(No Model.)

3 Sheets—Sheet 1.

W. H. PEPPER.

CIRCULAR KNITTING MACHINE.

No. 346,604. Patented Aug. 3, 1886.

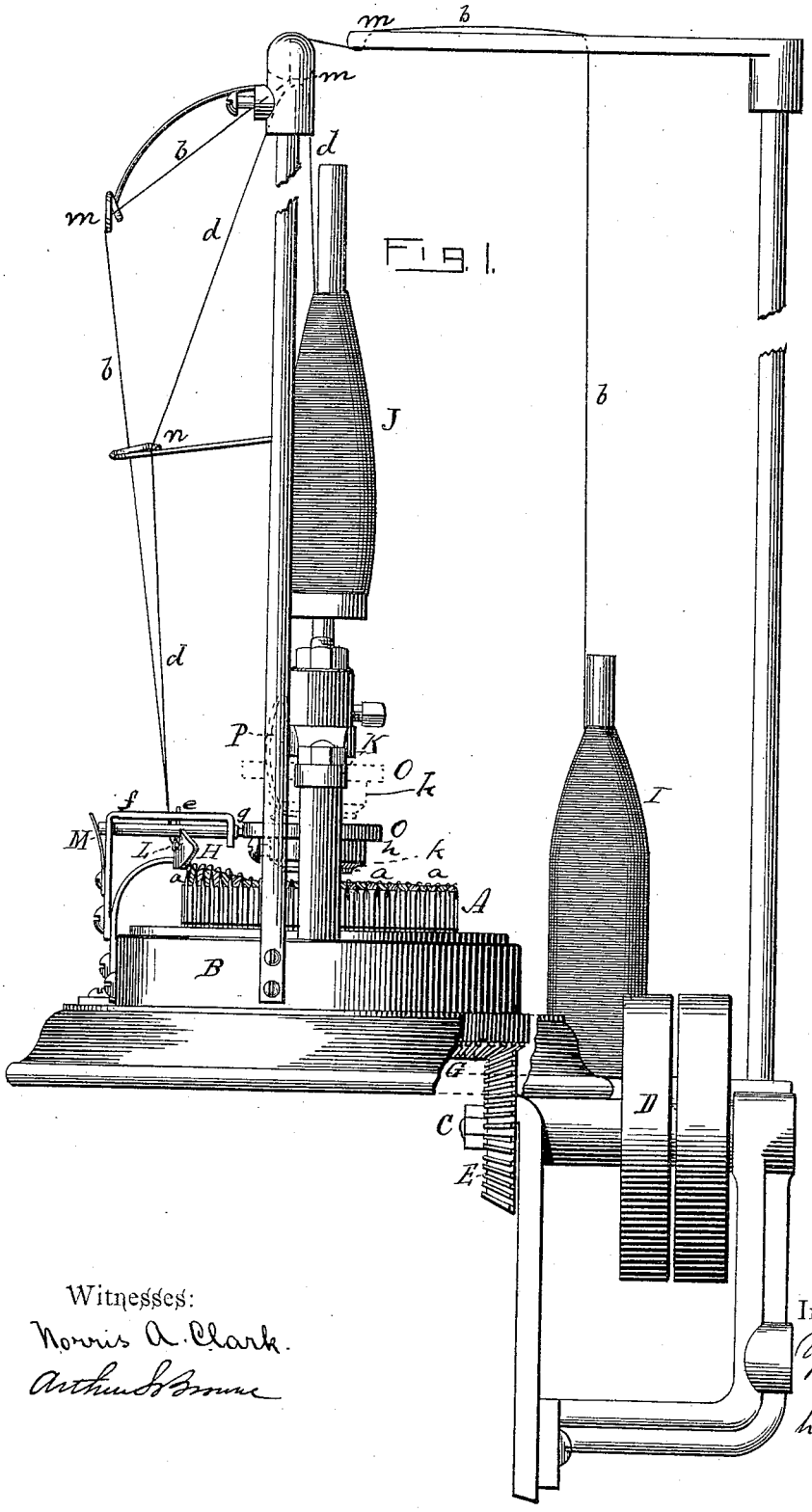

Fig. 1.

