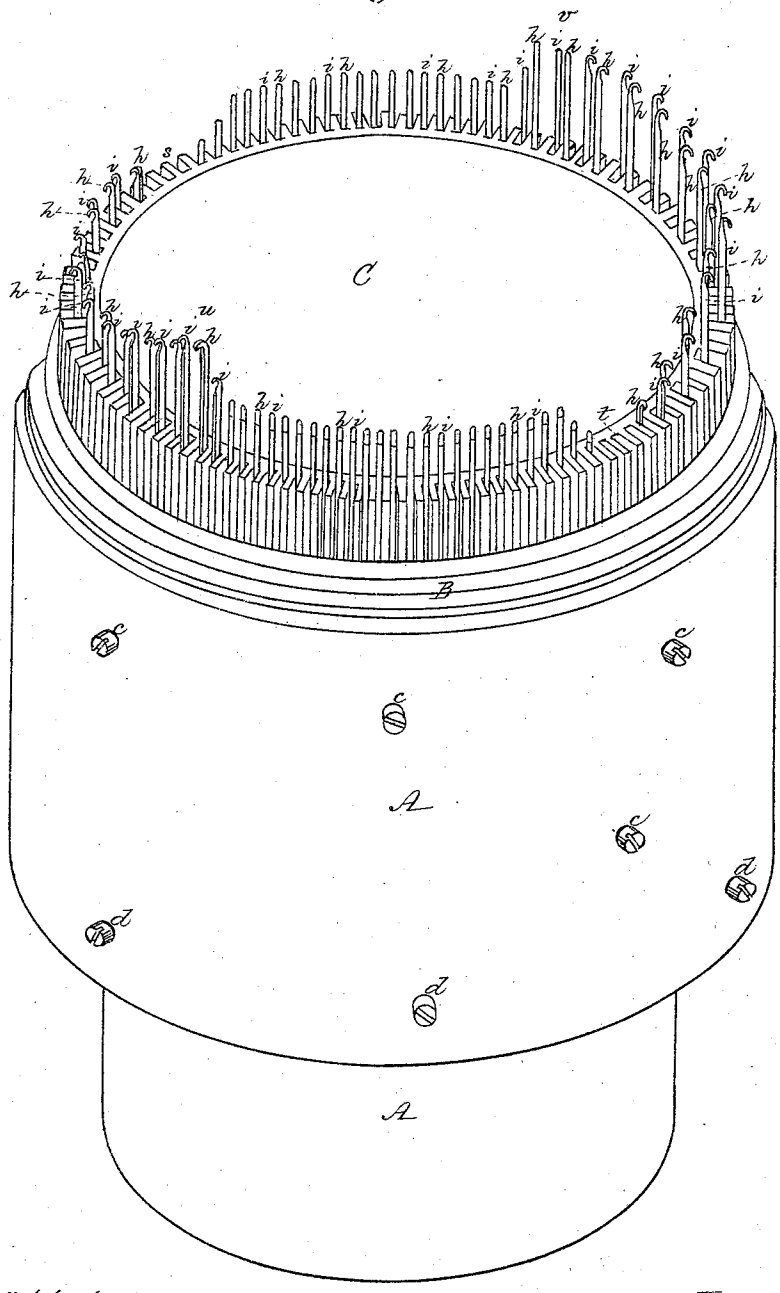
3 Sheets--Sheet 1.

C. CALLAHAN.

Weft-Thread Knitting-Machines.

No. 135,625. Patented Feb. 11, 1873.

Fig. 1.



Witnesses,
P. E. Teschemacher
N. W. Stearns

Inventor,
Cornelius Callahan

3 Sheets--Sheet 2.

C. CALLAHAN.

Weft-Thread Knitting-Machines.

No. 135,625. Patented Feb. 11, 1873.

Fig. 2.

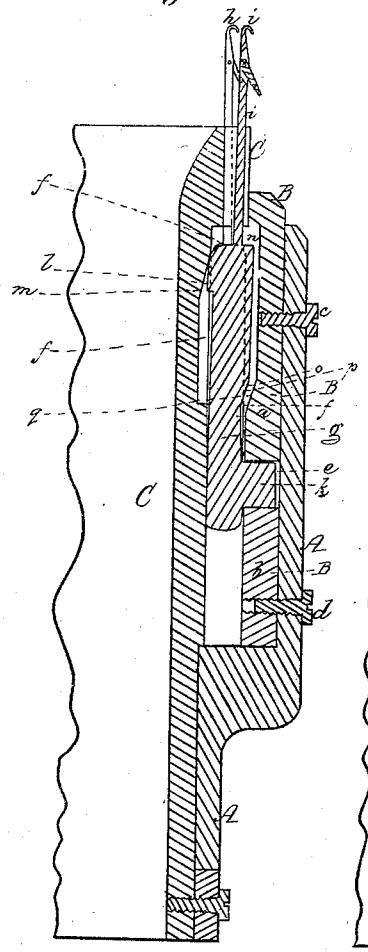


Fig. 3.

