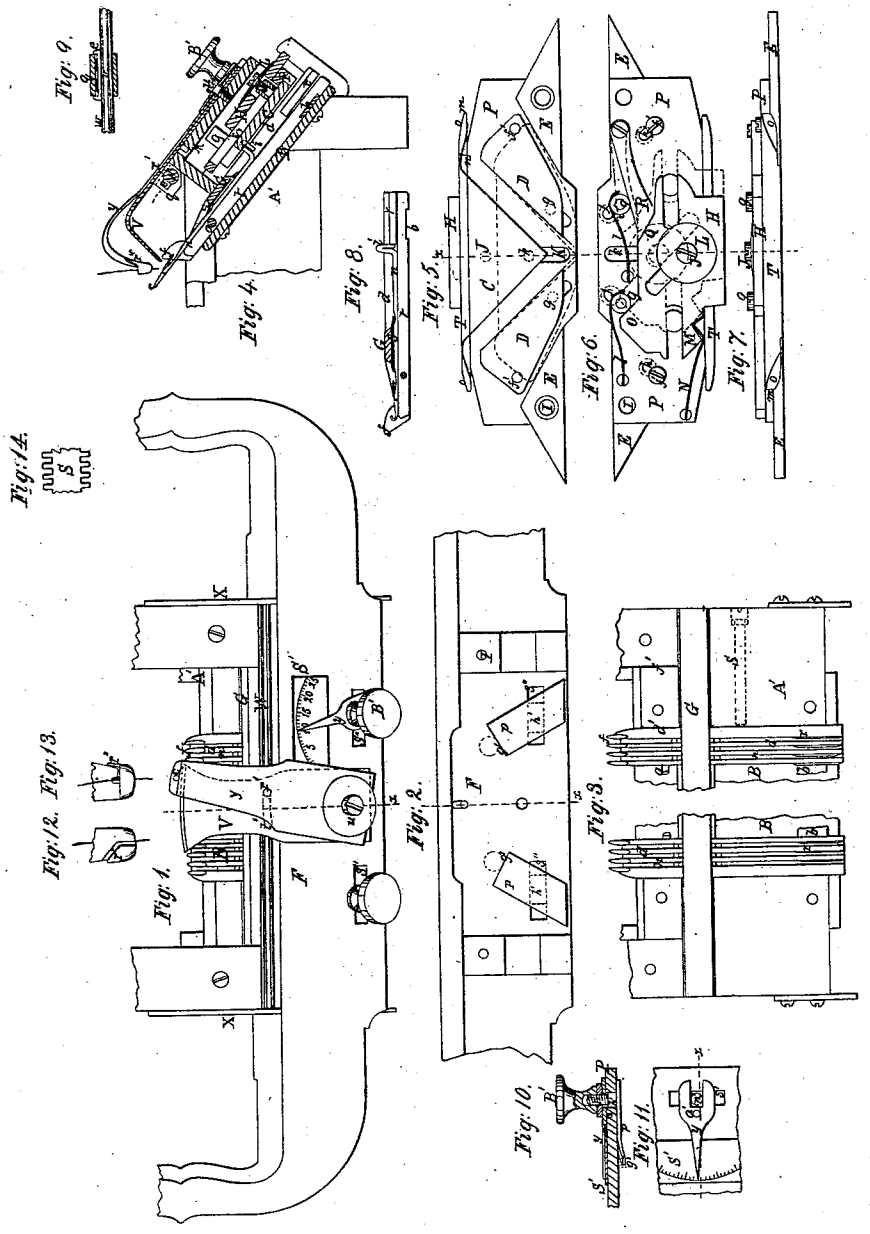
J. W. RIST.

KNITTING MACHINE.

No. 82,348. Patented Sept. 22, 1868.



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IMPROVEMENT IN KNITTING-MACHINE.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, J. W. RIST, of Rochester, in the county of Monroe, and State of New York, have invented certain new and useful Improvements in Knitting-Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a top view of one side of a very much shortened machine with my improvements attached, but the needles being removed.

Figure 2 is a view of an inverted sectional portion of one side of the sliding frame F, showing the tension-regulating plates *p*.

Figure 3 is a top view of a section of each end of one side of the needle-bed B, which also constitutes a portion of the fixed frame of the machine. The needles are not shown in this figure.

