

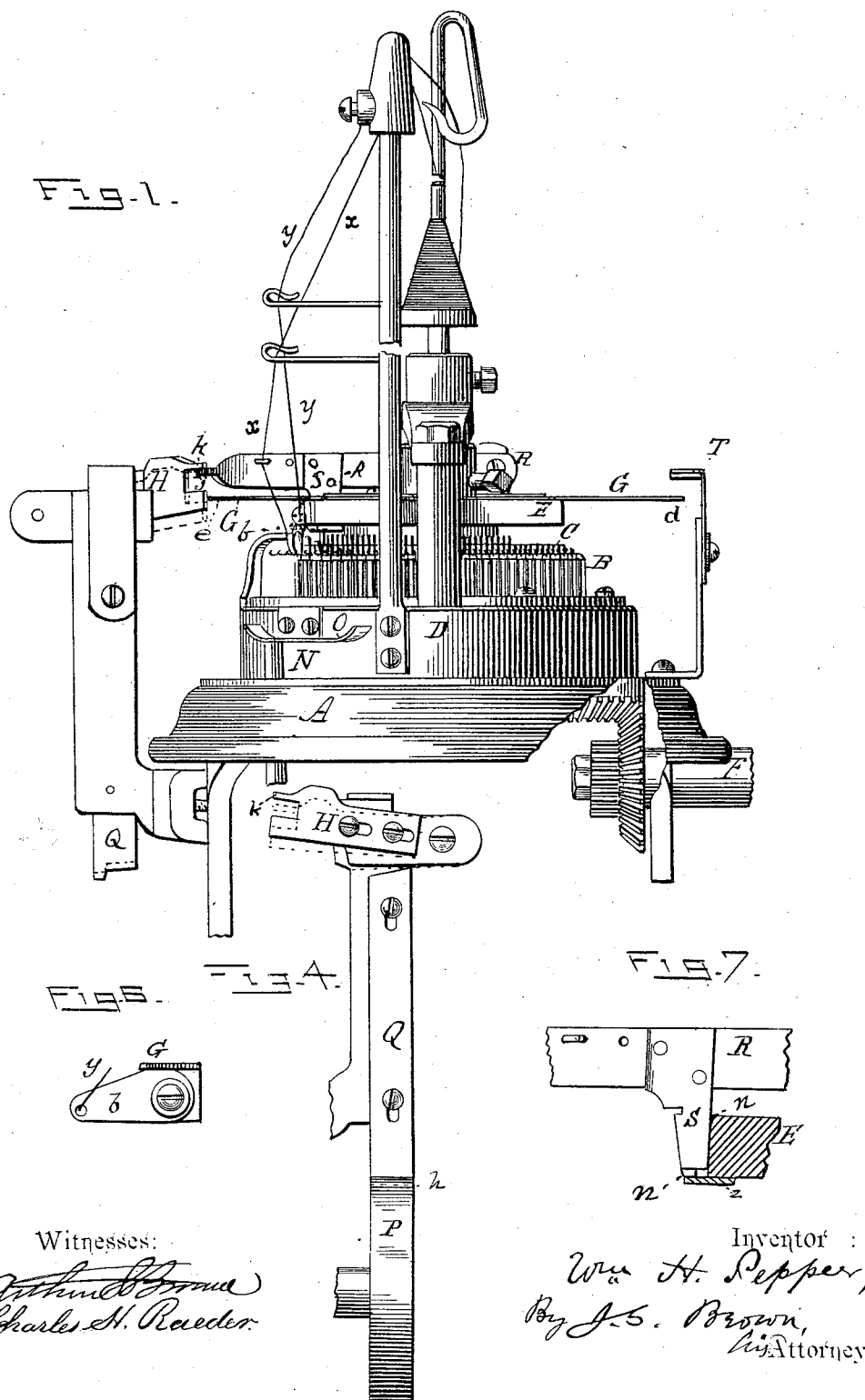
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3 Sheets—Sheet 1.

W. H. PEPPER.  
CIRCULAR KNITTING MACHINE.

No. 347,505.

Patented Aug. 17, 1886.



