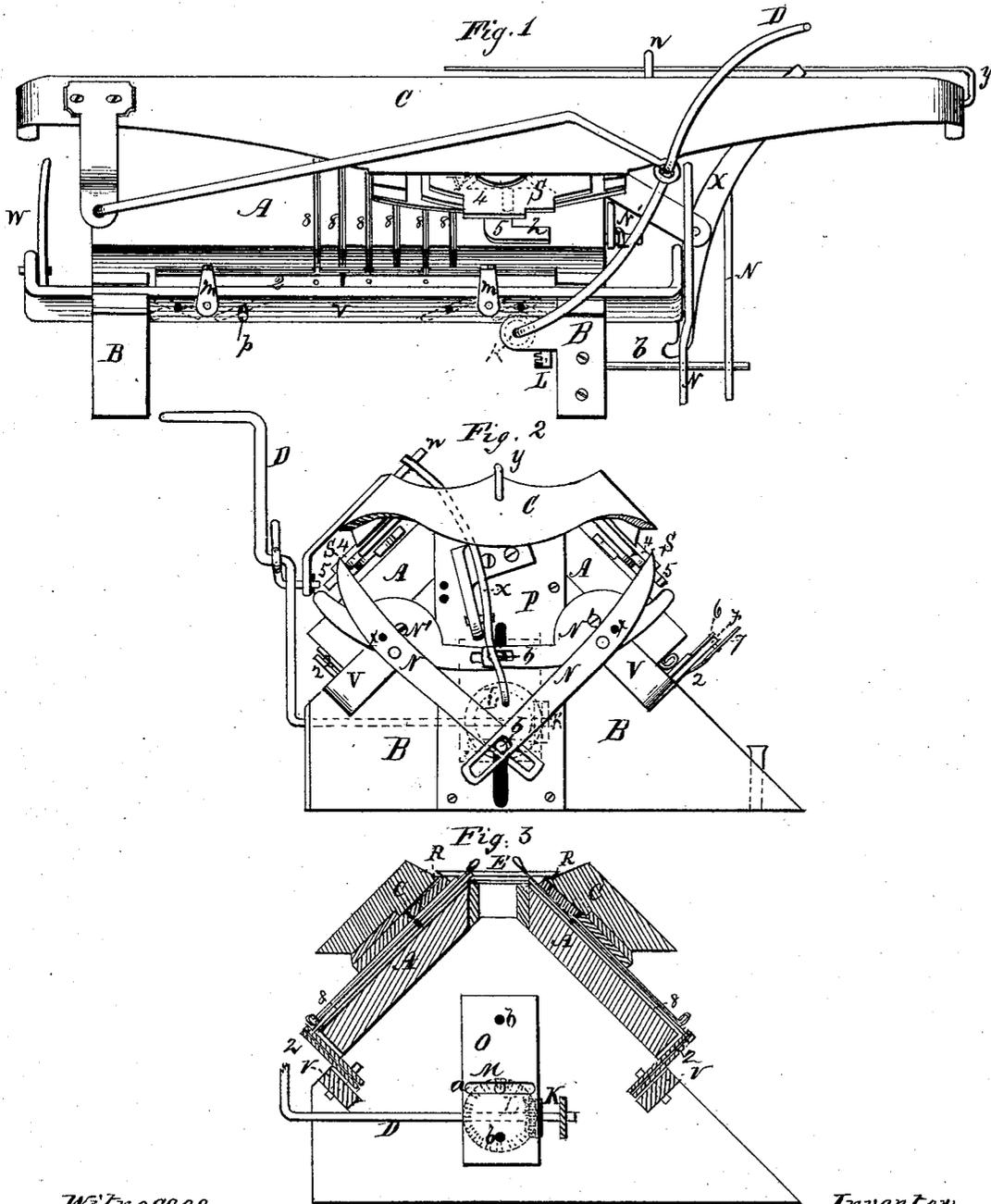


**J. C. WELSCH.**  
**Knitting-Machines.**

No. 149,272.

Patented March 31, 1874.



*Witnesses.*  
*Jas. Hill*  
*J. W. Bratten*

*Inventor.*  
*Jonathan C. Welch*

J. C. WELSCH.  
Knitting-Machines.

No. 149,272.

Patented March 31, 1874.

