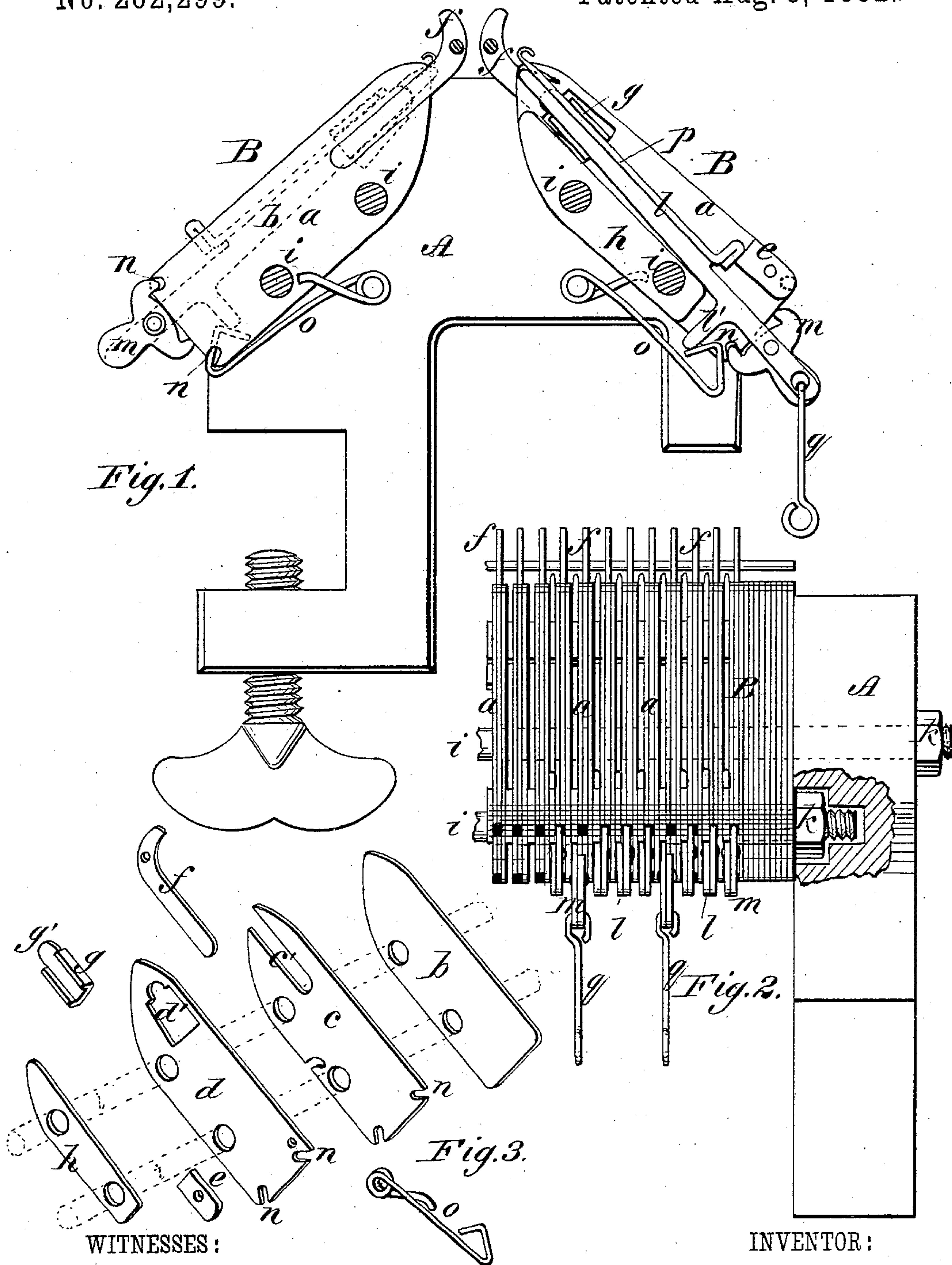


(Model.)

I. W. LAMB.
KNITTING MACHINE.

No. 262,299.

Patented Aug. 8, 1882..



WITNESSES:

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KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 262,299, dated August 8, 1882.

Application filed July 15, 1881. (Model.)

To all whom it may concern:

Be it known that I, ISAAC W. LAMB, of Parshallville, Livingston county, State of Michigan, have invented a new and useful Improvement in Knitting-Machines, of which the following is a full, clear, and exact description.

My improvements relate specially to the Lamb knitting-machine, but are applicable with slight modifications to various other styles of machines, both straight and circular, and have for their object to give facility in moving the needles in and out of the path of the cam, so as to increase the range of work and avoid risk of injury to the needles.

My invention consists in certain novel features of construction and combination, as hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a cross-section of the needle-bed of a Lamb knitting-machine containing my improvements. Fig. 2 is a front view, partially in section, of a portion of the bed; and Fig. 3 is a detail view of the several parts forming a section of the bed.

Similar letters of reference indicate corresponding parts.

