C. W. BLAKESLEE, E. B. BEECHER & A. G. DAVIS.

KNITTING MACHINE.

No. 79,897. Patented July 14, 1868.

Fig: 1.

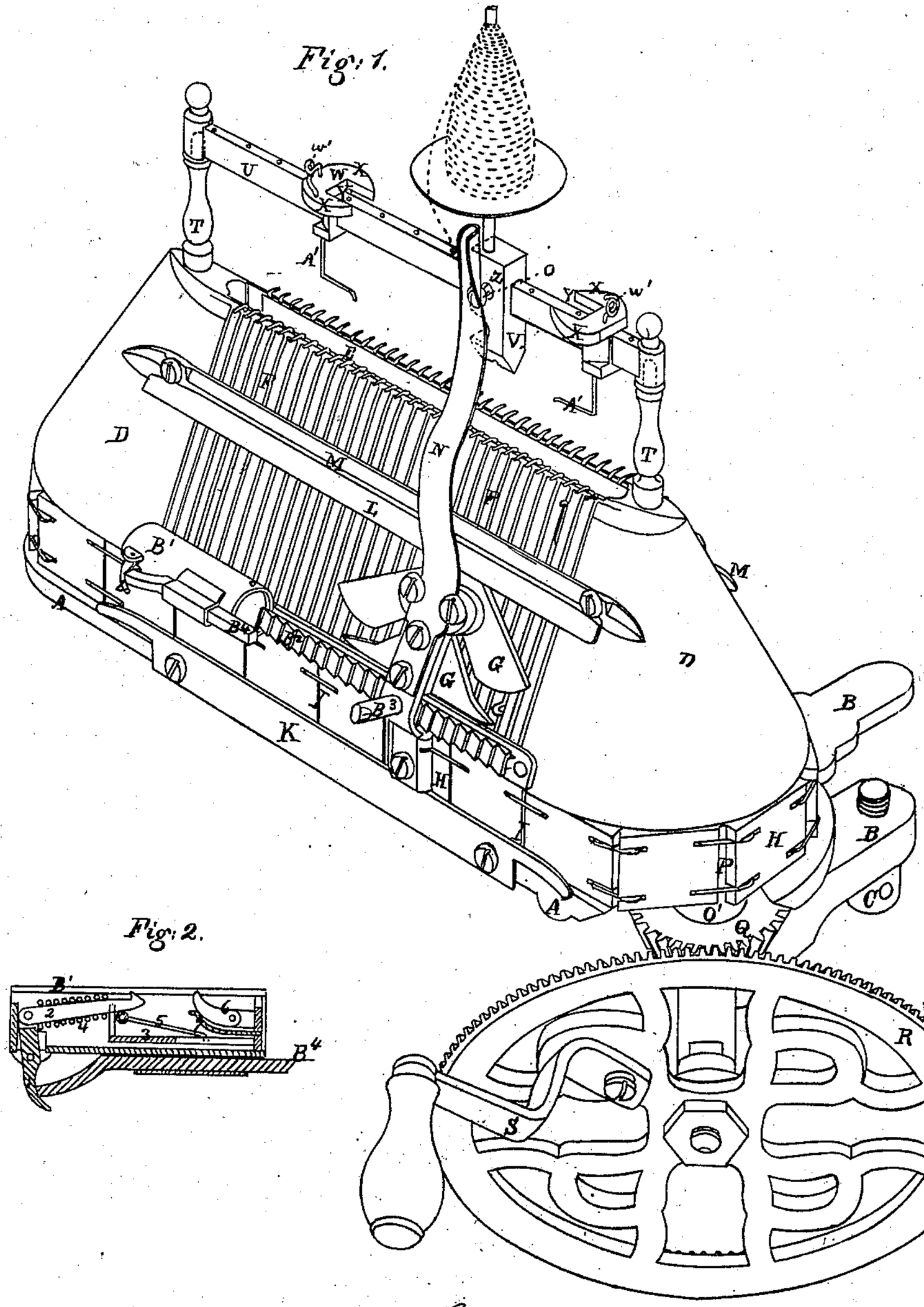

Fig: 2.

Witnesses { Wm. A. Bernacle. / John J. Halsted. }

Charles W. Blakeslee, Ebenezer B. Beecher, Anthony G. Davis } Inventors.

by Crosby Halsted & Gould their Attorneys.

UNITED STATES PATENT OFFICE.

CHARLES W. BLAKESLEE AND A. G. DAVIS, OF WATERTOWN, AND E. B. BEECHER, OF WESTVILLE, CONNECTICUT.

IMPROVEMENT IN KNITTING-MACHINES.

Specification forming part of Letters Patent No. **79,897**, dated July 14, 1868.

