rings C and D, constructed substantially as described, and seated on the disk B and operating in combination therewith, for the purpose specified.

3. The stitch-retainer L, rocker l, spring l^4, arm l^1, and cam h^1, all operating in combination, substantially as and for the purpose specified.

4. The combination of a horizontally-reciprocating needle, I, fixed comb-tooth or stripper E, and stitch-retainer L, substantially as and for the purpose specified.

5. The reversing yarn-carrier K, operated by means of sliding-bar k^1, feather f^1, and reversing mechanism, substantially as set forth, and for the purpose specified.

6. The needle I, constructed as described, and provided with the notch i^2 and notch i^1, or its equivalent, for the purpose specified.

In testimony that we claim the foregoing we have hereunto set our hands this 4th day of March, 1873.

C. H. PLATT.
GEO. A. STANBERY.

Witnesses:
GILES BOALT,
THOMAS STRATTON.