

J. M. HOWE.  
KNITTING MACHINE.

No. 100,765.

Patented Mar. 15, 1870.

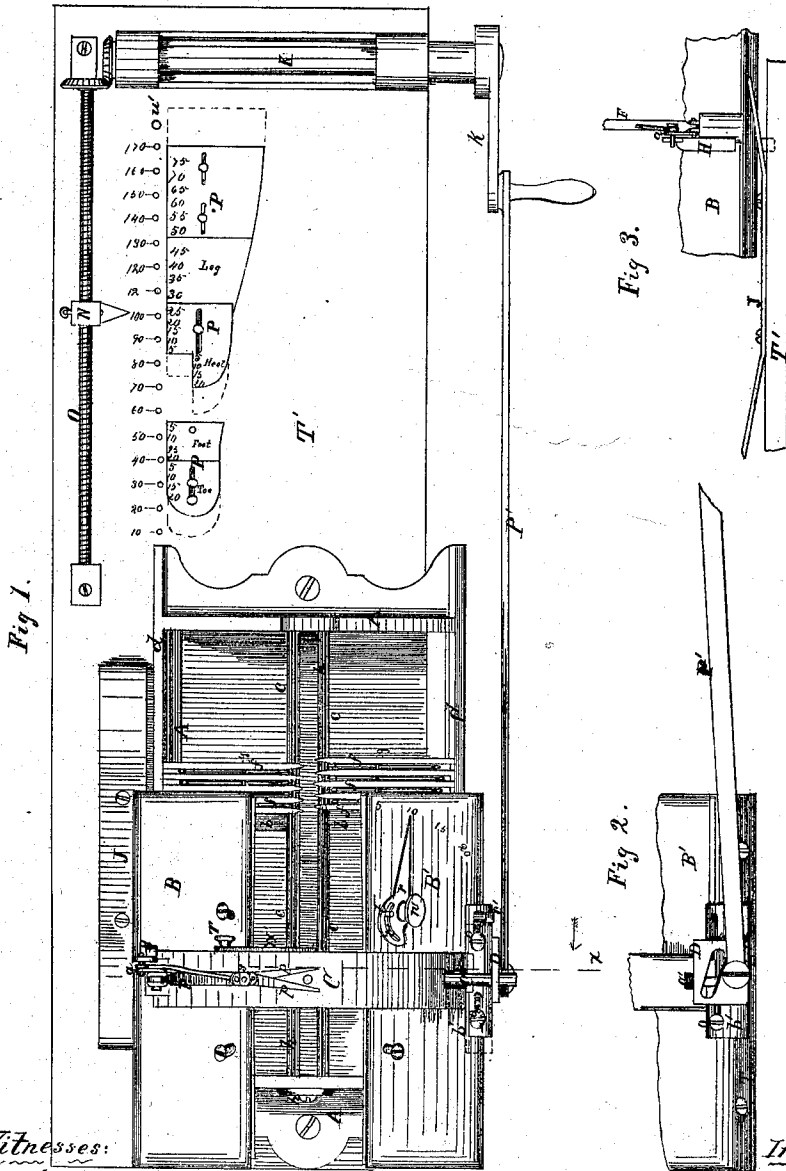


Fig. 1.

Fig. 3.

Fig. 2.

