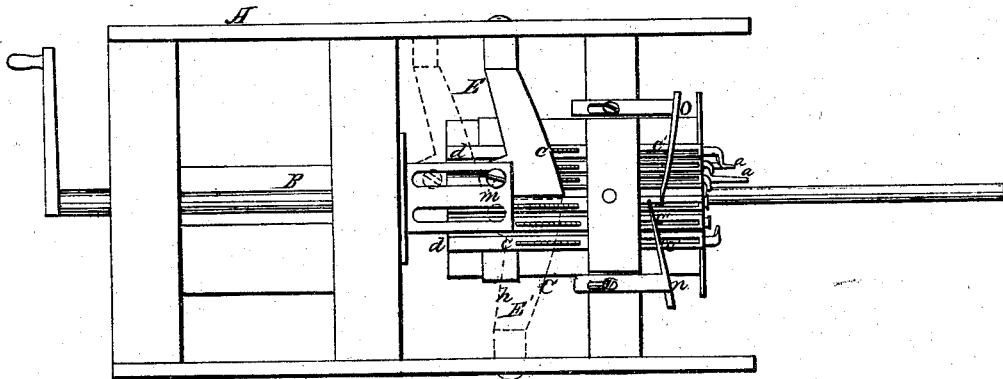


*J. M. Armour.*  
*Knitting Mach.*

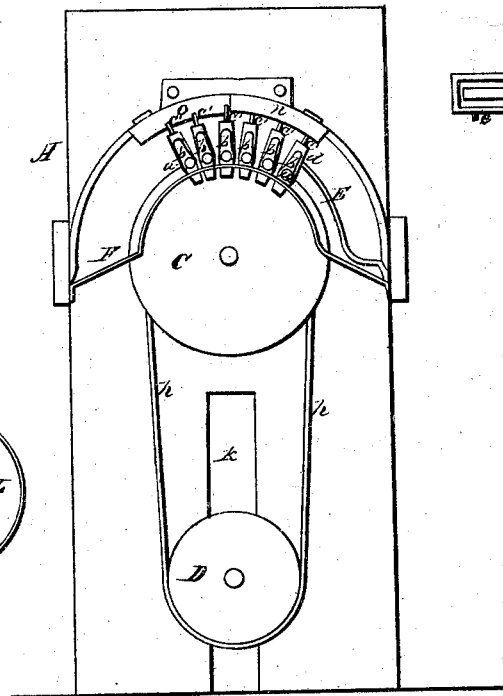
*N<sup>o</sup> 54,812.*

*Patented May 15, 1866.*

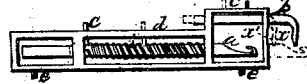
*Fig: 1.*



*Fig: 2.*



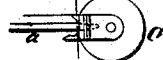
*Fig: 3.*



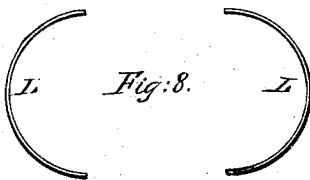
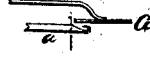
*Fig: 4.*



*Fig: 5.*



*Fig: 6.*



*Fig: 8.*

*Witnesses:*

*A. W. Bingham*  
*J. T. Dodge*

*Inventor:*  
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# UNITED STATES PATENT OFFICE.

J. M. ARMOUR, OF CRAFTSBURY, VERMONT, ASSIGNOR TO NATIONAL KNITTING MACHINE COMPANY.

## IMPROVEMENT IN KNITTING-MACHINES.

Specification forming part of Letters Patent No. 54,812, dated May 15, 1866.

*To all whom it may concern:*

Be it known that I, J. M. ARMOUR, of Craftsbury, in the county of Orleans and State of Vermont, 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, and to the letters of reference marked thereon.

Figure 1 is a top-plan view, and Fig. 2 a front elevation, of a machine embodying my improvements. Fig. 3 is a side elevation, and Fig. 4 an end view, of my improved needle and stitch-holder mounted in their frame. Figs. 6 and 7 are views of a modified form of stitch-holder; and Fig. 8 a view of a detached portion representing a modification of my improvements, as hereinafter explained.