Figure 4 is a transverse vertical section of the front side of the machine, taken in the plane of the red line *x* in fig. 1.

Figure 5 is an inverted view of the knitting-lock, which is attached to the under side of the sliding frame.

Figure 6 is a top view of the lock shown in fig. 5.

Figure 7 is a view of the outer edge of the lock, showing the outer face of the needle-adjuster T.

Figure 8 is a detached view of one needle, *n*, a spacing-plate, *t*, of the needle-bed, and one division-plate, *d*, of the same.

Figure 9 is a longitudinal section of the friction-slide *q*, which controls the action of the yarn-carrier *y*.

Figure 10 is a vertical section of the devices for regulating the tension of the stitches, or length of the loops, taken in the plane of the red line *x* in fig. 11.

Figure 11 is a top view of the tension-scale and index, the thumb or set-screw B′ being removed to show the axial point *a′* of the index *y*.

Figure 12 is a reverse view of the eyelet-end of the yarn-carrier *y*.

Figure 13 is an obverse view of the same.

Figure 14 is a plan of a section of the needle-spring *s*.

Similar letters of reference indicate corresponding parts in the several figures.

The improvements set forth in this application relate more especially to the Lamb knitting-machine; and their nature consists, essentially—

First, in providing a detachable needle-bed, which may be very readily removed, and one with different-sized needles substituted.

Also, in removing the "top arch," which was seriously objectionable, from the machine, and substituting a much simpler and more efficient plan for yarn-carrier.

Also, in an improvement in the mechanism constituting the lock.

Also, in improvements in mechanism for regulating the length of loop or stitch.

Also, in the employment and the arrangement of a needle-guide or adjuster on the sliding frame.

Also, in an open eyelet, of peculiar construction, for the yarn-carrier.

To enable others to make and use my invention, I will describe its construction and operation.

As this class of machines have been constructed heretofore, it is necessary to make several different sizes or "gauges," in order to adapt the machines to knit the different grades of yarn; that is, the machine must be provided with finer or coarser needles, as the case may be, and at the same time the spaces between the needles must also be increased or diminished. But the needle-grooves have heretofore been cut in the bed proper, consequently the "gauge" of every machine was rigid, and permanently fixed.

I make the bed-frame, A′, of the machine with a recess in the upper face on each side to receive a separate needle-bed, B, figs. 1, 3, and 4. This bed is composed of a series of spacing-plates, *t*, and division-plates *d*, which are securely attached together by means of a dove-tailed gib, *b*, and a dowel-pin or bolt, *a*, figs. 1, 3, 4,

and 8, or two gibs may be used, or two bolts, as may be preferred. The bolt-heads may be countersunk into one of the outside plates, *d'*, and tapped into the other.

The plates *t* may be cut from sheet steel, or made of malleable iron, and case-hardened. They should be made a little thicker than the needles, so as to permit them to work freely between the division-plates *d*.

These plates may be made of malleable iron, with a raised point, *f*, figs. 1, 3, 4, and 8, which constitute an efficient substitute for the "jack-wires" in the ordinary Lamb machine.

These points, *f*, may be finished or polished on an ordinary emery-wheel, and after the plates are properly finished up, they may be case-hardened.

The end plates *d'* may be made thicker than the others, as shown in figs. 1 and 3, in order to permit the countersinking in one and the tapping in the other, and to stiffen the form when set up and placed in position in the bed-frame, where it is held by the heavy dove-tailed gib G and the clamping-screw S, shown by dotted lines in fig. 3, which thoroughly clamps the parts together.

In order to adapt the same machine for knitting the various grades of yarn, from the finest to the coarsest, it is only necessary to provide two or more of these detachable beds, with needles to correspond, of a different gauge, and that one inserted in the machine which is adapted to the yarn that is to be knit. This adds but little, comparatively, to the expense of the machine, and exceedingly increases the value.

There is a spring-needle support, *s*, figs. 1, 3, 4, and a portion shown detached in fig. 14. This spring is made with projecting points on both edges, as shown in the drawings, to press upon the needles, and keep them steady while in action, and cause them to approach the latch-openers properly; and by means of a slight indentation made in the upper face of the needle-stem, shown at *s*, fig. 4, it may act as a needle-guard stop when the latter is thrown to its lower working position, at which time the point on the upper edge of the spring-plate is intended to act as a latch-closer, to prevent striking or being drawn under the gib G.