Fig 4

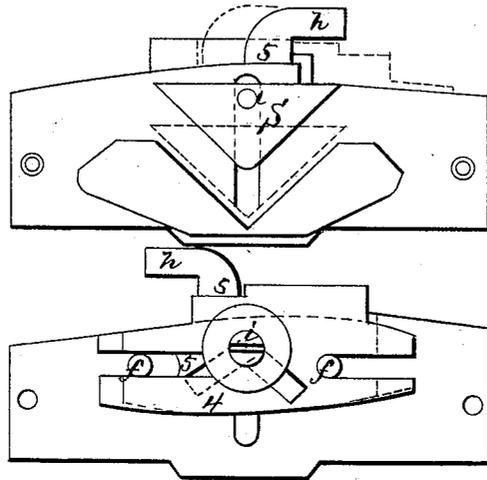


Fig 5

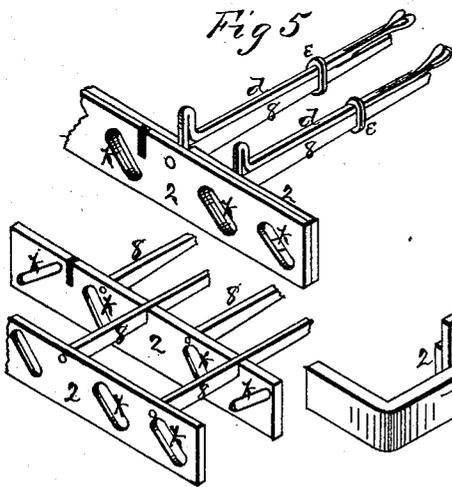
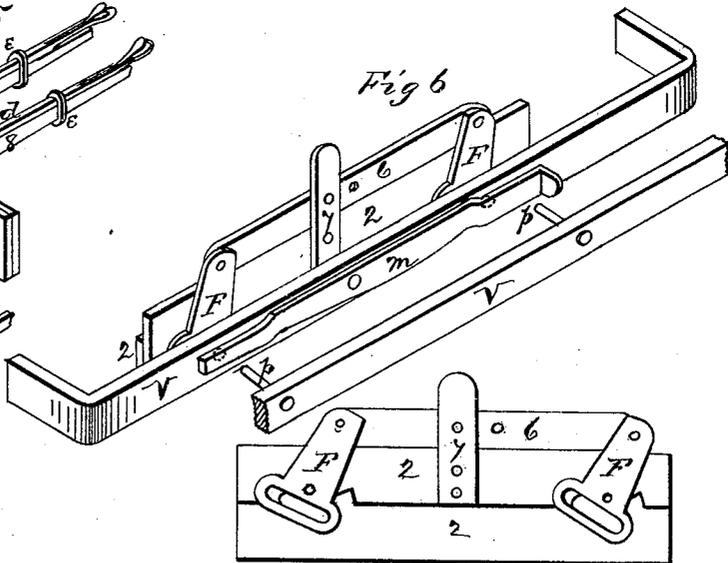


Fig 6



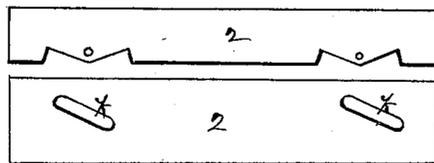
WITNESSES.

*H. G. Durand*  
*C. L. Ewert.*

INVENTOR

*J. C. Welsch*

*Alexander & Mason*  
Attorneys.



By

# UNITED STATES PATENT OFFICE.

JONATHAN C. WELSCH, OF EDGERTON, OHIO.

## IMPROVEMENT IN KNITTING-MACHINES.

Specification forming part of Letters Patent No. **149,272**, dated March 31, 1874; application filed June 9, 1873.

*To all whom it may concern:*

Be it known that I, JONATHAN C. WELSCH, of Edgerton, in the county of Williams and State of Ohio, have invented certain new and useful Improvements in Knitting-Machines; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention relates to that class of knitting-machines in which the needles are placed in parallel grooves upon two parallel inclined needle-plates, and a reciprocating carriage moves upon the needle-plates to operate the needles. The nature of my invention consists, first, in the construction and arrangement of the devices for operating the cams which raise and lower the needles in web or circular work; second, in devices for raising and depressing the needles, for the purpose of relieving the strain on the yarn and needles; and, third, in the construction and arrangement of devices whereby the machine is changed to do double or open work, as desired.

In order to enable others skilled in the art to which my invention appertains to make and use the same, I will now proceed to describe its construction and operation, referring to the annexed drawings, which form a part of this specification, and in which—

Figure 1 is a side elevation, Fig. 2 an end view, and Fig. 3 a transverse vertical section, of a knitting-machine embodying my improvements. Figs. 4, 5, and 6 are enlarged detached views of certain of the working parts.