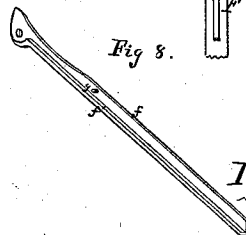
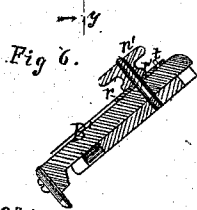
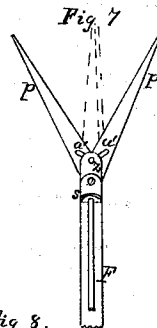
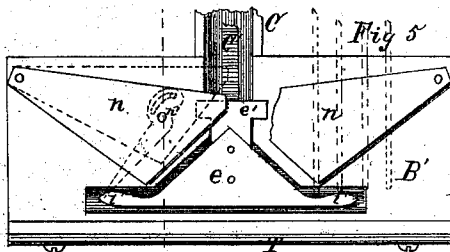
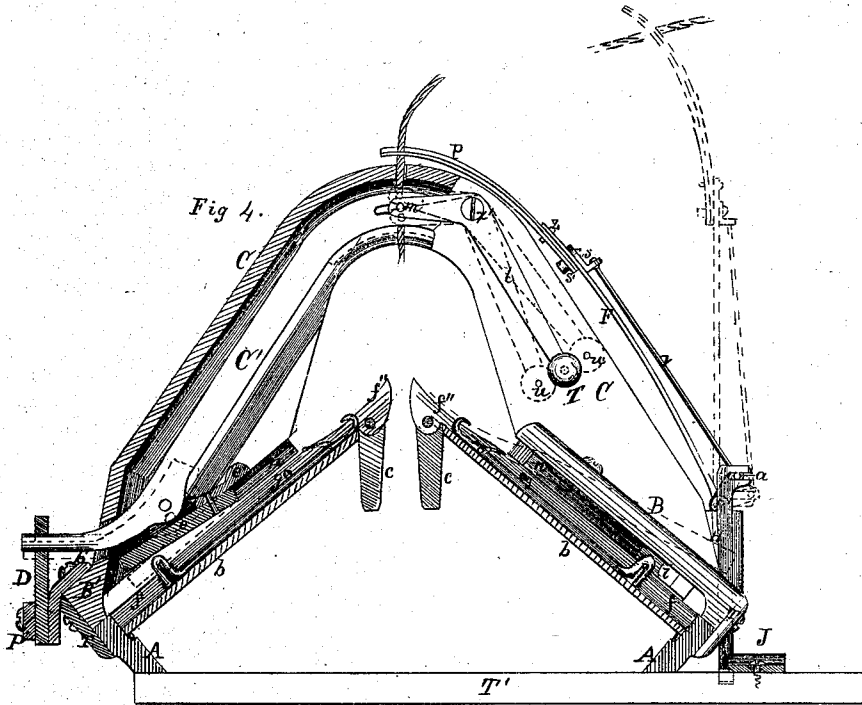
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# United States Patent Office.

JOHN M. HOWE, OF ROCHESTER, NEW YORK.

Letters Patent No. 100,765, dated March 15, 1870.

## IMPROVEMENT IN KNITTING-MACHINES.

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, JOHN M. HOWE, 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 plan view of my invention.

Figure 2 is a side elevation of a portion of the lock-plate B.

Figure 3 is a similar view of a portion of the lock-plate and adjacent parts.

Figure 4 is a sectional elevation at the dotted line *x*, fig. 1.

Figure 5 is a reverse view of one of the lock-plates.

Figure 6 is a transverse section of a lock-plate at the dotted line *y*, fig. 5.

Figure 7 is a face view of a portion of the take up F.

Figure 8 is a perspective view of one form of division-rib *f*.

My invention relates to that class of knitting-machines having two parallel rows of needles; and its nature will be understood by reference to the specification and drawings.

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

The skeleton bed A, which supports the main portions of my machine, is composed of the supporting-ribs *c* and the parallel guides or ways *d*, connected together by suitable transverse bars.

The needle-bed, short sections *b* of which are shown in figs. 1 and 4, is made detachable from the bed A, either wholly or in sections, and is composed of division-ribs, *f*, hinged at their upper ends to the rods *h*, and resting at their lower ends upon the ledges provided upon the ways *d*.

The relative position of the rods *h* and ways *d* is such that the needle-bed has the proper inclination.

By means of the detachable plate *h'*, secured over the ends of rods *h*, the latter may be removed from the bed A, whereby the needle-bed or any section of it may be readily taken out for renewal or repairs.

