JOHN M. ARMOUR.

Improvement in Knitting-Machines.

No. 113,965. Patented April 25, 1871.

Fig 1

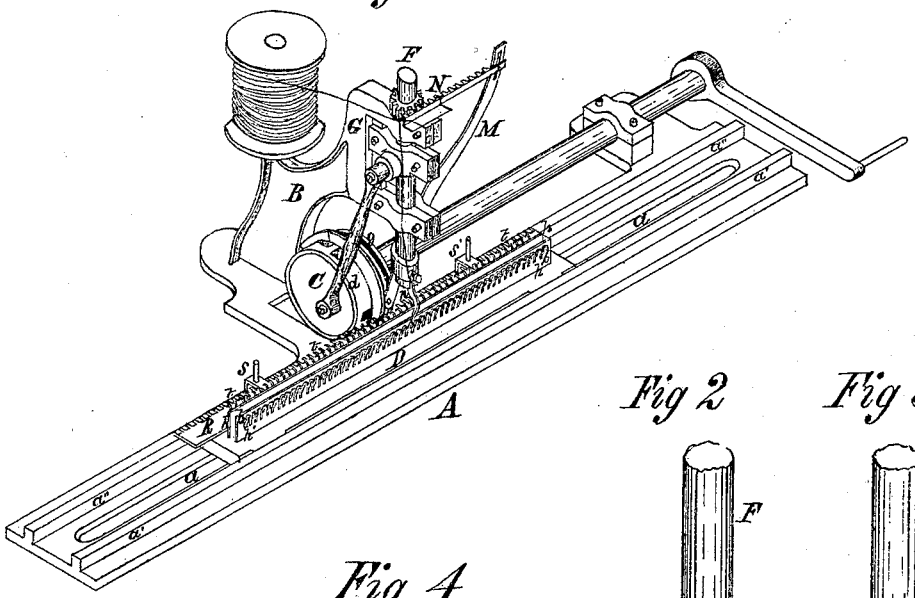


Fig 2

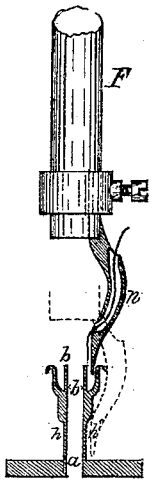


Fig 3

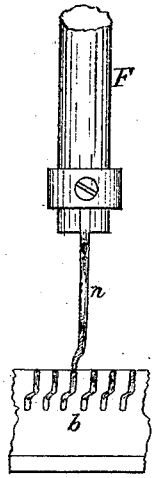
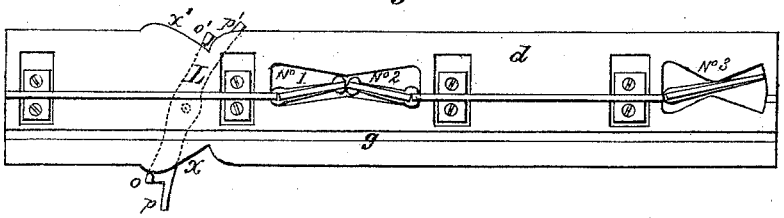


Fig 4

Fig 5



Witnesses

N. B. Smith

C. M. Smith

Inventor

John M. Armour

UNITED STATES PATENT OFFICE.

JOHN M. ARMOUR, OF SYRACUSE, NEW YORK.

IMPROVEMENT IN KNITTING-MACHINES.

Specification forming part of Letters Patent No. 113,965, *dated April* 25, 1871.

To all whom it may concern:

Be it known that I, JOHN M. ARMOUR, of the city of Syracuse, in the county of Onondaga and State of New York, have invented a certain new and Improved Knitting-Machine; and I do hereby declare that the following is a full, clear, and exact description of the construction of the same, and the form thereof when complete and ready for use, reference being had to the annexed drawing, forming a part of this specification, in which—

Figure 1 is a perspective view of the whole machine. Fig. 2 is a view of the needle-bar, needle, and stitch-hook. Fig. 3 shows another form of needle and stitch-hook, operating in the same general manner. Fig. 4 is illustrative of one mechanism for reversing the needle. Fig. 5 represents an extended surface of the sleeve covering the drum and cam-wheel.