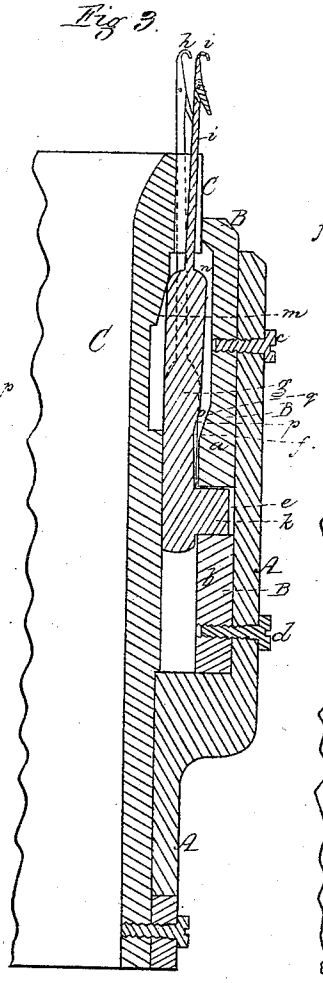
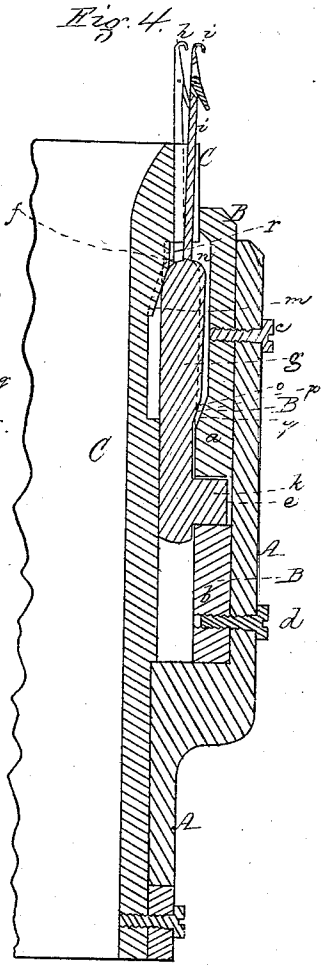


Fig. 4.



Witnesses,
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3 Sheets--Sheet 3.

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Weft-Thread Knitting-Machines.

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Fig. 7.

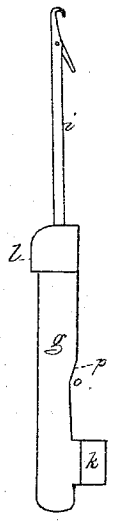

Fig. 5.

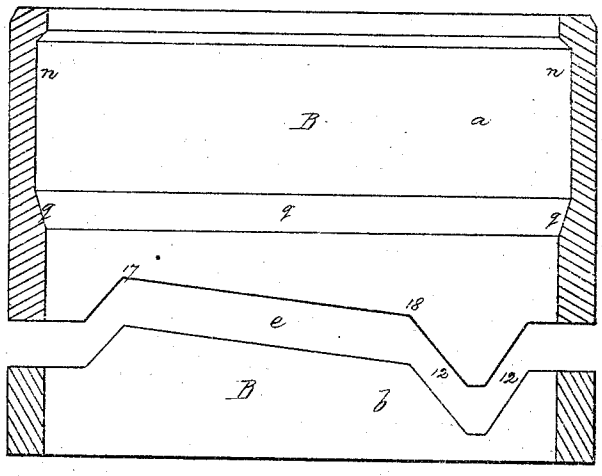

Fig. 8.

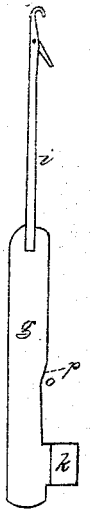

Fig. 9.

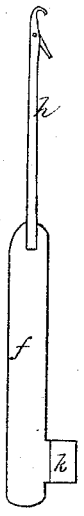

Fig. 6.

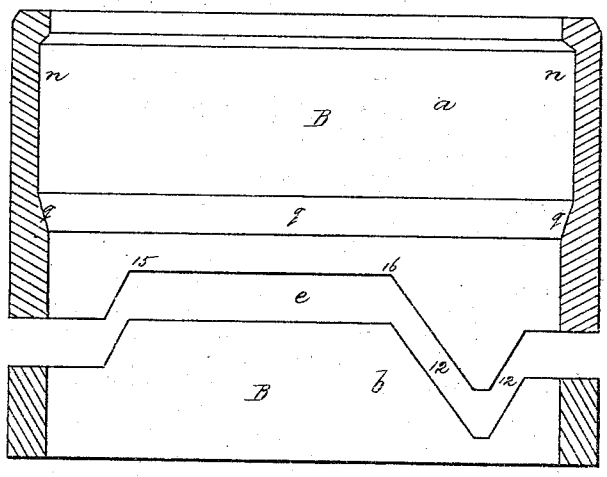

Fig. 10.