The heads *f''* of the division-ribs rest upon the concave face of the supporting ribs *c*, and are so formed as to act as loop-jacks, thus dispensing with the costly and troublesome jack-wires formerly in use.

When the division-ribs *f* are made separate from one another, I construct them as shown in fig. 8, having a flange, *f'*, upon the lower edge to support the needle, and a stud, *g*, to retain the latter in place. It may, however, be found advantageous to secure the ribs to backing-plates *b*, extending either entirely across the machine or made in several short sections. In this case sufficient space is left between the division-ribs

(which are made flat) for the needles to work easily, and the pin *g* passes through all the ribs in the section. The advantages of this style of needle-bed are: That the needles may be quickly removed by lifting a section, as shown in dotted lines upon the right of fig. 4, and drawing out the retaining-pin *g*; and also that any worn or broken portion may be readily replaced by withdrawing the rods *h*. The pins *g* are much cheaper and more convenient than the gibs commonly used in this class of machines.

The hollow arch O is made with and connects together the lock-plates B B'. By this means I avoid a long and cumbersome sliding frame connected by ribs at the ends, and also provide a means of supporting some of the working parts of the machine.

I secure the alternate adjustment of the V-cams *e* and *i* of the locks by means of the curved bar C', hinged at its extremities to these cams, as shown in fig. 4, and suspended within or upon the arch C, at or near its center, upon a stud, *m*, working in a suitable horizontal slot in said bar. One end of the bar C' extends through an opening in the arch, and enters the slot of the reciprocating cam D, figs. 1, 2, and 4. This cam is secured to the sliding frame B B' by screws *o*, passing through slots, as shown, whereby it is allowed a slight reciprocation independent of the sliding frame.

The pitman P' is pivoted to the cam D, and is actuated by the crank *k*, the stroke of which must be equal to that of the cam and sliding frame together. The revolutions of the crank *k* thus alternately elevate and depress the V-cams by means of the cam D and adjusting-arm C', as indicated by dotted lines in fig. 4, previously to the movement of the sliding frame, whereby said cams are caused to engage with the shanks of the needles upon alternate sides of the machines at each reciprocation.

The reciprocation of the cam D may be prevented when desired by inserting the stop *c'*, fig. 1, in an opening provided in the lock-plate, and so located as to retain the cam at either extremity of its stroke, as indicated by dotted lines. By this means either V-cam may be operated continuously, for the purpose of knitting a flat web on either side. The movement of the cam D may also be stopped by tightening the screws *o*.

The V-cams swing upon T-shaped fulcras, *e*, figs. 4 and 5, resting in suitable recesses formed in the lock-plates, and retained in place by the wing-cams *n*, which lap over the projections thereon, as shown in fig. 5. This is a very cheap and simple arrangement, dispensing with a number of parts usually required in locks of this class.

The stud *m*, fig. 4, passes through a vertical slot in the arch C, and is fixed to the short arm of the bell-crank *l*, pivoted at the point *x'* to the arch. The long arm of the bell-crank is provided with a stop, T, which

enters recesses *u* in the side of the arch. By this means I obtain a vertical adjustment of the adjusting-bar *C*, the upper portion of which is shown in its extreme positions by dotted lines in fig. 4. The lower adjustment of the stop *T* drops both *V*-cams into working position, and the motion of the cam *D* being stopped, both rows of needles are actuated simultaneously, producing a double flat-webbed fabric. The middle adjustment allows the cams to work alternately by the reciprocations of the cam *D* as before described, and is the ordinary running position for tubular work, while the upper adjustment lifts the cams away from the needles upon both sides, the cam *D* being stationary, as in the first instance. The object of this latter is to allow the operator to remove the sliding frame in case of breakage or disarrangement of the parts, when in the central part of its stroke, without interfering with the work. After the repairs are made, the sliding frame can be returned exactly to its former position, the *V*-cams lowered by means of the bell-crank *L*, and the work proceeded with. By this adjustment, also, the work may be left upon the needles when the operator is absent, without any liability of its being disarranged by other persons.