The letters used represent corresponding parts wherever they occur.

A is a metal base, with a slot, *a*, about half an inch wide, more or less, and about twenty inches in length, and having guideways *a' a''*, of suitable size to direct the movement of the carrier-frame D.

B is an arm for supporting the needle-bar, and which may be cast as part of the base A; or it may be securely attached in any ordinary manner.

D is the carrier-frame, having thereon, upon plates arranged for that purpose, the series of stitch-hooks *h h'*, in two rows, as shown in the drawing, and the rack R, with teeth *t t t*, to receive a movement from the cams on the drum and cam-wheel C.

The carrier-frame D has two thin plates of metal, *b b'*, about an inch in width and about ten inches in length, placed parallel with each other, and about one-eighth of an inch apart; and it is better to scarf off the side on which the stitch-hooks are arranged near the top to give more room for the operation of the needle.

On the outer side of each of these plates, and near the upper edge thereof, are attached the series of stitch-hooks *h h'*, so constructed and arranged as to allow the point of the needle *n* to enter the stitch already made, and held upon the hook between the stitch-hook and the plate, and, having entered such stitch, to pass down between the hook upon which such stitch has been formed and the preceding hook, thus taking off the old stitch, and, as the needle passes that hook, putting the new stitch on the hook just passed.

C is the drum and cam-wheel, and has a sleeve or band, *d*, surrounding the drum-wheel proper, with properly-arranged slots, in which three cams change, which work in the teeth of the rack of the carrier-frame, and impart to it the peculiar motions necessary for taking off the old stitch on the hooks and putting on the new one as the work progresses.

No. 1, the first of the cams, causes the carrier-frame to go forward half the distance between any two of the hooks, bringing it so as to insure the entry of the needle-point in the old stitch behind the stitch-hook between the hook and plate.

The moment it reaches that point with the old stitch upon the point of the needle, the second cam, No. 2, causes the carrier-frame to recede to its former position, thus allowing the needle to pass down between the hooks, taking with it the old stitch and carrying it off the hook.

The needle passes down as far as it will go, and just at the point of its beginning to return the third cam, No. 3, begins to operate, and carries the frame the entire distance from the center of the space between the last two hooks to the center of the next space between the hooks, thus causing the hook just relieved of its old stitch to pass under the curve of the needle, catching the thread beneath the hook as it passes, and securing a new stitch.

The operation of reversing these cams, and the method of pivoting the same to effect that object, will be described hereafter.

F shows a reversible needle-bar, with the hollow curved needle *n* attached thereto. The thread enters the needle near its upper end, and passes through the hollow part of the same, and is given out through an aperture near its point, substantially in the manner shown in Fig. 2 of the drawing.

The needle *n* is so placed in the needle-bar F that its point will necessarily come down near to the plate on which the stitch-hooks are attached, and then the cams will operate as above described.

The needle-bar F is operated in a frame, G,

at the end of the arm B, by means of a crank and pitman connected with the drum and cam-wheel C, substantially as shown in the drawing; or it may be done in any ordinary manner.

Two adjustable stops, S S′, are placed upon the rack R, and so arranged that by means of a stop-pin, in any ordinary mechanical manner, they can be set at any point upon the rack, and thus made to determine the width of the web.

As the carrier-frame moves forward until the stop is reached, it is made to operate upon the sleeve *d* of the drum and cam-wheel C by coming in contact with the short lever L, which runs across the drum proper under the sleeve *d*.

It is fulcrumed in the middle upon the drum-wheel proper, and has a short point, *p p′*, at each end thereof, with which the stop on the carrier comes in contact, and the side points *o o′*, branching off from the main lever, bear upon the cam-surfaces *x x′* on the side of the sleeve, so that when the points *p* or *p′* come down upon the stops S or S′, they operate to remove the sleeve to the other side, and thus reverse the regulating-cams. This lever L must be so placed on the drum and cam-wheel C that the above change will take place while the needle is up.

