

(No Model.)

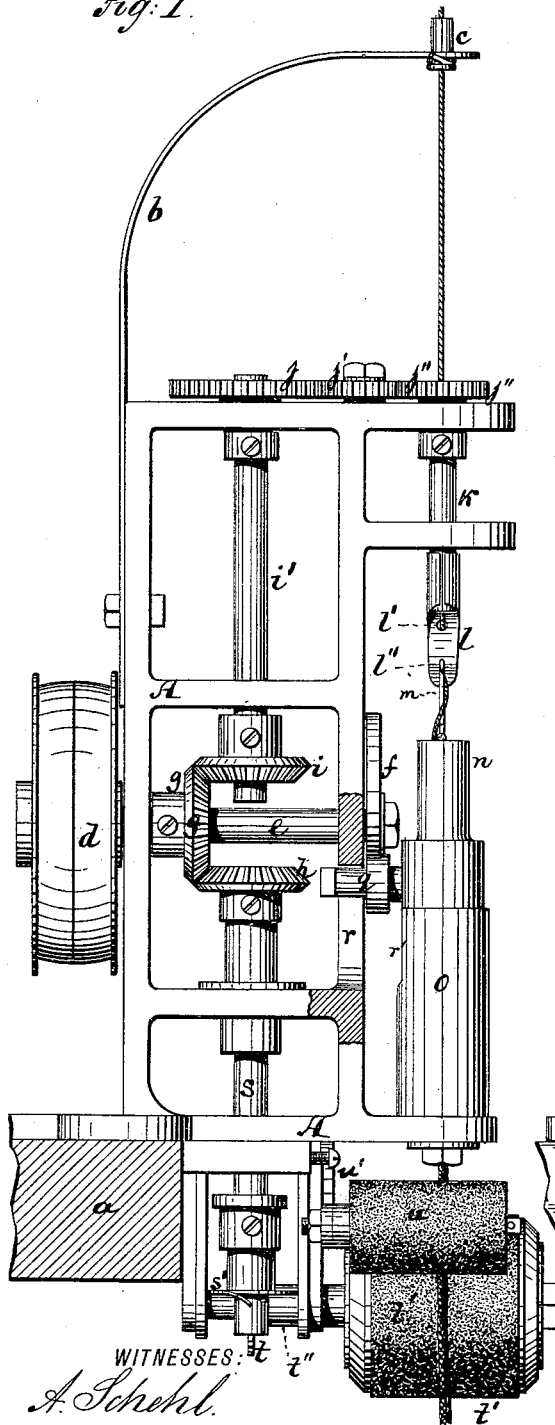
2 Sheets—Sheet 1.

A. WARD.
KNITTING MACHINE.

No. 346,182.

Patented July 27, 1886.

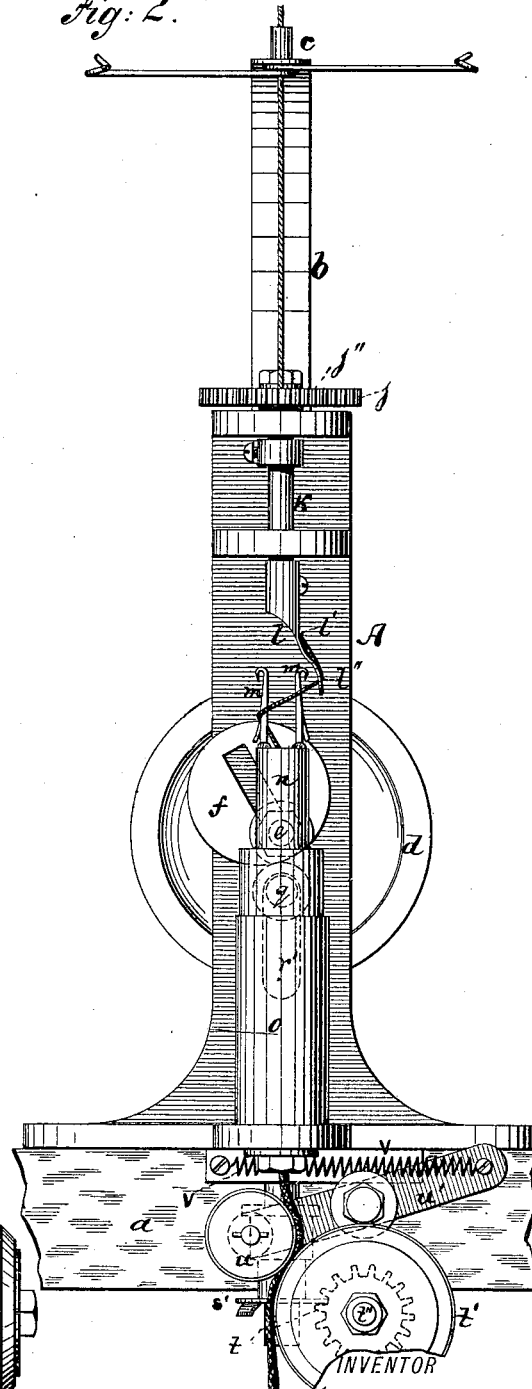
Fig. 1.