The ends of the *V*-cams are provided with suitably-rounded projections, *i*, fig. 5, the working edge of which, at the point where the needle-shanks leave them, is somewhat above the base of the cam. The effect of this arrangement is to give the needles a slight advance movement as they leave the projections, and they remain in such a position upon the bed that they cannot slip by or strike the point of the cam upon the return stroke.

When the machine is run at the ordinary speed, the needles are, in fact, projected considerably above the line of the projections *i*, as shown by dotted lines in fig. 5.

The adjustment of the tightness of the stitch is obtained by means of the wing-cams *n*, pivoted at their outer ends to the lock-plates, and adjustable at their inner ends by means of the set-screw and nut *n'*. To enable the operator to make the tension alike upon all the wing-cams, I pivot upon the set-screw *n'* the index-finger *r*, figs. 1, 5, and 6, moving over a graduated arc upon the lock-plate, as shown in fig. 1. A cam-slot, *r'*, is formed upon the index-finger, working upon a pin, *t*, fixed to the lock-plate. The set-screw *n'* moves in a curved slot in the latter, and by loosening the set-nut, and turning the index-finger to the required point, the cam *r'* raises or lowers the wing-cam correspondingly.

In this class of knitting-machines it is necessary that the slack yarn be drawn up at the beginning of each stroke of the sliding frame, to prevent its becoming entangled by the action of the needles. For this purpose I provide the take-up *F*, figs. 1, 3, 4, and 7, pivoted to the lock-plate *B*, and carrying at its upper extremity the automatic fingers *p*. These fingers are pivoted at *s* to the sliding plate *s*, connected by a rod, *v*, to a crank-arm, *a*, rocking upon the same center as the lower end of the take-up *F*.

The fingers *p* are provided with diagonal slots, *a'*, fig. 6, near the base, working upon a stud, *z*, fixed to the arm *F*. It will be seen that as the sliding plate *s* is drawn down by the crank-arm *a*, the fingers *p*, turning freely upon the pivot *s*, are closed upon the yarn as it passes through an opening in the arch *C* to the needles, by means of the diagonal slots *a'* and fixed pin *z*, and that if the motion of the arm *a* continues after the fingers are closed, the take-up will be forced over to the position shown in dotted lines, fig. 4, taking up the slack of the yarn with it.

The crank-arm *a* is actuated by a vertical slide, *H*, and fixed inclined planes *J*, secured either to the table *T* or the bed of the machine. A notch near the lower end of the slide *H* runs upon one edge of the inclines

*J*, and a horizontal slot at its upper end receives the wrist of the crank-arm. The reciprocations of the sliding frame cause the slide *H* to engage with and be reciprocated vertically by the plate *J*, which is inclined upward at the extremity, as shown in fig. 3. This drops the take-up upon the arch at each end of the stroke, grasping the yarn and taking it up as described, until it is drawn back by the action of the needles. In practice the take-up *F* does not retain the vertical position shown in dotted lines, but its momentum will throw it considerably back of such line.

It is evident that since the crank-arm *a* retains a fixed position during the central portion of the stroke of the sliding frame, and, consequently, the distance between the slide *s* and the outer extremity of said arm would become less as the take-up fell back of a perpendicular, the slide *s* is forced up by the rod *v* and the fingers opened, thereby releasing the yarn, if not previously drawn out by the needles.

For convenience and certainty in operating the machine, I provide upon the table *T* a counting device, shown in fig. 1. The sliding index-finger *N*, provided with a suitable nut, is actuated by the threaded rod *O*, driven by gears from the crank-shaft *K*. The nut on the index-finger is open at the bottom, whereby it may be removed and adjusted to any desired point. A scale is laid off upon the table *T* parallel with the screw *O*, and corresponding to its "pitch." The index thus shows the number of reciprocations of the machine, and, consequently, the number of rounds knit.