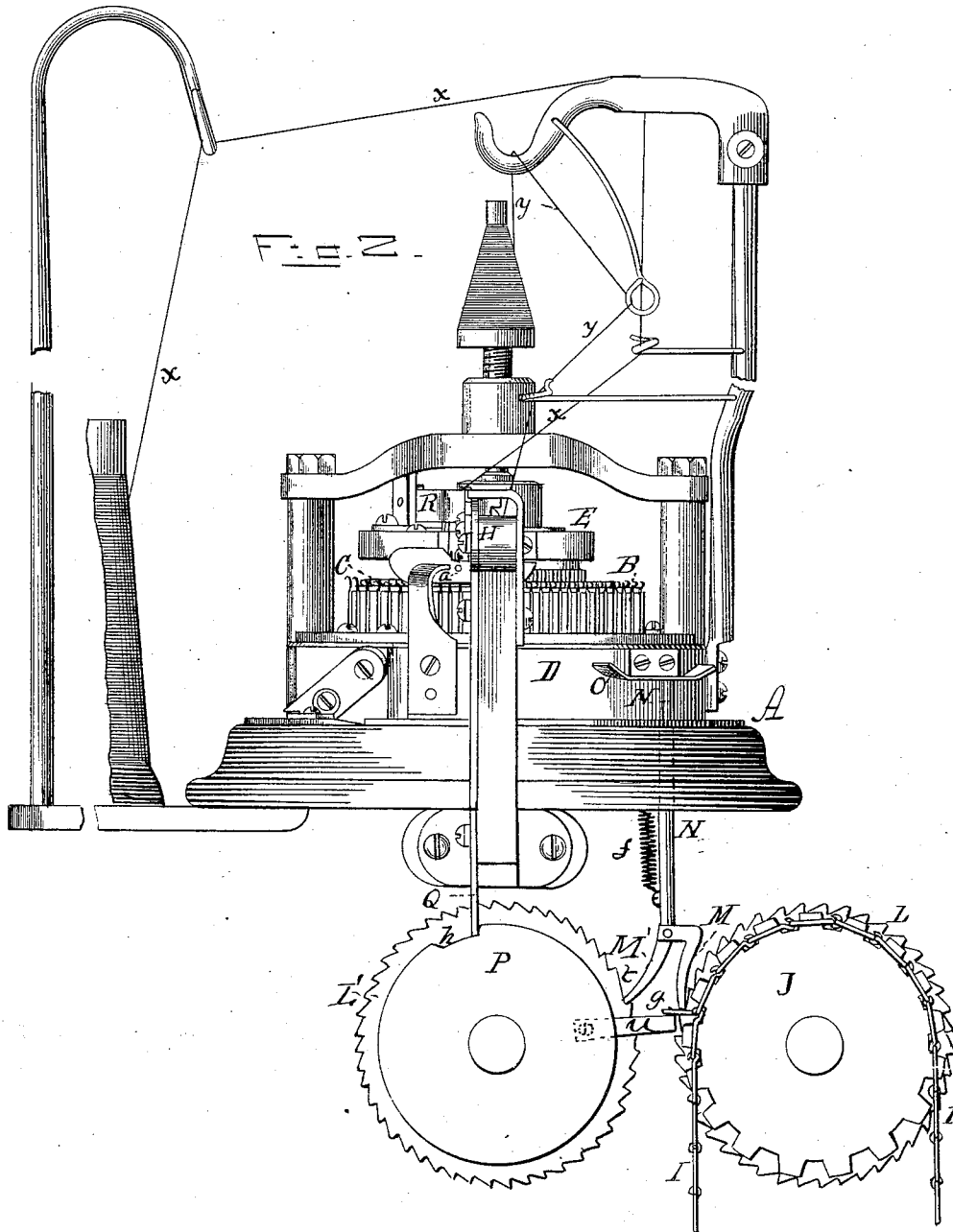
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Witnesses:

*Arthur Brown*  
*Charles H. Raeder*

Inventor :