WITNESSES: t t'

A. Schohl.
John M. Speer.

Fig. 2.



INVENTOR
Anthony Ward
BY *Briesen & Steelf*
ATTORNEYS.

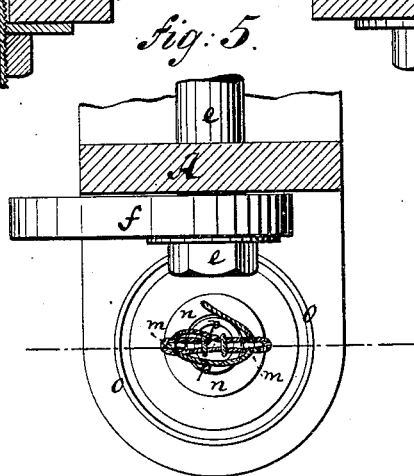
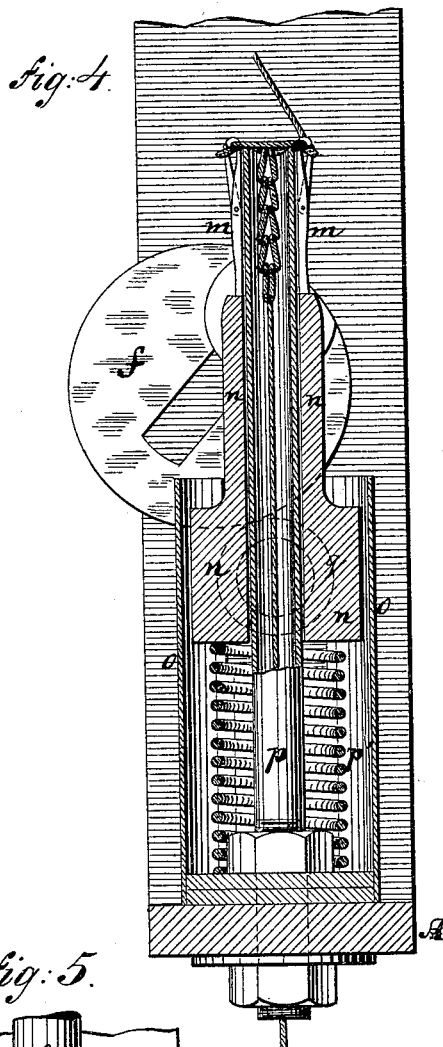
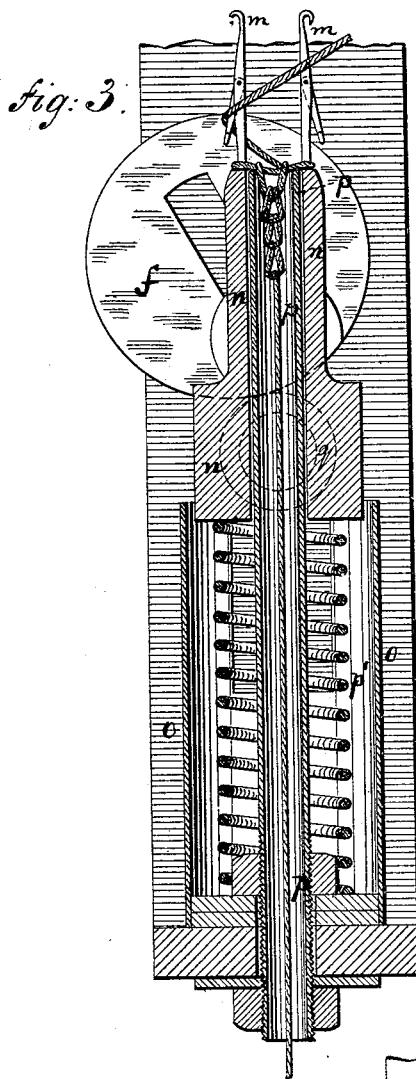
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Brisson & Steele

ATTORNEYS.

UNITED STATES PATENT OFFICE.

ANTHONY WARD, OF BROOKLYN, NEW YORK, ASSIGNOR TO A. G.
JENNINGS & SONS, OF SAME PLACE.

KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 346,182, dated July 27, 1886.

Application filed August 21, 1885. Serial No. 174,940. (No model.)

To all whom it may concern:

Be it known that I, ANTHONY WARD, of the city of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Knitting-Machines, of which the following is a clear, full, and exact specification.