Witnesses,
P. C. Dieckmacker
N. W. Stearns

Inventor,
Cornelius Callahan

UNITED STATES PATENT OFFICE.

CORNELIUS CALLAHAN, OF CHELSEA, MASSACHUSETTS, ASSIGNOR TO HIMSELF AND EDWIN E. SIBLEY, OF SAME PLACE.

IMPROVEMENT IN WEFT-THREAD KNITTING-MACHINES.

Specification forming part of Letters Patent No. **135,625**, dated February 11, 1873.

To all whom it may concern:

Be it known that I, CORNELIUS CALLAHAN, of Chelsea, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Knitting-Looms, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing making part of this specification, in which—

Figure 1 is a perspective view of a rotary knitting-loom having my improvements applied thereto. Fig. 2 is a vertical section through a portion of the same. Fig. 3 is a similar section illustrating a modification. Fig. 4 is a similar section illustrating another modification. Fig. 5 is a vertical section through the cam-cylinder, showing one-half of the cam-groove by which the needles are raised and lowered. Fig. 6 is a vertical section through the cam-cylinder, showing the other half of the cam-groove. Figs. 7, 8, 9, and 10 are elevations of the needles and their slides.

In some knitting-looms, where the needles are divided into two rows in order to introduce a weft or filling thread, a strain is brought upon the thread at the knitting-point, by pressing the alternate needles outward to bring them into line with respect to the other needles. This frequently causes the thread to break should a weak place occur at this point.

My invention has for its object to avoid this liability of breaking the thread; and consists in a mechanism of peculiar construction for separating or dividing the needles into two rows, and bringing them back again into a single row or line at the proper times, in such manner as to avoid the strain heretofore brought upon the thread at the knitting-point. My invention also consists in a mechanism of peculiar construction for bringing the alternate needles gradually into line with respect to the other needles as they approach the knitting-point, which causes the weft-thread to be pressed against the needles of the inside row, so as to insure the closing of their latches.

To enable others skilled in the art to understand and use my invention, I will proceed to describe the manner in which I have carried it out.

In the said drawing, A represents the outer casing or frame of the machine, which is of cylindrical form, and within this frame is fitted another cylinder, B, formed in two parts, *a b*, secured in place by screws *c d*, the lower edge of the upper portion and the upper edge of the lower portion being separated from each other, and of such shape as to form a cam-groove, *e*. Within this cam-cylinder B is placed the needle-cylinder C, which is intended to be revolved by gearing, in the usual manner. The exterior of the needle-cylinder is provided with a series of vertical grooves for the reception of the needle-slides or bases *f g*, to which the latched needles *h i* are secured. Each of the needle-slides is provided with a projection, *k*, and these projections fit into the cam-groove *e*, which is provided with suitable inclines 12, by which the needles are operated to form the loops as the cylinder C is revolved, in the ordinary manner.

I will now describe the manner in which the alternate needles *i* are thrown out of line with respect to the other needles *h*, so as to form two rows above the work, to allow a weft-thread or filling (not shown) to be introduced a short distance in advance of the point where the knitting-loop is formed. At the top of the back of each of the slides or bases *g* of the alternate needles *i* is a projection, *l*, which, as the slide is raised by the cam-groove *e*, strikes against an inclined projection, *m*, which extends entirely around the exterior of the needle-cylinder C. The needles *i* are thus forced out of line with respect to the needles *h*, as seen in Fig. 2, the interior of the cam-cylinder being cut away at *n*, and each of the slides *g* being cut away at *o*, to allow of this movement. If it were not for this enlargement of the interior of the cam-cylinder near its top, the needles could not be thrown out without tapering their slides at the upper end, which would tend to weaken them at the points where the needles were attached. The slides *f*, being made with straight backs without any projections, do not come into contact with the projection *m* as they rise, and the needles *h*, consequently, remain in the same vertical plane.

As the needles approach the knitting-point they are drawn down by the cam *e*, when an incline or projection, *p*, on each of the slides *g*

of the needles *i* is brought into contact with an incline or projection, *q*, extending entirely around the interior of the cam-cylinder B, which throws the needles *i* back into line with respect to the needles *h*, so that their hooks will catch the warp-thread and form the loops as required, the weft-thread being brought down into place by the pressure of the warp-thread as the loops are formed.

If desired, the incline *q* on the interior of the cam-cylinder can be dispensed with, in which case the tension of the work upon the needles *i* must be relied on to bring them back into line with the other needles; but I prefer to employ the incline *q*, as it insures the return of the needles.