*Wm. H. Pepper,*  
*By J. S. Brown,*  
*his Attorney*

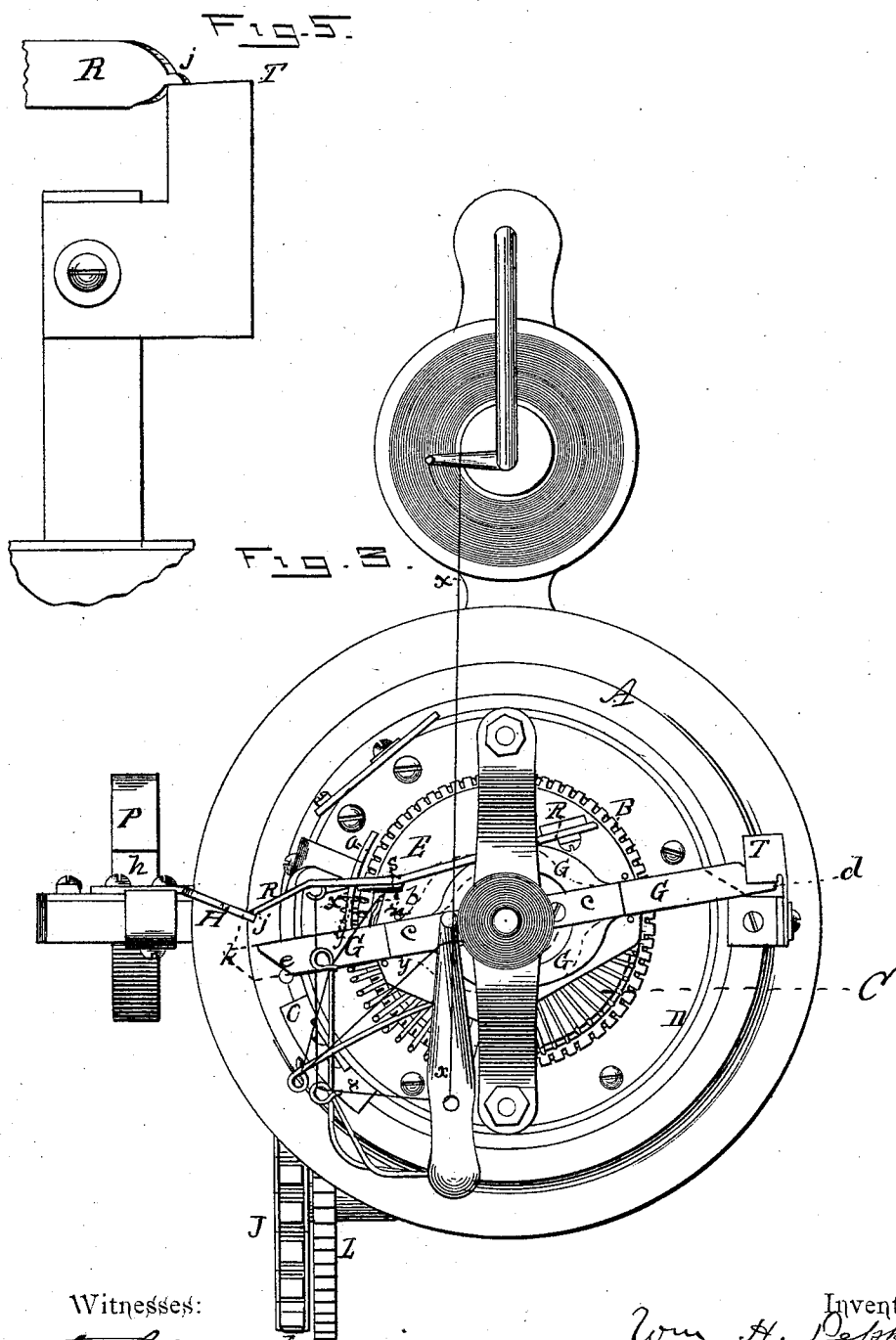
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# UNITED STATES PATENT OFFICE.

WILLIAM H. PEPPER, OF LAKE VILLAGE, NEW HAMPSHIRE.

## CIRCULAR-KNITTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 347,505, dated August 17, 1886.

Application filed November 9, 1885. Serial No. 182,195. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM H. PEPPER, of Lake Village, in the county of Belknap and State of New Hampshire, have invented certain Improvements in Circular-Knitting Machines; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

The special work accomplished by this invention is the knitting in of a re-enforcing thread in any part of a continuous tubular web at any required intervals, to any required extent lengthwise of the web and any proportional part of the circumference thereof, and the breaking off of the re-enforcing thread, after knitting it in at each round, holding the end of the said thread when severed from the web in place ready to be taken by the needles at the proper time for again knitting it into the web, and again releasing the thread at that time, all the above movements being automatically controlled by a pattern mechanism.