To all whom it may concern:

Be it known that we, CHARLES W. BLAKESLEE, of Watertown, in the State of Connecticut, and EBENEZER B. BEECHER, of Westville, and ANTHONY G. DAVIS, of Watertown, in the same State, have invented certain Improvements in Knitting-Machines; and we do hereby declare that the following, taken in connection with the drawings which accompany and form part of this specification, is a description of our invention sufficient to enable those skilled in the art to practice it.

Our improvements relate to that class of knitting-machines in which two straight parallel rows of needles are employed, and to both of which rows the same thread or yarn is delivered, first to one row and then to the other, in order to knit tubular goods; and they consist in the employment of an endless chain or belt as a means for operating the needle-actuating cam; in the combination, with this belt, of an arm which, while moving forward only and in a continuous circuit about the needles, shall impart a reciprocatory movement to the yarn-delivering guide; in a provision for supporting the traveling cam in ways or guides, one of which also serves as a bar or support to keep the needles in position within the grooves in which they reciprocate; in the construction of the stops which serve to limit the size of the tube to be knitted in narrowing and widening, so that they shall perform an additional duty of intermittently connecting and disconnecting the thread-guide with its actuating-arm; in such a construction of the bar which supports the thread-guide and spool, and the uprights which sustain it, that the bar, guide, and spool may be removed without disturbing any other of the mechanism for the purpose of giving free access to the needles in "setting up" the work; in a removable attachment which, when applied to the machine, serves automatically to lessen, stitch by stitch, the length of the courses when knitting a stocking-heel or similar portion of work, and in other details hereinafter enumerated.

In the accompanying drawings, Figure 1 represents a perspective view of our improved machine, and Fig. 2 a longitudinal section of the narrowing and widening device, the same device, of reduced size, being also shown in Fig. 1 as applied to the machine ready for use.

A is the frame of the machine, having side brackets, B, by means of which it may be readily secured to the top of a table or any other projecting ledge by means of set-screws C, as shown.

D is the body of the machine, made, as shown, of oblong form and rounded ends at the base, and thence tapering upward from all points of this base, so that at its top the sides are near to each other. A space, E, between these sides or edges affords room for the knitted fabric to drop down as fast as fabricated.

F F are parallel grooves on the sides of this portion of the machine, for the reception of the usual reciprocating latch-needles. These grooves are made only on the sides, and not upon the rounded ends of this needle-frame.

G is the needle-actuating cam, which, by reason of the rising and falling grooves therein, causes the needles to rise and fall in succession in a well-known manner whenever the cam is moved. This cam is secured upon one of the plates or links, H, of an endless chain or belt, I, and its lower edge is steadied and guided on either side of the machine by a strip, K, or by a groove, and its upper edge runs in a guide formed by a downward-projecting rim or flange, L, on a cross-rib, M. This rib lies across the range of needles and needle-grooves, and serves also to keep the needles in proper place. Such a flange and rib are placed on each of the opposite sides of the machine, and inasmuch as the traveling cam in our machine leaves one of these ribs and passes to the other constantly during the process of knitting, it is necessary that it should be so made as readily to allow the cam-plate to enter and emerge from the guide or groove on rib M. Hence the entrances or mouths of these guides are made flaring to insure certainty of engagement.

Projecting upward from the cam-plate is a spring-arm, N, having a projecting pin or nipple, O, thereon, for a purpose hereinafter stated. Upon a stud or shaft, O′, is a many-sided wheel, P, each side coinciding in length with each of the plates or links of the chain, and to this wheel a revolving motion is given by

means of a pinion, Q, meshing into a toothed wheel, R, to which motion is imparted by the hand-crank S.

Above the parts heretofore described, and securely fitted to the body of the machine, and at its opposite ends, are two uprights, T, whose upper ends are formed, so as to fit snugly in mortises in a cross rail or bar, U, upon which slides a thread-guide, V, and which also carries the spool or bobbin. The same bar also supports two adjustable pieces, W, each of which is formed, as shown, with cam-surfaces X on their outer and opposite sides, and with a yoke, Y, capable of spanning across the thread-guide. A hole, Z, in the thread-guide is provided to receive the pin O on spring-arm N. The stop-pieces W have each a spring-pin, *w'*, or other appropriate fastening device, by means of which they may be held at any desired position on the bar, this pin entering holes in the bar provided for the purpose. Projecting downward from these stop-pieces are wires A', shaped at their bottom ends somewhat as shown. These wires serve to support the drooping slack thread when the thread-guide has reached the limit of its traverse, and prevent its getting down between the rows of needles, so that the needle in commencing would fail to take the thread, and so miss a stitch and make imperfect work.

