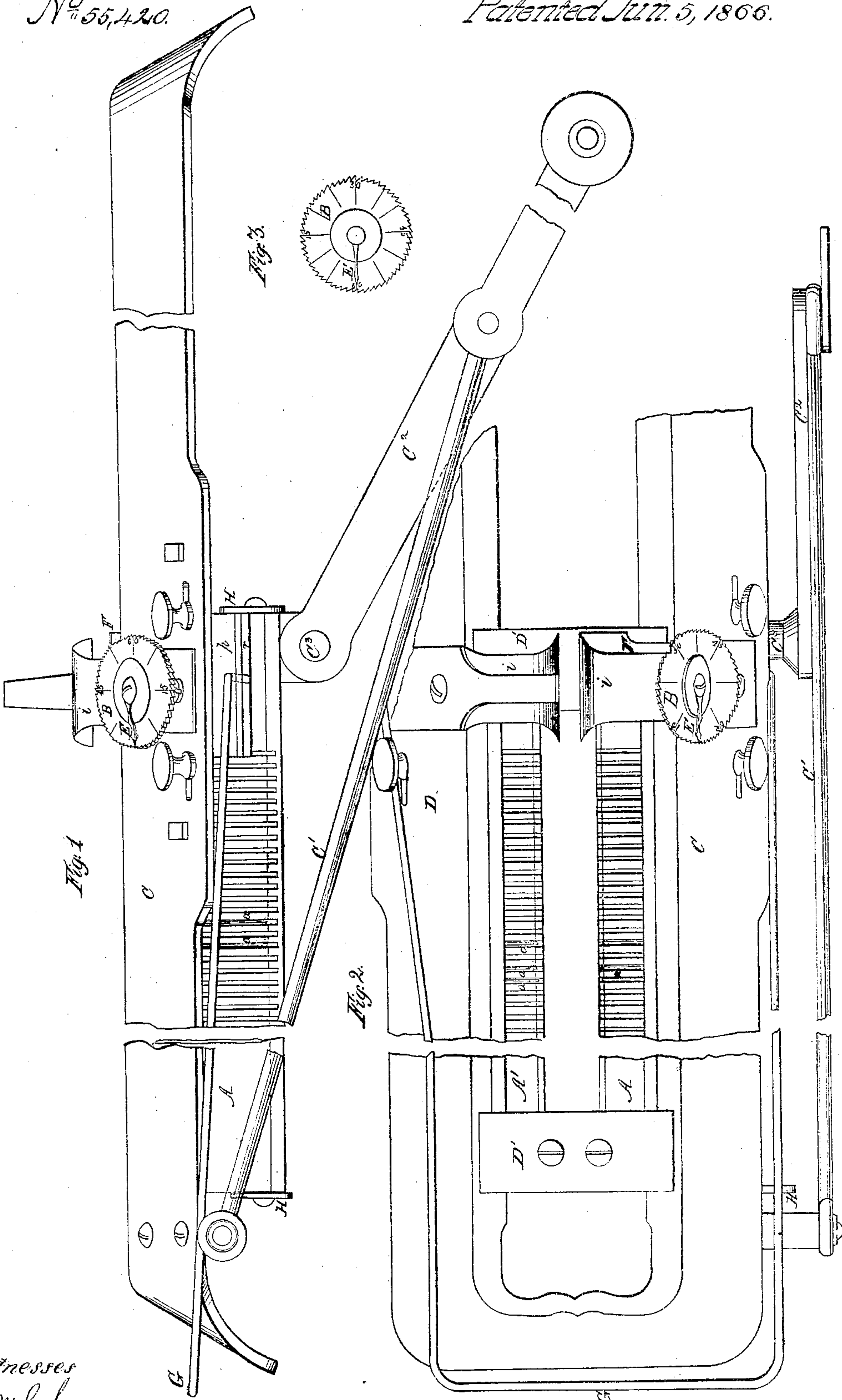


M. T. Lamb.

Straight Knitting Mach.

Patented Jun 5, 1866.

N<sup>o</sup> 55,420.



Witnesses  
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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN KNITTING-MACHINES.

Specification forming part of Letters Patent No. 55,420, dated June 5, 1866.

*To all whom it may concern:*

Be it known that I, Rev. M. T. LAMB, of Valparaiso, in the county of Porter and State of Indiana, have invented a new and useful Improvement in Knitting-Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 represents a front view of a machine of the kind known as "Lamb's knitting-machine," showing my improvement applied thereto. Fig. 2 is a top view of the machine, one end being partly broken away, showing my improvement as seen from above.