There is also a spring-needle stop, *r*, figs. 3, 4, and 8, attached to the division-plates *d*, to retain or hold the needles in their working position, but so made and arranged as to permit them to be drawn down out of working position when desired.

The knitting-lock, shown more clearly in figs. 5 and 6, is composed principally of the lock-plate P, V-shaped cam C, wing-cams D, and cam-needle guards E, on the lower side of the lock-plate, next to the needles, as it hangs on the sliding frame, and the reversing-slide H, which is connected to the upper side of the lock-plate. The needle-guard cams are fixed to the lock-plate by the same screws, at I, by which it is attached to the sliding frame F. The wing-cams D are attached loosely to the plate by the screw-bolts *f'* and *g*, which pass through the slots *h* and *j* in the plate.

The slots converge toward the upper edge of the lock-plate, as seen in fig. 6. The V-cam C is also loosely attached to the lock-plate P, by the clamping-screw J, through the vertical slot K and washer L, and its parallelism is preserved by means of a steady-pin, *k*, fixed near the point of the V, and working in the same slot with the screw.

The construction and action of the V and the wing-cams C and D, are the same in this as in the Lamb machine. The reversing or adjusting-slide H is connected to the lock-plate P and to the V-cam, as heretofore practised in this class of knitting-machines, but it is provided with a V-cam, M, fig. 6, upon which the spring N operates, by means of which the slide is securely locked in either adjustment, whereby any desired speed may be given to the machine, with no possibility of confusion in the action of these parts of it, which is of the utmost importance.

One of the wing-cams is thrown up by the inclined plane or cam O, sliding under the stud *g* of the wing, and the other is raised at the same stroke of the slide by the cam Q raising the latch or pivoted lever R, as shown in fig. 6. The return of the wings D is assisted by the springs *l*. The studs *g* extend above the face of the slide H, as seen in fig. 7, and the upper end of the tension-regulating plates or wedges *p*, at *g'*, fig. 2, governs their throw or stroke.

In the original machine, the reversing-slide has no connection with the wing-cams. The advantage of raising them with the V-cam is, that the needles cannot be drawn down so as to strain the stitches.

The bolt *n'*, I provide with a flat-sided head, *h'*, to fit nicely in the slot *s''*. This head is rigidly fixed to the wings or plates *p*; therefore when the screws B' are moved one way or the other, the oblique end at *g'* will carry the stud *g* of the wing up, or allow it to recede, as the case may be, and thereby lengthen or shorten the stitch-loops. These wedge-plates *p* only limit the downward throw of the wing-cams, they being carried up by the adjusting-plate H at every round of the sliding frame.

I apply a needle-guard or automatic adjuster, T, rigidly to the lower edge of the lock, as shown in figs. 5, 6, and 7. The ends are so shaped and arranged, that if the spur or shank, *i*, of the needle happen to be exactly in the track of the adjuster T, the point *m* mounts the spur and rides over it, when it immediately falls into the recess *n*, fig. 5, and is carried up by the V-cam; but if the position of the needle is too low to strike the point of the adjuster, it is carried down by the cam-face *o*, and clears the lock below

The rigid V-cams E catch and adjust the needles when they happen to get thrown, or set too high to be caught and operated upon by the wing-cams D. By the employment of these needle-adjusters E and T, one of the most serious class of obstacles and accidents heretofore experienced in the working of the machines has been successfully and entirely removed.

The "top arch" and its appendages, used in many machines, are very imperfect in their action, and a source of great inconvenience to the operator in certain manipulations of the work, such as changing the stitches when widening, and when threading the yarn to the carrier.

This "top arch" I dispense with, and with it all its serious objections. I substitute in its stead the yarn-carrier Y, which is pivoted to the sliding frame at *u*, figs. 1 and 4, directly over the latch-opener V, which is constructed as heretofore.

The yarn-carrier Y is connected with a friction-traveller, *q*, figs. 4 and 9, by a pivot, *r'*, operating through a slot, *t'*, in the latch-opener V. This slot limits the throw either way of the carrier Y.

The friction-traveller *q* slides upon the rod W, the ends of which are supported in suitable standards, X, bolted to the ends of the bed-frame of the machine. The rod W is made of round steel, flattened on one side, as seen in figs. 1 and 4.