To fully set forth and illustrate this invention, I have shown in the accompanying drawings a circular-rib-web-knitting machine with my improvements attached thereto, to be hereinafter described.

In the drawings, Figure 1 represents a front view of the machine with my improvements, a portion of the pattern mechanism being omitted; Fig 2, a side view of the same; Fig. 3, a top view thereof; Fig. 4, a rear side view of a portion of the machine; Fig. 5, a partial side view taken in the direction opposite to that of the view in Fig. 2; Figs. 6 and 7, detail views, respectively, of the movable thread-carrier and thread-breaker.

Like letters designate corresponding parts in all of the figures.

In the drawings, A represents the machine-head supported by a suitable stand or legs; B, the needle-cylinder; C, the dial; D, the cam-cylinder; E, the dial cam-plate, and F the driving-shaft. All these parts are of ordinary or any suitable construction, having the ordinary adjuncts of a circular-rib-web-knitting machine.

The thread *x*, for forming the main web, is led to an ordinary thread-guide, *a*. The re-enforcing thread *y* is led to a special thread-

guide, *b*, attached to a thread-carrier, G, which has a sliding movement outward to carry the thread into a position to be taken by the needles for knitting it into the web, and inward to carry the thread inside the cylinder-needles, where it will not be taken by either set of needles. This thread-carrier G slides in proper guides to keep it in place, and is held beneath spring-plates *c c* or their equivalents, in any position out or in required. It has extensions respectively on both sides of the machine, terminating in inclined or cam-formed ends *d e*, one of which, *d*, when it strikes a suitable fixed arm or stud, H, moves the thread-guide outward for knitting in the re-enforcing thread, and the other cam end, *e*, when it strikes the said arm H, moves the thread-guide inward out of action.

In Figs. 1 and 3 the thread-carrier is shown as having been just previously moved inward by the arm H, out of action, the previous position being indicated by dotted lines in Fig. 3; and it is obvious that when the cam end *d* has been brought round in turn and made to strike the arm H the thread-carrier will have been moved as far in the opposite direction, thereby moving its thread-guide *b* again outward into position for feeding the extra thread to the needles.

With the construction and arrangement shown the re-enforcing thread is knit into half the circumference of the web, and this is the extent required for ordinary re-enforcing; but either more or less than half the circumference may be re-enforced by arranging the throw-in cam end *e*, not opposite to the other, but following the other at an interval of any desired extent, either less or more than half a circle.

The arm H, against which the cam ends of the thread-carrier G strike to throw the same out or in, is required to have two positions, one, as shown by full lines in Figs. 1 and 4, such that the thread-carrier arms *d e* will strike it when knitting in the re-enforcing thread, and the other, as shown by dotted lines in the same figures, such that the said carrier-cams will not strike it, as when the ordinary knitting is going on. A pattern mechanism is required to secure the specified positions of this arm in order that the re-enforcing may be done automatically.

I have represented a pattern mechanism constructed and operating as follows: A pattern-chain, I, is mounted on a wheel, J, the shaft K of which is slowly rotated by means of a ratchet-wheel, L, on the said shaft, a pawl, M, having a tracker-pin, N, attached thereto, and sliding up and down in the machine-head, through which it projects upward, and a cam, O, carried around by the cam-cylinder D and depressing the tracker-pin and pawl at every revolution of said cam-cylinder, the pawl being raised by a retracting-spring, f. Another ratchet-wheel, L', in the same plane as the ratchet-wheel L is moved by another pawl, M', on the same tracker-pin. One of the teeth of the ratchet-wheel L' is wanting, so that when the vacant space *t* reaches the pawl M', as shown in Fig. 2, the ratchet-wheel will cease to turn, because the pawl cannot reach the next succeeding tooth. On the pattern-chain I there are one or more projections, *g*, which, when brought round into position, as shown in the same figure, will strike a projecting arm, *u*, on the ratchet-wheel L' and move it far enough to enable the pawl M' to reach the next ratchet-tooth in order, and then continue to move the ratchet-wheel till it completes another revolution. On the shaft of the ratchet-wheel L' is a disk or wheel, P, which has a depression, *h*, in its periphery. This cam-disk turns under the lower end of the lifting-slide Q, or its equivalent, which raises the stationary arm H into position to be struck by the thread-carrier cams *d e*, and thereby cause the knitting in of the re-enforcing thread. The raised part or regular periphery of the cam-disk P is held under the slide Q as long as the re-enforcing thread is to be knit into the web, and then the slide Q is caused to drop into the depression *h* of the cam-disk, and thus allow the arm H to drop out of the pathway of the thread-carrier cams *d e*, when plain knitting follows. The projections *g* on the pattern-chain I are arranged at such distances apart on the chain as to cause the movements of the slide Q to suit the required re-enforcements in the web.