The change in the position of the sleeve operates to reverse the three cams, and they are so hinged on the drum proper that this result can be effected and they made to change in the slots in the sleeve, substantially in the manner as shown in the drawing.

The change in the position of the sleeve also reverses the needle by operating the lever M, which is fulcrumed upon a small arm running up from the base, and has a pin in the lower end of it, which runs in the groove *g* in the sleeve, and at the other end is attached to the small rack operating the pinion N, placed around the needle-bar, substantially as shown in the drawing.

The upper end of the lever M should be properly slotted, so as to operate with the small rack or pinion N in either position thereof.

The drum and cam-wheel C will be placed upon an axle, substantially as shown in the drawing, or in any other convenient manner, to receive the propelling power.

The above form for needle-reversing arrangement is more particularly adapted to the knitting of a continuous web.

The work is set up at the commencement by simply looping the threads across the top from one stitch to its opposite on the other plate, and so on until the desired width of web is reached; then putting over the crossed threads a bent wire, between the plates on which the hooks are placed, and attaching them to a weight sufficient to easily carry the web down.

The machine, with all the parts as above described in place, will then be ready to start and the needle will perform its work.

The plates for the stitch-hooks may be placed at such angle with the carrier-frame as may be desired, the needle being adapted thereto.

Another mode of reversing the needle would be by means of spiral grooves crossing each other upon a thimble, substantially in the form shown in Fig. 4, through which thimble the needle-bar operates, with a lever operated from the drum-wheel in any ordinary manner, with a slide in the end of it which will conform to either of the grooves in the thimble and cross the other, passing out of the groove at its upper end, thus coming down without turning the thimble. By this arrangement the lever can be made to turn the needle whenever desired and whichever way it may find it.

In setting up the work the lever may be made to turn the needle at every revolution of the drum or stroke of the needle; and that also will make ribbed work, which, at the proper time, can readily be changed to plain.

By using a needle with the body thereof like that shown in Fig. 2, but with the point turned to one side, as shown in Fig. 3, half the distance between the centers of any two hooks, so that the point of the needle will pass down behind the hook carrying the stitch off, while the body of the needle passes down between the hooks, cams Nos. 1 and 2 will be dispensed with. In that case the hook is made as in the other instance, except that it is not fastenep to the plate from the center of the hook, but at one side, so that the point of the needle will pass quite down behind the hook. Thus all that is required in this connection for a plain circular hub would be one cam not reversible, one needle not reversible, with the stitch-hooks properly arranged upon the outer edge of a cylinder.

In case the stitch-hooks are placed upon a cylinder, the number of needle arrangements may be increased as desired, and one made to follow the other around the hub.

Two needles may also be used on the machine shown in the drawing, by so arranging the needles that they will operate opposite to each other and both turn at the ends or whenever desired.

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

1. The combination of the needle *n* and stitch-hooks *h h′*, constructed and arranged in relation to each other, and operating together, substantially as herein described, so that they perform by their own motions the entire work of knitting without auxiliary or intermediate devices, as herein specified.

2. The reversible needle *n*, in combination with two rows or sets of stitch-hooks, *h h′*, when arranged and operating as described, so as to knit either plain circular work or ribbed work, or work changeable from plain to rib

work, and vice versa, substantially as herein specified.

3. The combination of the stitch-hooks *h h'* and carrier-plate *b*, so arranged together that the stitches are held open laterally by the said hooks and plate, and also afford space between them to allow the needle to enter the stitches thereof, substantially as and for the purpose herein specified.

4. The drum *c* and the cams and reversing mechanism thereon, for imparting the movements to the stitch-hook carrier, and for reversing the needle, substantially as herein described.

JOHN M. ARMOUR.

Witnesses:
N. B. SMITH,
C. W. SMITH.