The traveller is made by drilling a hole through a piece of steel, and filing a square offset at one side to receive the steel gib *e* and spring *v*, figs. 4 and 9. The rod, slide, and the gib are all thoroughly hardened. The strap-spring *v* is placed between the gib and the slide or traveller, and, if necessary, there might be a screw tapped through the traveller to set against the spring.

The pivot *r'* is rigidly attached to the yarn-carrier, and fits loosely in a slot running transversely across the traveller.

Another source of very great annoyance and inconvenience heretofore experienced was, the imperfect means provided for determining the degree of tension given to the knitting or the length of loop. I obviate those difficulties entirely by providing a tension-scale, S', and index *y*, figs. 1, 10, and 11, connected with the set-screw B' of the plates *p*, that are made to govern the downward stroke or throw of the needles. The degree of tension or length of loop is here measured to less than the hundredth part of an inch, and the locks on both sides of the machine may be set with equal precision, because it is measured by the scale, whereas formerly it could only be done by guess, and the slightest difference in the position of the set-screws and plates makes so great a difference in the degree of the tension or length of the loops, that it was almost utterly impossible to get both locks set exactly alike.

The difficulties attending the operation of threading the yarn into the carrier Y, as it was made heretofore, with a close eye, I have effectually obviated by slotting the yarn-carrier, as shown in figs. 4, 12, and 13, leaving a projecting overlapping lip, *r''*, over which the yarn is passed to thread the carrier, and which cannot possibly slip out in the ordinary operations of the carrier. It is threaded almost instantly by holding the yarn in the thumb and finger of each hand, one hand above and the other below, when the yarn is readily slipped through the sinuous slot or opening, and into the open eyelet.

The yarn passes upward from the yarn-carrier to any suitable spool-stand. After the yarn is inserted in the carrier Y, the work is set up, and the general operation of the machine, and the manipulation of the work, as in widening, &c., are the same as in the ordinary machine.

When the index *y* is turned toward the yarn-carrier, the tension is made less, or the loop longer, and *vice versa*.

The opposite side of the machine is only a duplicate of that shown and described, except the yarn-carrier Y, and the friction-rod W, and the traveller *q*. By placing the rod W in the position shown, it is entirely out of the way of the operator when changing stitches for widening, &c.

I am aware that thread-carriers for knitting-machines have been before slotted, but not as shown by me.

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

1. The needle-bed, composed of the division-plates *d* and spacing-plates *t*, when connected together, substantially in the manner and for the purposes herein shown and described.

2. The gib G, in combination with the bed A' and removable needle-bed, as and for the purposes set forth.

3. The arrangement of the locking-spring N, constructed as described, attached rigidly to the lock-plate P, and operating upon the V-shaped cam M, on the reversing-plate H, substantially as and for the purposes set forth.

4. The arrangement of the cam Q with the pivoted lever R and stud *g* of the wing-cam D, on that end of the lock, substantially in the manner and for the purposes herein shown and described.

5. The arrangement of the cam O upon the reversing-slide, in connection with the stud *g* of the wing-cam, the parts all operating substantially in the manner and for the purposes shown and described.

6. The reactionary spring *l*, in combination with the stud *g* and wing-cam D, substantially as shown and described, and for the purposes set forth.

7. The combination, with the lock-plate P, of the needle-adjuster T, constructed, arranged, and operating substantially in the manner and for the purposes set forth.

8. The combination, with the lock-plate P, of the cam and needle-guides or adjusters E, substantially in the manner and for the purposes set forth.

9. In combination with the wing-cams D and their studs *g*, the cams O and Q and latch R, or their equivalents, whereby said cams D are moved upward simultaneously with the closing of the V-cam C, for the purposes described.

10. The combination of the plates *p* and studs *g* with the set-nut B, index-hand *y*, and scale S', for the purposes set forth.

11. In combination with the scale S', for gauging the tension or length of the loop, the pivoted lever-index *y*, arranged and operating substantially as and for the purposes shown and described.

12. The pivoted yarn-carrier Y, in combination with the friction-traveller *q* and the rod W, all constructed, arranged, and operating as shown and described.

13. The yarn-carrier or guide Y, slotted as shown and described, and for the purposes set forth.

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