This invention relates to that class of knitting-machines which employs straight rows of needles, and it is here shown applied to a knitting-machine like that represented in the Letters Patent granted to J. W. Lamb, October 10, 1865.

My invention consists, first, in a counting device attached to a knitting-machine to assist the operator in shaping articles knitted thereon. In operating such machines—taking, for the purpose of illustration, Lamb's knitting-machine—the operator is compelled to count the number of revolutions of the crank or the number of reciprocations of the sliding carriage which are made in producing each portion of any article which is in the process of being knitted—as, for example, in making a man's stocking, average size, the crank is turned around sixty times to form the foot, twenty times for the heel, and one hundred and twenty times for the leg. By means of my improvement the number of revolutions of the crank is registered or counted by mechanical means. The example of this part of my invention herein set forth consists of a ratchet-dial attached to the sliding carriage in such a way that a spring-catch or other suitable device turns the dial the distance of one tooth every time the machine or sliding carriage arrives at one end of its movement. A bar fixed on the axis of the dial is extended across its face, so that the number of revolutions of the crank or reciprocations of the carriage will be indicated by the relative positions of the dial with respect to the bar, the face of the dial being

divided by numbered lines, and the feed-bar answering the office of an index.

This improvement consists, secondly, in means for facilitating the operation of producing work upon both rows of needles and having the work so produced united at one end of the rows and separated at the other end. In the example here shown of this part of my invention the means I employ consists of a bent rod or wire, which I have called a "changer," whose ends are attached to the shifters that change the cams. It extends thence over or alongside the sliding carriage toward its left-hand end, where it is seized and operated by the attendant with the left hand, while the crank is turned with the right.

The letters CD designate the sliding carriage of a Lamb knitting-machine. A A' are needle-plates, which receive the knitting-needles in grooves *a*. The sliding carriage is mounted upon the needle-plates and is held thereon by gibs D' D', which are fastened to the bed of the machine and are applied in such a way as to allow the carriage to be reciprocated above the needle-plates by means of the connecting-rod C', the crank C<sup>2</sup>, and the shaft C<sup>3</sup>.

B is a dial with ratchet-teeth cut on its periphery, and attached to the face of one of the sides of the sliding carriage. I have shown it in this illustration attached to the side C, the pin on which the dial turns and which connects it with the carriage going also through the latch-opener *i*. The face of the dial is marked with a succession of figures that indicate the number of ratchet-teeth cut on its periphery.

F is a spring catch or finger fixed upon that gib D' which is on the right-hand side of the machine, and extending over the edge or top of the part C of the sliding carriage far enough to engage the ratchet-teeth of the dial. The finger F may be adjustably attached, so that compensation may be made for wear.

E is a pointer or index fixed to the pin on which the dial turns, and extending radially, but always in the same direction, over the face of the dial toward its edge.

The spring catch or finger F is placed a little space to the left of the termination of the movement of the sliding carriage when it completes its movement toward the right-hand side, where it will engage the edge of the dial and cause the latter to revolve through a



space equal to the distance between the left edge of the finger and the terminal point in the said movement of the carriage. The dial will therefore strike against the finger only once for every full revolution of the crank, and consequently will be advanced one tooth on the completion of each revolution. By this means the dial is made to indicate, in conjunction with its fixed index, the number of revolutions of the crank, or, in other words, the number of times around which have been knitted on the stocking from a given point, without requiring any other attention in this behalf on the part of the attendant than to observe the dial.

The manner of using the counting device is as follows: After a piece of work has been begun—as, for example, if a stocking is being knit, after its toe has been widened out—the operator looks at the dial to see what number is opposite the index, or, if he prefers, he may turn the dial around until the figure 1 is opposite the index. If the operator desires to knit sixty times around to form the foot of the stocking, the crank is turned until sixty numbers have passed the index, or, if the first tooth of the ratchet is found under the index when the counting begins, until the figures 60 are brought beneath it. The dial may have sixty teeth cut on its edge, and, since sixty is the number of rows most commonly required in the foot of a man's stocking, it follows that in such a case the dial will make one revolution during the knitting of the foot of such a stocking. When the heel has been set the crank is turned until the dial has moved through the space of twenty teeth. The leg will usually be of proper length when the dial has been turned twice around, making one hundred and twenty revolutions of the crank.

The invention may be varied in the form without departing from the principle thereof, which consists, essentially, in causing the number of turns of the crank or the number of reciprocations of the machine to be automatically indicated by any suitable apparatus. The apparatus here shown only indicates to the eye how many turns the crank has made; but it may be made also to indicate the same by sound.