A A are the end plates, by which are supported needle-beds B B, whose slots are formed by spacing-pieces arranged between the separate sections *a*. The several parts of these sections are shown by detail views in Fig. 3 of the drawings.

b c d are plates of similar size and form, of such thickness that when placed together they form a bed-section, *a*, of proper width or thickness. The plate *b* is plain. The middle plate, *c*, is formed with a slot, *c'*, at the upper end, and the plate *d* has an aperture, *d'*, near the upper end.

e is a small spacing-piece, which in use is secured to the outside of plate *b* or *d*, so that when the bed-sections are put together the pieces *e* completely fill the groove at a point just outside of the needles, and yet so that the needle-shifters can pass under them, as shown at the right side of Fig. 1.

h is a spacing-piece, which forms the bottom of the needle-groove and limits the downward movement of the needle-shifters.

g is a grooved or flanged piece, which I term

the "switch," of a size to permit its oscillation within the aperture *d'* of plate *d*. It is formed with a rounded lug, *g'*, that engages an extension of the aperture, so that the switch may oscillate on the lug.

f is the jack, which is cut out of flexible sheet metal, and formed with a curved end of usual form and a shank portion that enters the slot *c'* of plate *c*.

The plates *b*, *c*, *d*, *h*, and *e*, I prefer to have riveted together to form one piece for convenience in handling; but it is not necessary, since they are sufficiently secured by means of the bolts and nuts hereinafter described.

Two rods, *i i*, for each side of the machine or each needle-bed, extend from one end of plate A to the other. The inner or upper of these rods I prefer to have extend entirely through the end plates, A, as shown in Fig. 2, while the outer or lower rods terminate in a proper recess or counterbore, also shown in Fig. 2. The plates *b*, *c*, *d*, and *h* are strung on the rods *i i*, and the plates *e* are secured by rivets or otherwise in their proper places. The whole are then secured together and to the end plates, A, by the nuts *k* on the rods *i*.

The needle-shifters *l* are made somewhat longer than the bed-sections *a*, and enter at their upper ends between the flanges of the switch-pieces *g*, so that they are held therein above the spacing-pieces *h* and beneath the pieces *e*. Their form is shown in Fig. 1.

The switch-pieces *g* may be inserted in the apertures *d'* as the sections are strung on the rods *i i*; or they may be inserted after the other parts are all secured together, it being only needful to slacken the nuts *k*, when the bed-sections may be separated sufficiently to permit the insertion of the switch-pieces one by one. In practice I find the latter plan preferable. The needles rest upon the shifters and beneath the upper flanges of the switches *g*. The shifter and needle together just fill the space between the two flanges of the switch *g*, and, since the switch *g* oscillates within the apertures *d'*, it follows the lower ends of the shifter and needle are free to move up and down between the pieces *h* and *e*, while the needle and shifter will be kept close together all the time.

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On the lower ends of the shifter *l* are pivoted double-ended latches *m*, which engage with notches *n*, formed in the plates *c d*, so as to retain the shifters in either position. Springs *o*, engaged by their inner ends in apertures at the under side of the bed-sections *a*, bear at their outer ends against lugs *l'*, formed on the needle-shifters, so that the springs tend to raise the shifters and at the same time to press them endwise, so as to retain the shifters within the switch-pieces *g* and the latches *m* in the notches *n*. The depth of the needle grooves is such that when the shifters *l* are moved downward the needle-shanks are entirely within the grooves, and consequently below the surface of the bed, while in the raised position of the shifters the shanks project above the bed in position for contact with the cams. With this construction any desired number of needles can be moved down out of operation, while their hook ends remain elevated in position for retaining the loops of yarn. The action of the springs *o* is such that no shifter will remain partly depressed; but if by accident the operator fails to press any shifter entirely down, so that the lower hook of the latch *m* engages the lower notch *n*, the spring will immediately throw the shifter up again into working position. By this arrangement one of the greatest objections to the Lamb knitting-machines as heretofore constructed is wholly obviated; and since in my improved machine the needle can be thrown out of work without removing the loop from its hook all the fingers of a glove may be knit without removing the work from the machine, while on machines of usual construction only one finger can be knit at a time, and hence each separate finger must be picked up onto the machine before knitting the hand of such glove.

In the manufacture of socks with what are termed "mock-ribbed" tops the practice is to remove the loop from every fifth or sixth needle and throw such needle out of work. The needles being closer together than the width of the operator's finger, it is somewhat inconvenient to press down one shifter between two others which remain up; and to obviate this difficulty I attach to such shifters as are to be depressed wire links *q*, of suitable shape, as shown in Figs. 1 and 2, which serve to designate the seam-needles, and also as convenient means for drawing them down without interfering with the others. In attaching these links to the latches and shifters I make a small hole through the latch and a hole somewhat larger through the shifter, and pass the wire through both holes. By this means the action is first on the latch to unlock it, and then on the shifter to move it.