A A represent the two inclined needle-plates, the upper edges of which are sufficiently close together to allow the knitting process to be carried on freely, and the fabric to hang down between them. These needle-plates A A are attached to or cast with end pieces or bed-pieces B B. Upon the tops of the plates A A will be arranged the devices for carrying the yarn—the same as are used in what is known as the Lamb knitting-machine. D represents a crank-shaft, resting in suitable bearings attached to the inner side of one of the end pieces B, and carrying at its inner end a cog-wheel, K. This wheel gears with and operates another cog-wheel, L, having double the

number of cogs, so that it will make exactly one-half of a revolution to each revolution of the crank-shaft D and wheel K. To one end of the shaft of the cog-wheel L is attached a crank-pin, M, which extends into a transverse slot, *a*, on a bar, O, located in a recess on one of the end pieces B, and held there by a covering-plate, P. The bar O is, when the machine is in motion, moved up and down, alternately, by the crank-pin M. Near each end of the sliding bar O is inserted a pin, *b*, which two pins pass through vertical slots in the covering-plate P, and each pin passes through slots in the lower or inner ends of two stops, N N or N' N'. For every two revolutions of the crank-shaft D one revolution of the crank-pin M is obtained, which gives an upward and a downward motion to the sliding bar O, thereby operating the stops N N', for purposes that will be hereinafter explained. The needle-plates A A are provided with the usual parallel needle-grooves, at equal distances apart, but made sufficiently deep to admit in each groove, beneath the needle, a supporting-bar, S. These supporting-bars are attached alternately to two plates, 2 2, forming two sets, one set to each plate, slots being cut through the inner plate to admit the free passage and operation of the bars attached to the outer plate, as shown in Fig. 5. The object of the supporting-bars S S; and of their attachment to the plates 2 2, is to raise and lower alternate needles in knitting open and double work, thereby relieving the strain on the yarn and on the needles. The object of lowering every alternate needle is to knit on every other needle in forming the double work, and that of lowering all the needles in alternate rows is to take the strain off of the yarn, the needles on one side being perfectly loose while the machine is knitting on the other side. The needles *d d* are held to the supporting-bars S S by means of links *e e*, slipped over them, and located in a slot or groove in the needle-plate. The needles are kept in place by means of skeins R R, attached to the needle-plates A A. C represents the carriage, which is constructed in any of the known and usual ways, and provided in the center and on each side with an adjustable V-shaped cam, S, to operate the needles on either side of the machine.

Each cam S is operated by means of two plates, 4 and 5. The plate 5 is provided with a longitudinal slot at each end, an oblique slot in the center, and a downwardly and backwardly extending projection, *h*. The plate 4 is similar to the plate 5, except that it has no projection; and the plates are held in place by pins *f f* passing through the longitudinal slots in their ends. These plates are so placed that the diagonal slots cross each other, and the cam S is held on and by a screw, *i*, passing through said slots, so that by sliding the plates endwise the cam is alternately raised and depressed, thereby closing and opening the cam-groove, and the machine thereby made self-adjusting while knitting web-work. The object of the two shifting-plates to each cam is to shift the cams, when the carriage is thrown to the right, at every revolution of the crank, when the stops at the other end of the machine are turned down.

In Figs. 5 and 6 I have shown two essentially equivalent means for raising and depressing the needles in their grooves while knitting. The inner of the plates 2 is, near each end, provided with two slots, *k k*, running obliquely in opposite directions across the center, as shown in Fig. 5. The outer of the plates 2 has, also, near each end, two oblique slots, but running in the same direction, so that one slot will be on a line with one slot in the inner plate, and the other two slots will cross each other. *p p* are pins, passed through holes in a slide-bar, V, and held by latches *m m*. These pins may be made to pass through the slots in the plates 2, that cross each other, or through the slots that are on a line with each other. In the former case, alternate needles on one side are raised and lowered together, and in the latter case all the needles on one side are so operated together.