The second part of my invention relates to means for operating devices which in the Lamb knitting machine control the positions of the needle-operating cams. The needles in that machine are moved up and down in their grooves *a* by a system of cams placed on the under side of the parts C of the sliding carriage, the central one, *r*, of which is shifted by a sliding plate or shifter, *p*, which is itself moved upon the carriage by means of adjustable stops H on the end of the machine. When the sliding plate or shifter of the part C of the sliding carriage is moved toward the left its movement causes the central V-shaped cam, *r*, to descend to a lower position, where it will engage the butts *d* of the needles and operate the needles to produce a row of knitting. When

the shifter *p* is moved toward the right it causes the cam *r* to rise above the line, where it can engage the butts of the needles, and in that case the sliding carriage moves over the needle-plate A without operating the needles of that plate. If the stop H on the left-hand end is down, the shifter will remain down, and consequently the cam *r* will continue in its lowest position, in which it will again engage the butts of the needles. The reverse movements will take place in the shifting plate and cam of the part D of the carriage, considering the observer to remain on the same side of the machine with the crank. If the stops H of the machine are so set that the cams *r* of the parts C and D are brought down alternately, the needles of the needle-plate A will be operated during one half of the revolution of the crank and those of the needle-plate A' during the other half of that revolution, and so on continuously, thereby producing a tubular web, the yarn being fed first to one set of needles and then to the other. If the stops are so set that the cam *r* of part D of the carriage remains down while the crank is making the first half of its next revolution, the needles of plate A' will be again operated, and if that cam is then raised and the cam *r* of part C is lowered the needles of plate A will be operated during the latter part of the revolution. If the cam of part C remains down during the first half of the next revolution, the needles of plate A will again be operated, and if the cams be then changed the knitting will be again transferred to the side D of the machine.

If the cams are changed from time to time so as to operate the two sets of needles in the way last described, the cloth produced will be equal to twice the width of one row of needles, being united at one end of the rows but separated at the other end. In order to accomplish this character of work upon such a knitting-machine, I attach to the shifters that change the said cams a rod or wire, G, extending toward the left end or side of the machine, as seen in the drawings, the ends of the rod being bent down so as to enter holes made through the shifters near their lower edges. In operating with this device, which I call a "changer," I turn down the stops H at the right-hand end of the machine, in which case the back row of needles alone would be operated if the crank were turned without subsequent changes of the stops, producing a plain or flat web on that row. Supposing the work to be already begun with the stops so arranged, the crank in the next place is turned to the left-hand end of the stroke. Then with the left hand take hold of the rod G and pull it toward the left, while with the right hand the crank is turned through a small part of a revolution. The result will be that the cams *r* of both sides C D of the sliding carriage are shifted when they are at the left-hand end of the stroke, just as they would be changed at the right hand end if the stops were not turned down, and



consequently as the carriage proceeds from the left to the right hand end of its movement the front row of needles are operated because the cam *r* of the part C is down the same as it would be if the shifter *p* had struck against the stop H on the right-hand end of the frame. The carriage being then moved from right to left, the front row of needles will be again operated. When it reaches the left end of its movement the cam-stops H cause the cams *p* to be changed, that of the front side, C, being pushed up out of the way of the butts of the needles, while that of the back side, D, is brought down, and the next revolution of the crank will cause the back row of needles to be operated down and back. When the carriage has reached the left-hand end of its movement the rod G is again seized, and, the rotation of the crank being continued, the cams will be again shifted, so that the front row of needles are again operated, first toward the right and then toward the left, as before. When the carriage has again reached the left end of its movement the cam-stops H will shift the cams *r*, and the knitting proceeds down and back on the back row of needles. The work is continued in this way, the attendant holding the rod or changer with his left hand and shifting the cams at the left-hand end of the movement at every second revolution of

the crank. The work thereby produced will be of a width equal to both rows of needles.

The changer may be in one piece, and may be attached to the shifters in such a way as to be readily taken off when other kinds of knitting are to be produced.

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

1. Attaching the counter to the sliding frame in such a manner that the movement of the sliding frame will carry the teeth of the dial against a stationary pawl or ratchet, substantially as and for the purpose herein described.

2. The changer G, consisting of a bent wire or its equivalent attached at its ends to the cam-shifters *p*, and so placed that the operator can operate it with one hand while he turns the machine with the other, substantially as described.

3. Constructing and applying the changer G to the cam-shifters *p* of a knitting-machine in such a way that it can be removed at pleasure without alteration in the machine, substantially as shown.

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Witnesses:

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