The nature of my invention consists in a peculiar manner of mounting and operating the needle for forming the loops or stitches.

Second. It consists in a novel device and method of operating the same for holding the stitch on the needle while the latter receives the thread for forming another stitch.

Third. It further consists in a novel method of operating the needles and stitch-holders and causing them to perform the operation of knitting.

To enable others skilled in the art to construct and use my invention, I will proceed to describe the same.

I first construct a needle, *a*, as shown in Fig. 3, its point terminating in a hook like an ordinary crochet needle or hook. I then mount this needle *a* in a frame, *d*, in such a manner that the needle can be moved longitudinally therein, causing the hook thereon to protrude through a hole or opening in the front end of said frame. A spiral spring, *i*, or its equivalent, is employed to draw or force the needle *a* back within the frame and hold it there at all times except when thrust out, as hereinafter explained, to receive the thread preparatory to forming a new stitch.

In the front portion of the frame *d*, I place the stitch-holder *b*, which consists of a small rod having its front end bent down toward the needle, its lower end or point being cut out in a circular form, so as to embrace the

needle *a*, as shown in Fig. 4 and also in Fig. 2. In the front face of the carrier *d*, and also in the rear face of the bent part of the stitch-holder, is formed a transverse groove, (marked respectively *x* and *x'*,) the object being that when the holder shall pull back and clamp the thread there shall not only be a space prepared to receive it, but the tendency will be to cause the thread to ride upward in this space from the needle-shank, the better to insure the thread from being caught by the hook. A pin, *C*, is attached to the needle *a*, and a similar pin, *C'*, is attached to the stitch-holder *b*, for the purpose of imparting to the needle and stitch-holder a to-and-fro movement by means of cams, as hereinafter explained.

To the bottom of each frame *d*, each of which is intended to carry or support a separate needle and stitch-holder, an attachment, *e e*, having both a hook and an eye, is secured for the purpose of uniting any desired number of the frames, with their needles and stitch-holders, in a continuous series by hooking them together and thus forming of them an endless chain.

As knitting consists essentially of forming loops and drawing them through other loops previously formed successively, it is only necessary, in using the devices above described for that purpose, to so arrange them, in connection with mechanical devices, as to impart to them at the proper time a to-and-fro movement; and this may obviously be accomplished in a great variety of ways.

Figs. 1 and 2 represent one method of accomplishing this object.

A represents a frame, which may be of any desired form, and having mounted in its upper portion a shaft, *B*, on which is secured a cylinder or pulley, *C*, a similar pulley, *D*, being below the pulley *C*, in such a manner that it can be adjusted at pleasure, according as a large or small number of needles is desired to be used. The series of needles and frames being united by the hooks *e*, or secured to the belt *h*, as described, is then mounted on the pulleys *C D*. A cam, *E*, is then secured to the frame *A* in such a position that, as the needles are moved over the pulley *C*, the pins *c* will come in contact with the edge or face of said cam *E*, thereby causing the needles *a* to pro-

trude through the opening in the front end of the carrier or frame *d*, as shown in red in Fig. 3, in which position the thread is delivered, either from a stationary spool or other device conveniently located, to the hook on the end of the needle. As soon as the pin *c* is carried past the cam *E* the spring *i* draws the needle back within the carrier *d*, and, of course, drawing in the thread with it, forming a new loop and drawing it through the loop previously formed upon the same needle. At the same time that the pin *c* on the needle comes in contact with the cam *E*, and thereby commences to force the needle outward, the pin *c'*, attached to the stitch-holder *b*, is brought in contact with the rear face of cam *o*, by which the stitch-holder is drawn back. The previously-formed stitch, encircling the needle *a*, is thus drawn back by the stitch-holder, and held in close contact with the front end of the carrier or frame *d*, and just above the upper surface of the shank of the needle, while the needle, with its hook thus freed from the old stitch, is projected, ready to receive the thread for the new stitch, as shown in Fig. 1, the position of the needle and stitch-holder being also shown in red in Fig. 3. The cams *E* and *o* are so proportioned and arranged that as soon as the needle has passed the cam *E* and drawn the new stitch within the frame *d* the pin *c'* strikes the front face of the cam *n*, which forces the stitch-holder *b* out again to its original position, where it remains, ready to grasp this new stitch upon the needle as the latter in its revolution is again forced out by the cam *E*, preparatory to receiving the thread for another stitch. The spring *i* operates to draw the needle *a* back very quickly as the pin *c* passes the end of cam *E*, thereby insuring the drawing of the new stitch or loop in through the previous stitch before the latter is released by the stitch-holder *b*, which is immediately thereafter forced forward by the cam *n*, and letting the previous stitch drop off before the needle *a* is again thrust forward. By these means a continuous series of stitches will be formed as the needles pass successively past the cam *E*, by which means a tubular web will be produced, varying in size as more or less needles are used.