Where it is desired to knit much work of the same form and size, pegs *u* are inserted in holes provided in the table, (or in a separate bar,) at the division-lines, and are located at such points as to indicate the changes to be made in the needles.

To assist the operator in the formation of stockings and similar irregular work, a plate or paper pattern, *P*, made in adjustable sections, for convenience, and graduated upon one edge similarly to the scale upon the table, is placed parallel and adjacent to the rod *O*. The foot section may be made in two parts, the numbers upon them increasing toward the outer end. When a short foot is wanted, the sections are either shut together, as shown in full lines, or the index set at as high a number as is needed, and the work begun at that point. The size of the heel and leg is similarly indicated, except that the numbers upon the latter pattern increase in the opposite direction—that is, from the heel toward the outer end. Spaces in the pattern or numbers may be skipped by adjusting the index-pointer *N*.

The sliding frame *B B'* rests upon the bed *A* at the lower edges, and runs upon the ways *d*. The gibs *T* are attached by screws to the outer edges of the sliding frame, and lock under the inclined sides of the ways *d*, as shown in fig. 4. These gibs retain the sliding frame in its place, and possess the advantage of being adjusted when worn, as well as of cheapness in construction. If desirable, a slight packing may be put under them, which can be removed as they wear away.

It may be found necessary to attach a spiral spring to the take-up *F*, in such a manner that it will operate to throw the latter over after passing the perpendicular in either direction.

It may be desirable to incline the plate *J* at other points than at its extremities, for the purpose of operating the take-up at various parts of the stroke.

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

1. The skeleton bed *A*, constructed as shown and described, provided with the central supporting-ribs *c* and ways *d* at its lower edges, substantially as and for the purposes set forth.

2. The hinged division-ribs *f*, arranged either separately or in sets, and their upper ends acting as loop-jacks, substantially as herein set forth.

3. The backing-plates *b*, entire or in two or more sections, in combination with the hinged division-ribs *f*, for the purposes set forth.

4. The removable rods *h*, in combination with the hinged division-ribs of a knitting-machine, for the purposes set forth.

5. The combination with the two parallel rows of needles of the single hollow arch *C*, the lock-plates *B* and *B'*, and the curved adjusting-bar *C'*, substantially as set forth.

6. The reciprocating cam *D*, when actuated directly or indirectly by the crank *k*, in combination with the adjusting-bar *C'*, substantially as and for the purposes set forth.

7. The curved adjusting-bar *C'*, suspended within or upon the arch, in combination with the V-cams *e* and *i*, operating substantially as shown and described.

8. The reciprocating cam *D*, in combination with the adjusting-bar *C'*, operating substantially as set forth.

9. The reciprocating cam *D*, when provided with a suitable locking-stop, *c'*, substantially as and for the purposes set forth.

10. The automatic take-up fingers *p*, actuated by the fixed pin *z* in the swinging arm *F*, and the diagonal slots at the base of the said fingers, in combination

with the crank *k* and inclined planes *J*, substantially as and for the purposes set forth.

11. In combination with the sliding index *N*, constructed as described, the numbered pattern *P*, made in adjustable sections, as and for the purposes set forth.

12. The V-cam *e*, provided with the fulcrum *e'*, and arranged and operating substantially as set forth.

13. The pivoted adjustable bell-crank *l*, in combination with the curved adjusting-bar *C'*, for the purposes set forth.

14. The hinged yarn take-up *F*, provided with automatic fingers *p*, in combination with the sliding frame *B B'*, the whole operating substantially as and for the purposes set forth.

15. In combination with the fixed inclines *J*, the actuating-slide *H* and take-up apparatus, all operating substantially as described.

16. The crank-arm *a* and actuating-slide *H*, in combination with the sliding plate *s*, the fingers *p p*, and the hinged take-up *F*, arranged and operating substantially as set forth.

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Witnesses:

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