Although the above-described pattern mechanism is suitable for my present purpose and indicates one means of automatically timing the movements of the re-enforcing devices, I do not confine myself to this particular pattern mechanism.

In connection with the thread-carrier-shifting mechanism, I employ a device for seizing the re-enforcing thread as soon as its thread-guide is moved inward away from the needles, for breaking the thread from the web as soon as it is caught and held, and for releasing it again, ready to be knit into the web, as soon as the thread-guide is moved out over the needles again. The simple device for these purposes (shown in the drawings) consists of a lever, R, pivoted to a revolving part of the machine, conveniently the dial cam-plate E, as shown, the said lever having a downward projection or jaw, S, which strikes upon some

movable part of the machine, such as the ledge or lip *z*, Fig. 7, on the said dial cam-plate. This jaw S is in proper position to strike down on the re-enforcing thread when its thread-guide is moved inward by the cam *e*, and it is held down by any suitable means, the means represented being a cam projection, *j*, on the outer end of the lever R, which strikes a fixed projection, *k*, on the arm H. The action of this cam, by forcibly pressing the jaw S down upon the ledge *z*, causes the re-enforcing thread to be tightly held for a moment while the dial cam-plate advances in its revolution, and, since the knit web is held stationary, the thread is instantly broken thereby close to the web. As the dial cam plate continues to move in its revolution, the re-enforcing thread continues to be held under the jaw S by the weight of the lever, the friction of the jaw in its guide-slot *n* of the cam-plate E, as indicated in Fig. 7 of the cam-plate, or otherwise, there being no tendency to draw the thread from its place there until its thread-guide is again moved outward by the cam *d*, ready to knit the thread into the web. At that moment a stationary cam, T, is struck by the cam projection *j* of the lever R and lifts the lever and its jaw S sufficiently to free the thread therefrom, when the knitting proceeds without obstruction. Thus there is no waste of the re-enforcing thread, and the whole mechanism for its introduction is very simple and inexpensive. The projection *k*, which the cam projection *j* of the lever R strikes, being on the same arm, H, that causes the movements of the thread-carrier G, is automatically controlled by the same pattern mechanism, the two movements being required to be timed together; but it is not necessary that the projection *k* be on the arm H. It may be on a separate arm, which may be controlled in a similar way by the pattern mechanism.

I claim as my invention—

1. The combination of the needles of a circular-knitting machine, revolving dial cam-plate E, shifting thread-carrier G, thread breaking and releasing mechanism R S T, means, as the movable arm H, for actuating the said thread-carrier and thread-breaking mechanism, and a pattern mechanism for automatically controlling the action of the said actuating device H, substantially as and for the purpose herein specified.

2. The combination of the needles of a circular-knitting machine, revolving dial cam-plate, movable re-enforcing thread-carrier mounted on and rotated by the said cam-plate and provided with oppositely-moving cam projections, an arm or projection against which the cam projections of the said thread-carrier strike to shift its position, and a pattern mechanism for automatically moving the said arm into and out of engagement with the thread-carrier cams, substantially as and for the purpose herein set forth.

3. The combination of the needles of a circular-knitting machine, a revolving dial cam-

plate, a movable re-enforcing thread-carrier carried around by said cam-plate, a thread seizing and breaking mechanism carried around by the said cam-plate, a fixed arm or projection for causing the shifting movements of the thread-carrier, and the seizing movement of the thread holder and breaker, a pattern mechanism for controlling the positions of the said fixed arm or projection, and a stationary cam for lifting the thread-holder and releasing the thread, substantially as and for the purpose herein specified. 10

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