Instead of the traveling stitch-holders, a stationary one, consisting of a circular disk or wheel, *G*, as shown in Figs. 6 and 7, may be used, it only being necessary to so locate it that it shall press against the stitch upon the needle *a* as the latter is protruded from the frame *d*.

To render the operation more certain and prevent the loops or stitches from being dropped from the needles, a cloth-presser, *F*, as shown in Fig. 2, may be attached to the frame in such a position as to press the web close against the ends of the frames *d* immediately under the needles.

It is obvious that instead of attaching the needles and their frames to a belt, or uniting them in the form of an endless chain, they may be firmly secured upon a cylinder and made

to operate in the same manner, the only difference being that in that case the size of the web woven could not be varied, as in the former case.

It is also obvious that instead of having the needles and stitch-holders revolve and the cams remain stationary, the needles and stitch-holders may be secured to a stationary part of the machine and the cams made to travel, the operation of knitting being the same in either case. In order to vary the size of the web in such case the modification shown in Fig. 8 may be used. This consists simply in attaching the needle-frames *d* to two segments, *L L*, so arranged that they may be united and form a circle, or separated to any required extent, and have their edges united by a greater or less number of needles suitably mounted on frames to fit in and fill up the space between the adjoining edges of the segments.

It is also further obvious that instead of operating the sliding stitch-holders *b* by means of two cams, *o* and *n*, a spring may be used to force them out and a cam to draw them back, or vice versa. If preferred, the spring *i* on the needle may be dispensed with and a cam used instead.

In case it be desired to knit a flat instead of a circular web, it is only necessary to add another cam, *E'*, on the opposite side, in a reversed position, as shown in red, and give to the needles a reciprocating instead of rotary motion, the cams *E* and *E'* being so arranged as to automatically come into operation alternately—one cam operating the needles when moving in one direction and the other to operate them when moving in the reverse direction.

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

1. Forming a stitch or loop by drawing the needle and thread through an opening in the end of the frame *d*, which supports the needle and stitch-holder, substantially as described.

2. The stitch-holder *b*, arranged to press the stitch against the face of the frame *d* and hold it there while the needle, with the new stitch, is drawn in through it, substantially as and for the purpose set forth.

3. The carrier-frame *d*, constructed and operating as and for the purpose herein shown and described.

4. Withdrawing the needle *a* by means of the spring *i*, or its equivalent, for the purpose of imparting to the needle a quick backward movement, and thereby insuring the drawing of the new stitch through the previously-formed stitch before the latter is released by the stitch-holder *b*, as described.

5. Providing the frames *d*, within which the needles traverse, with the hooks and eyes *e e*, for the purpose of uniting more or less of them together, as and for the purpose set forth.

6. The combination and arrangement of the cam *E* and the cams *o* and *n* with the needle *a* and stitch-holder *b*, for the purpose of giving

to said needle and stitch-holder the required movements, substantially as herein set forth.

7. Constructing the form or endless chain for holding the needles of lags or sections so arranged or connected together as to permit of enlarging or contracting the form or chain by adding more sections or removing some of them at pleasure.

8. The combination of a revolving endless chain or form constructed, as above described, with one or more stationary cams for operating the needles.

J. M. ARMOUR.

Witnesses:

W. C. DODGE,  
EDM. F. BROWN.