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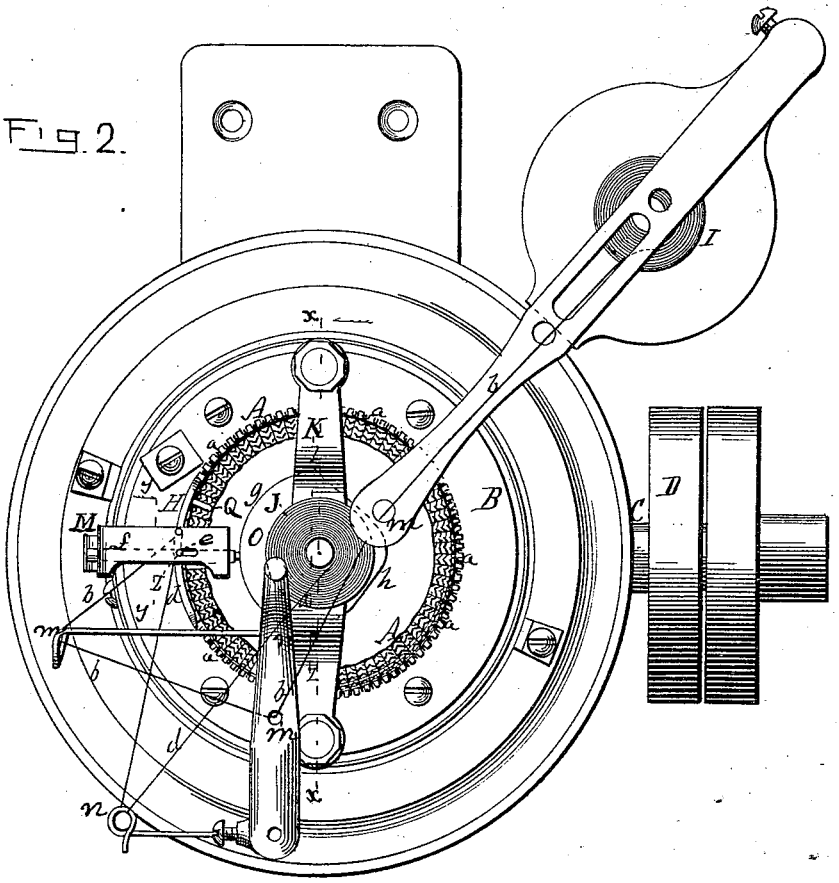
Fig. 2.



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(No Model.) 3 Sheets—Sheet 3.

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Fig. 4.

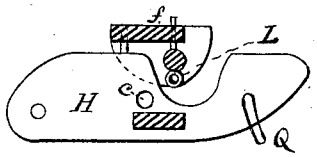


Fig. 3.

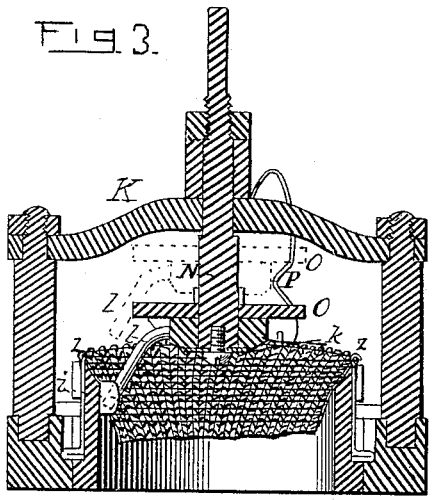
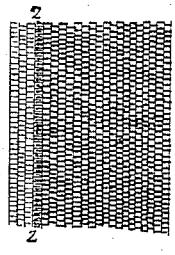


Fig. 5.



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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. 346,604, dated August 3, 1886.

Application filed August 29, 1885. Serial No. 175,658. (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 an Improvement 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.

My improvement is applied to circular-knitting machines, and is for the purpose of knitting into the ordinary tubular web an additional thread in as large a portion of the web as desired, for re-enforcing that part of the web.

In the accompanying drawings, Figure 1 represents a side view of a circular latch-needle knitting-machine for knitting plain hose, showing my devices or mechanism attached thereto for re-enforcing the knees of the hose or stockings knit in the machine; Fig. 2, a top view of the same; Fig. 3, a partial vertical section of the machine in a plane indicated by the line *x x*, Fig. 2; Fig. 4, a sectional view of a part of the machine in a plane indicated by the line *y y*, Fig. 2; Fig. 5, a view of the interior surface of the re-enforced fabric, showing how the loose thread left in the fabric by the re-enforcing thread is cut from the knit web.

Like letters designate corresponding parts in all of the figures.

The main parts of the machine shown in the drawings are those of an ordinary circular-knitting machine for knitting a plain tubular web, and need no description here, as the construction of the same is well known to those skilled in the art. Some of these parts will be referred to by letters of reference to identify the parts in showing their connection with the parts necessarily described in this specification.

Thus A represents the needle-cylinder, and *a a* the needles thereon; B, the cam-ring, which in this machine is represented as revolving and the needle-cylinder as stationary; C, the driving-shaft, and D the driving-pulley thereon; E, a bevel gear-wheel on the driving-shaft, gearing into the bevel gear-wheel G on the cam-ring for rotating the said cam-ring; and H, the ordinary thread-guide for the main thread.