In the operation of depressing the shifter the first movement disengages the latch from the upper notch *n*, and the shifter is then pressed down until it touches the bottom of the groove or the piece *h*, when the spring will cause the lower portion of the latch to engage

the lower notch *n*. To raise the shifter it is only necessary to disengage the latch, when the spring *o* will carry the shifter upward and cause the latch to engage the upper notch *n*, when the shifter will be securely locked in its upper position.

The links *q* may, if desired, be all connected for simultaneous movement to a rod, which may pass through the lower eyes of such links.

It is plain that the needle-beds may be constructed of any desired length and the end plates, *A*, of any suitable form.

My improved machine gives great facility for the removal of the needles from the bed, and permits any one to be removed without disturbing others. To remove a needle it is only necessary to take hold of the shank, lift the lower end up out of the groove, and draw it out endwise. Nothing hinders the removal of the shifter, as mentioned, except the spring *o*, and it is only needful to draw on the shifter with sufficient force to overcome the pressure of the spring *o*, when it will move out of the groove, as before described. To insert and secure a needle it is first inserted through the groove, and held in place while the shifter is inserted at the lower edge of the bed beneath the spacing-piece *e*, and pressed endwise until the lug *l'* passes the shoulder of the spring *o*. This means of retaining the needle-shifters in place by the use of the springs *o* secures them with sufficient certainty, and yet, as has been already shown, permits their ready removal, and is simple in construction and efficient in operation.

The switch-piece *g*, having its part *g'* to exactly fit the aperture *d'* in the bed-sections, forms alone, without any needle-gib, a perfect support for the needle-shifter and needle.

The pieces *e* perform a double office. First, they act as needle-stops to prevent the needles from sliding down below the cams; second, they very greatly support the bed-sections, since they completely fill the grooves at the point just outside of the needle-shanks when the needles are at their lowest or most outward position; and the main strain on a needle-bed is while the needle is casting its loop, which is at the time when the needle-shanks are very close to the piece *e*.

By making the bed-sections of three pieces, *b*, *c*, and *d*, I can readily form the openings *c'* for the jacks and the openings *d'* for the switches, and by having one piece on each side of the piece *c*, which receives the jack, I secure the jack against any lateral movement.

By making the jacks as I have described, and having each separate from the other, I am able to remove them when worn and replace them with new ones at very slight cost, and the first cost of these jacks is very much less than those in general use.

I am aware that needle-beds have been constructed in sections with bottom pieces between the sections to separate the sections and form the bottoms of the needle-grooves.

J. W. Rist describes a needle-bed so constructed in Patent No. 82,348, dated September 22, 1868.

I am also aware that machines have been constructed with needle-shifters for raising and lowering the needles out of and into the needle-grooves.

By constructing the needle-beds in sections I am able to provide grooves of sufficient depth to receive the needle-shifters without difficulty, as well as to secure great facility for attaching the spring, the jacks, the spacing-pieces, and the switches, or other suitable devices for controlling the shifters, and so make successful machines of any gage, coarse or fine, having needle-shifters and all the advantages which may be by them secured.

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

1. The combination, with a needle-bed having grooves and apertures d' formed in the partitions between the grooves, of the oscillatory shifters l and the grooved pieces g , arranged in said apertures d' , as and for the purpose specified.

2. The combination of the plate c , provided with the slot c' for receiving the jack, and the plates b and d , one on either side of plate c , for retaining the jack within the slot c' , with the removable jack f , substantially as herein explained.

3. A needle-bed section consisting of the plates $b c d$ and spacing-pieces $e h$, said parts arranged with relation to one another, as described.

4. The combination, with the needle-bed sections a , comprising the pieces $b c d e h$, of the rods i , passing through said pieces and provided with end nuts, whereby the sections and the parts of each section are detachably held together, as described.

5. The combination of the bent wire springs o with the slotted needle-bed, and with the needle-shifters l , each provided with a lug, l' , whereby the needle-shifters are retained within their grooves when in use, and provision is made for their ready removal when desired, substantially as herein explained.

6. The combination of the spring o , needle-shifter l , latch m , and notched bed-sections a for securing the automatic locking of the needle-shifter, substantially as and for the purpose herein described.

7. The links or wires q , combined with the oscillating needle-shifters l , pivoted latches m , and bed-sections a , substantially as herein explained.

8. A needle-bed section consisting of the plates b and c , the latter having slots c' , plate d , provided with aperture d' , and spacing-pieces $e h$, in combination with the jack f , arranged in slot c' , and switch-bar g , arranged in the aperture d' , as shown and described.

9. The combination, with the plate d , provided with the aperture d' , formed as shown, of the grooved piece g , having a rounded lug, g' , upon which it is adapted to turn in the said aperture d' , as and for the purpose specified.

10. The combination, with the plate c , provided with the slot c' , of the jack f , arranged in said slot c' , as and for the purpose specified.

11. The combination of the oscillatory shifters l , and the spaced needle-bed sections a , having plates d , provided with apertures d' , with the flanged pieces g , whereby the needles are supported by the shifters and held beneath the flanges of the pieces g , for the purpose specified.

ISAAC W. LAMB.

Witnesses:

GEO. D. WALKER,
C. SEDGWICK.