In Fig. 3 is represented a slight modification of the device shown in Fig. 2 for throwing out the alternate needles *i*. In this case the projection *m* extends out further from the surface of the needle-cylinder than that shown in Fig. 2, and the projections *l* on the slides *g* are dispensed with, the tops of these slides themselves striking the projection *m* as they rise, while the slides *f* of the needles *h*, which do not require to be thrown out, are shorter (see Fig. 10) than the slides *g* of the needles *i*, so that when raised they do not reach the level of the projection *m*, and are consequently not thrown out thereby.

Fig. 4 represents another modification, in which the projection *m* extends out the same distance from the surface of the needle-cylinder as that shown in Fig. 3, the projections *l* on the slides *g* being also dispensed with, and the tops of these slides themselves striking the projection *m* as they rise; but the slides *f*, instead of being shorter than the slides *g*, are of the same length, but are prevented from being thrown out as they are raised by entering grooves *r* (seen dotted) in the projection *m*.

The projection *m* on the rotating needle-cylinder C may be beveled or inclined, as shown, or may be of rectangular or other form in cross-section, in which case the upper inside corners of the slides *g* or the projections thereon should be rounded or inclined.

In the machine represented in the accompanying drawing two series of needles are employed, each series extending half-way around the circumference of the machine, and having a separate warp and weft thread; *s t* representing the knitting-points, and *u v*, the points where the weft-threads are introduced.

A single series of needles only may, however, be used, or more than two series, if desired, the form of the cam-groove *e* being such as to elevate and depress the needles at the proper times.

It will be seen that instead of pressing the alternate needles outward at the knitting-point, to bring them into line with the other needles, they are carried inward, and consequently no strain is brought upon the thread at the knitting-point, and the liability of breakage is thus avoided.

In Fig. 6 that portion of the cam-groove *e* from 15 to 16 is represented as horizontal, while in Fig. 5 the corresponding portion of the groove *e* from 17 to 18, opposite thereto, is inclined from a horizontal line. I prefer this latter construction, for the reason that where this portion of the cam-groove is inclined the needles *i* are drawn down and at the same time brought back into line with respect to the other needles gradually as they approach the knitting-point, which insures the weft-thread being pressed against the needles *h* of the inside row so as to close their latches, which is thus effected with more certainty than where the cam-groove is horizontal from 15 to 16, as shown in Fig. 6, in which latter case the needles *i* are not drawn back into line with respect to the other needles until just before they reach the knitting-point, and consequently the weft-thread, not being pressed up close to the needles of the inside row, is liable to pass over some of the latches without closing them, and catch in the hooks of the needles, which would result in imperfect work.

In machines in which the needles are divided into two rows for a short distance only to allow of the introduction of the weft-thread, and then brought into a single row again sometime before reaching the knitting-point, it is necessary to employ a presser-wheel, or some other mechanical device, to press down the weft-thread in order to insure its getting below the latches of the inside row of needles at the knitting-point; but in the machine above described the needles are kept divided into two rows while traveling from the point where the weft-thread is introduced until they nearly reach the knitting-point, and consequently the weft-thread is easily brought down into place by the pressure of the warp-thread thereon as the loops are formed, thus avoiding the necessity of employing a presser-wheel for this purpose, as has heretofore, in some cases, been required, which greatly increased the complication of the machine, and rendered it liable to get out of order.

My improved machine is very simple, and comparatively inexpensive, and by its use I am enabled to produce knit fabric having a weft-thread or filling, and which can be fulled and finished so as to form broadcloths, cassimeres, and similar fabrics.

Although I have described my improvements as particularly adapted to rotary or circular machines, they may, nevertheless, be applied equally as well to reciprocating knitting-machines.

Claims.

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

1. The needle-cylinder C having the projection *m* arranged upon it, as described, with reference to the slide-guiding grooves, in combination with the slides *g*, constructed substantially as described, and actuated by a cam-groove, whereby the alternate needles *i*, as they

are raised, are thrown out of line with respect to the other needles, and may return again into line when lowered, substantially as set forth.

2. The incline or projection *q* on the inside of the cam-cylinder B, in combination with the needle-slides *g*, provided with inclines or projections *p* and actuated by a cam-groove, whereby the needles *i* are brought back into line with respect to the other needles, substantially as set forth.

3. The cylinder B having the groove *e* with the long gradual incline 17 18, in combination with the cylinder C having the projection *m* and the needle-slides *g*, whereby the needles *i* are brought gradually into line with respect to the other needles as they approach the knitting-point, substantially as set forth.

Witness my hand this 28th day of December, A. D. 1872.

CORNELIUS CALLAHAN.

In presence of—

P. E. TESCHEMACHER,

N. W. STEARNS.