The main thread *b* is carried from the bobbin I, through suitable eyes or loops, *m*, to the thread-guide H, and threaded through its eye *c*, as usual. The additional thread *d*, for re-enforcing the web, is carried from a bobbin, J, mounted on the cam-ring yoke K, through or over suitable eyes or hooks, *n*, to a movable thread-guide, L, which is constructed, arranged, and actuated substantially in the following manner: The said thread-guide L has its bearings in a bracket, *f*, attached to the cam-ring B, and has a sliding movement toward and from the center of the needle-cylinder sufficient to bring the thread *d* into position to be taken by the needles *a a*, as shown in Figs. 1 and 2, or to carry the thread inward far enough to hold the additional thread inside of the needles. It is forced inward to hold the thread ordinarily away from the needles by a suitable spring, M, the extent of its sliding movement being limited by the slot and pin *e*, or equivalent means. Now, to move this thread-guide outward, so as to cause its thread *d* to be taken by the needles, and therefore to be knit into the web, together with the main thread *b*, for re-enforcing the web, the following mechanism is employed:

Upon a vertical round spindle, N, projecting downward from the cam-ring yoke K, concentrically with the needle-cylinder and cam-ring of the machine, is mounted a cam, O, which is shaped to force and hold the thread-guide L outward into position for knitting the additional thread into the web through a portion, *g*, of its periphery, which bears against the inner end of the said thread-guide when in position to operate thereon. The remaining portion *h* of the periphery of the cam is cut inward sufficiently to allow the thread-guide L to be sprung out of operative position. If one-half of the circumference of the knit web is to be re-enforced, one-half of the periphery of the cam is to be formed to hold the thread-guide out into operative position; or if more or less than half of the circumference of the web is to be re-enforced, then a corresponding part of the periphery of the cam is to act on the thread-guide. The cam has a free movement up and down on the spindle, and it has a free turning movement thereon, or the spindle turns therein, since the cam is to be stationary when the cam-ring revolves, as in the machine represented in the drawings. To hold the cam sta-

tionary, mounted as it is on a revolving spindle, it is or may be coupled to the stationary needle-cylinder A by having a downwardly-projecting pin, *l*, which strikes against a lug, *i*, on the interior of the said needle-cylinder, as shown in Fig. 3; or any equivalent means of holding the cam from turning may be employed.

When the cam O is in position for operating on the thread-guide, it rests on a flange or collar, *k*, of the holding-spindle N, as shown by full lines in Figs. 1 and 3, and when the cam is to be made inoperative it is raised on its spindle into a position shown by dotted lines in the same figures. In that position it is simply retained by a spring-catch, P, arranged as shown, or in any suitable way; or any equivalent sustaining-catch may be used. When it is thus raised, the cam is not coupled to the needle-cylinder, and it may turn with its spindle carried by the revolving cam-ring.

During the knitting of the tubular web, whenever a point is reached where a re-enforcement (as the knee of a stocking-leg) is to begin, the attendant simply releases the cam from the catch and lets it drop into position, whereupon it automatically couples itself to the needle-cylinder, and begins to operate on the thread-guide L as the latter is carried around its periphery, and when a sufficient length of re-enforced web has thus been knit the attendant simply raises the cam on the spindle till it is caught and held by the catch P.

The portions of the re-enforcing thread *d* which reach from end to end of the knit-in portions at each round across the inside of the needle-cylinder, as indicated at *z z*, Figs. 1 and 3, are to be cut away after the web has been knit. This may be done in any suitable way, generally leaving short projecting ends of threads on the inside of the web, as shown at *z z* in Fig. 5, which shows a portion of the inside of the web partly re-enforced. These ends form a partial interior nap and do no harm. The ends may be trimmed close to the web, however, if preferred, and there is then no danger of the threads raveling, since they are knit in closely with the main thread of the web.

When the cam O is raised out of action, the re-enforcing thread is still held in proper position to be taken by the needles at its end, when the cam is next lowered into position by means of a hook or pin, Q, projecting inward and downward from the thread-guide H, as shown most clearly in Fig. 2.

It is obvious that the re-enforcing thread *d* may be of any desired size, so as to re-enforce as thickly or thinly as is desired, and that it may be of the same color as the main thread *b*, or of a different color, so as to ornament the hose to that extent, if desired.

I claim as my invention—

1. The combination of the needle-cylinder, needles *a a*, cam-ring B, thread-guide H, movable thread-guide L, shifting cam O, cam-ring yoke K, spindle N, and catch P, substantially as and for the purpose herein specified.

2. The combination of the needles *a a*, cam-ring B, thread-guide H, movable thread-guide L, shifting cam O, needle-cylinder A, and cam-coupling *l i*, substantially as and for the purpose herein specified.

3. The combination of the needle-cylinder, needles *a a*, cam-ring B, thread-guide H, movable thread-guide L, shifting cam O, and thread-holding hook or pin Q, substantially as and for the purpose herein specified.

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Witnesses:
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F. M. SHACKFORD.