A hook or comb-bar, the teeth of which correspond with the spaces between the needles, serves to protect or guard the work from being pulled down by the needles in their descent. These bars may be secured in any proper manner, one for each row of needles; but we prefer to lodge each in a longitudinal groove sunk in the top of the needle-frame.

B' is a removable device or appendage, which we call a "widening and narrowing traveler," and which we place upon the machine, one upon each side, whenever we wish to knit less than the entire circuit of the machine. We will describe its action when employed for narrowing—as, for instance, in knitting the heel of a stocking. It is formed to hook and ride upon a toothed or ratchet bar, B^2, as shown, and serves to arrest or check the movement of the cam when it comes in contact with it, and its internal construction is such that whenever the projecting pin B^3 on the traveling cam comes in contact with the slide-rod B^4 it will dislodge a pawl from the ratchet-bar and force it forward one tooth, with which it then engages, while an internal spring will, the moment the cam moves away, quickly impel the whole device one tooth forward. A similar device on the opposite side of the machine performs the same duty.

It will be understood that when knitting a heel or similar piece the cam is not required to make a continuous path in the same direction around the frame, but, on the contrary, a reciprocating movement is needed for it, which is attained by simply turning the crank first in one direction and then in the other for the distance required. The details of construction of this appendage may be varied so long as it operates to effect the purpose above stated; but in the one illustrated in the drawings they are as follows:

B' is a tubular piece closed at one end and open at the other, and having a longitudinal slot to permit the thin edges of the slot to grasp and ride upon the ratchet-bar B^2. A lever, 1, whose outer end is acted upon by slide-rod B^4, is pivoted at its other end to the pawl 2, around which is a coiled spring. 3 is a removable frame inserted and secured in the open end of the tube, as shown. The inner end of this frame is in the form of a yoke, which spans the end of pawl 2 and bears against the coiled spring 4. A spring-piece, 5, having a friction-roller thereon, is also affixed to this frame 3, and serves as a bearing for the under side of pawl 2 when the latter is put into action. Another pawl or detent, 6, pivoted, as shown, to this frame, and against which bears a light spring, 7, to press it toward the teeth of the rack, serves to prevent any back movement of the whole appendage during the period when the actuating-pawl 2 is passing from one tooth of the rack to another.

The operation of this device is as follows: It is first placed upon the rack (whenever it is desired to knit a piece not tubular and to narrow it) and set at such position on both sides of the machine as will allow the knitting of a piece of the desired width at starting. The crank of the machine being then turned first in one and then in the other direction at each end of the traverse of the cam, the projection B^3 strikes against slide-rod B^4, and thus forces back the upper end of lever 1, whose lower toothed pawl is forced forward sufficiently to engage the next tooth on the rack. This action also compresses the coiled spring between a stationary bearing formed by the yoke above described and its movable bearing on the shank of the pawl which it surrounds. When the movement of the cam is reversed its release of the slide-rod enables the coiled spring to push the device along until the spring has resumed its former condition, and this permits also the detent 6 to drop into a notch in the rack next to that it occupied before. When, therefore, the pin upon the cam comes in contact with the slide-rod both the pawl and the detent resist any tendency of the device to run back upon the rack.

It is evident that by placing other similar racks upon opposite sides of the machine, but with their teeth pointing in the other direction, this device may be used for widening as well as for narrowing.

In the form of construction of our machine illustrated in the drawings no needles are used except upon the sides of the machine. In some cases, however, we propose to use them at the ends also.

We make our endless belt or chain in any well-known manner, and may propel it by

pins on a wheel taking into holes on the belt, or vice versa; and we also propose as a modification a thin endless sheet of steel instead of a linked or jointed chain, and in such cases would provide it with holes to receive pins upon its driving-wheel.

We claim—

1. The combination, with the needle-actuating cam, of an endless belt or chain for driving it, substantially as set forth.

2. The combination, with an endless chain or belt, of an arm which, whether revolving continuously or reversing its movements around the machine, substantially as set forth, will impart a reciprocating motion to the thread-guide.

3. The combination of the traveling needle-operating cam with the guide-bars M M, with which it engages and disengages, substantially as set forth.

4. The narrowing and widening stops, constructed with cam-surfaces, as described, for insuring the connection of the thread-guide with its driver and its disconnection therefrom, substantially as set forth.

5. The combination of the thread-guide, spool, and stops, with the removable bar which supports them, constructed substantially as and for the purpose set forth.

6. The combination, with a knitting-machine, of a detachable automatic traveler for narrowing and widening, actuated by a traversing finger or projection, substantially as described.

7. A narrowing and widening device constructed and operating substantially as set forth.

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