In Fig. 6, the inner of the plates 2 is provided with a single oblique slot, *k*, at each end, and the outer plate has two slotted cams, F F, pivoted to it. These cams are connected at the top by a cross-bar, 6, and may be adjusted so that their slots shall be on line with, or run across, the slots in the inner plate, by withdrawing the pin in the spring 7 from one of the holes in the cross-bar, and sliding said bar toward the left or right, as desired, the pins *p p* of the slide-bar V passing through the slots in both the plates and the cams. The slide-bars V V rest in slots made in the end pieces B B, and are of sufficient length to extend past the machine at each end, and their ends are turned at right angles, as shown in Fig. 6. Upon the thus turned-up ends of the slide-bars, at one end of the machine, are pivoted the stops N N, the lower ends of which are slotted and placed on the lower pin *b*. On this end of the machine are pivoted the stops N' N', the lower ends of which are also slotted and placed on the upper pin *b*, as shown in Fig. 2. At the other end of the machine, and to the other turned-up ends of the slide-bars V V, are pivoted two stops, W W. Upon

the same end of the machine as the stops N N and N' N' is pivoted a lever, X, which is struck by a pin, *n*, on the carriage or frame C, during the motion of said carriage, to operate the slide-bars V V, so as to throw them to the left while the carriage is thrown to the right, when the stops W W are turned out of the way of the carriage. Attached to one end of the carriage C is a rod, Y, for the purpose of preventing the fabric being raised by the needles, and to obviate the necessity of using weight on the fabric. This rod should be of sufficient length to extend the whole distance between the needle-plates when the carriage is thrown forward, and when drawn back it should be entirely free from the needles.

To knit single-web work, the stops N N on the slide-bars V are disconnected by taking out the lower pin *b*, and turning out of the way of the sliding carriage D. The stops W W on the other ends of the slide-bars V are also turned out of the way of the carriage, so as not to move the plates 4 and 5 at that end of the machine. Pins *p p* are then placed in the slots in the plates 2, which are in line with each other, all the needles on one side being thus lowered, while those on the other are raised. The stops N' N' on the machine-bed B are connected to the slide O by the upper pin *b*, so as to move the sliding plates 4 at one revolution, and the sliding plates 5 at the next revolution. By so doing, one row will knit to the left and back to the right. The next revolution the other row knits to the left and back to the right. This will leave the web open at the left hand and make it twice the width of the machine.

To knit double-web work, the stops N N and W W on the slide-bars V V are turned up, so as to cause the carriage C to move the slide-bars at every half-revolution of the crank. The plates 2 are set so that the oblique slots therein cross each other, and the pins *p* inserted in said slots, which will raise alternate needles when the slide-bars V are moved to the extreme left by means of the carriage C; and when this carriage is thrown to the extreme right, it throws up the other half of the needles and lowers the first half—one half of the needles to the right and the other half to the left, on the same side of the machine, when the carriage is thrown forward and backward; and the next revolution the other side goes through the same performance, the operation of the cams being the same as in the single-web work.

To knit double circular work, the plates 2, with their pins, are arranged the same as in double-web work. The stops N' N' on the bed B are disconnected by removing the upper pin *b*, and are made stationary, so as to strike the plates 4 at every revolution of the crank; and the stops W W are also turned up, so as to strike the plates 4. This will knit a circle, such as a stocking-leg. Now, by connecting the stops N N on the bars V V, and turning the stops W W out of the way, one half of the

needles knit one revolution, and the other half knit the next round, and so on.

To knit single circular work, the plates 2 2, with their pins, are arranged the same as in single-web work, and all of the stops on the bars V are turned out of the way, and all the needles thrown up. If the operator desires to take the strain off of the yarn, all the stops on the bars V are turned up so as to strike the carriage C at every half-revolution of the crank, so that when one side is knitting, the needles on the opposite side are free of the cams, and are perfectly loose.

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

1. The combination of the plates 4 and 5, having longitudinal slots in their ends, and oblique slots in the center, the pins *ff*, cam S, and screw *i*, the plate 5 having the extension *h*, and all being constructed and arranged substantially as and for the purposes herein set forth.

2. The combination of the plates 2 2, supporting-bars 8 8, and links *e e*, constructed and arranged substantially as and for the purposes herein set forth.

3. The combination of the slotted plates 2 2, supporting-bars 8 8, pins *p p*, and slide-bars V V, all substantially as and for the purposes herein set forth.

4. The combination of the stops N N, N' N', and W W, arranged as and for the purposes herein set forth.

5. The combination, with the slotted stops N N and N' N', of the pins *b b*, slide-bar O, and crank-pin M, operated by the gears K L from the crank-shaft D, substantially as herein set forth.

In testimony that I claim the foregoing I have hereunto set my hand.

JONATHAN C. WELSCH.

Witnesses:

JAMES HILL,  
L. F. GISHWILLER.