My invention relates to that class of knitting-machines by which cords or tubular fabrics are knitted; and it consists in the apparatus hereinafter described.

In the accompanying drawings, Figure 1 represents a side view, partly sectional, of the cord-knitting machine. Fig. 2 represents a front view thereof. Figs. 3 and 4 are vertical longitudinal views, partly in section, of the apparatus for raising and depressing the needles. Fig. 5 is a detailed top view of the needle-carrying tube, stationary tube, and box.

Referring to the drawings, A is a frame, preferably of cast-iron, which is securely fastened to a table or other support (represented at *a*.) From the rear of the frame rises a bent rod or hook, *b*, having at its end a small tube or opening, *c*, through which the thread is conducted to the thread-guide and needles.

e is a shaft having its bearings in the frame A. A pulley-wheel, *d*, is fastened to the shaft *e* at one end thereof, the other end of the shaft carrying an eccentric wheel, *f*. The shaft *e* also carries a bevel-wheel, *g*, which drives two bevel-wheels, *h* and *i*. The upper bevel-wheel, *i*, by means of its shaft *i'*, transfers its motion to the toothed wheel *j* on top of the frame A, which in turn drives the toothed wheels *j'* and *j''*, that have only one-half the number of teeth which the wheel *j* shows, thus making two revolutions to each one of the latter. The toothed wheel *j''* is rigidly fastened to a hollow shaft, *k*, carrying at its lower end the thread-guide *l*, which has two openings, *l'* and *l''*. The lower end of the thread-guide *l* is bent, so as to overreach the knitting-needles *m* sidewise, and thereby to revolve around them when in motion.

The knitting-needles *m* are of a well-known construction and form, being commonly known as "latch-needles." They have a hook at the upper end thereof, a latch being pivoted in the body and working partly in a slot in the

body, the end of the latch being spoon-shaped, so as to allow the loops formed by the needle to slip off easily when the latter makes its downward movement. The needles are fastened by screws or otherwise to the top of a tube, *n*, which means of the depressing and raising apparatus, hereinafter to be described, slides up and down in the box or upright tube *o*. From the bottom of the box *o* rises another stationary tube, *p*, which, when the machine is at rest, as in Fig. 3, reaches up to about the top of the tube *n*, and is surrounded by the same, as shown. The box *o* contains a coiled spring, *p'*, which presses against the bottom of the tube *n*. Attached to the tube *n* at the rear is a bolt, *q*, bearing a friction-roller, which is in contact with the eccentric *f*. The bolt *q* passes through an upright slot *r* in the frame A, and through a corresponding slot, *r'*, in the rear of the box *o*. When the eccentric *f* presses on the friction-roller, the bolt *q* is depressed in the slot *r*, and with it the tube *n*, which afterward is raised again by means of the spring *p'* when the eccentric recedes.

s is a shaft, which carries at its upper end the bevel-wheel *h*, and at its lower end a worm, *s'*, both revolving with the shaft *s*. The worm *s'* gears into a worm-wheel, *t*. The wheel *t* in turn drives the roller *t'*, both being rigidly fastened to the axle *t''*.

u is a roller, which is hung in a pivoted bar, *u'*, and which, by a spring, *v*, is firmly pressed against the roller *t'*.

The operation of the machine is as follows: The thread is led through the opening *c* and the hollow shaft *k* to the thread-guide *l* and its openings *l'* and *l''*. It is then drawn through the tube *p* and between the rollers *t'* and *u*. To cause the formation of loops, it is necessary to lay the thread, in starting, twice around the needles *m*, in such manner that one loop will surround their lower portion below the latches and one loop will surround their upper portion over the latches, as is clearly shown in Fig. 3. When the machine is now set in motion, the eccentric *f* presses the bolt *q* downward, and thus causes the needle-carrying tube *n* to slide downward in the box *o*, thereby compressing the coiled spring *p'*. While the needles are moving downward that portion of the

thread which was conducted around them below the open latches is held in the same horizontal position by means of the stationary tube *p*. (See Fig. 3.) It thus presses against the latches of the descending needles from below and turns them up, as in Fig. 4, until their spoon-shaped ends will rest against the hooks of the needles, thus holding upper portion of the thread, which had been laid over the latches, in an eye, as is shown in Fig. 4. When the lowest position of the needles is nearly reached, the loops which have been pressed upward from the base of the needles slip over the hook, and are immediately thereafter drawn toward the center of the tube *p* and slightly downward by means of the pressure-rollers *t' u*, which are set in motion by the worm *s'*. The latches being now released fall easily downward. The eccentric gradually releases its pressure. The coiled spring *p'* correspondingly raises the tube *n*, and with it the needles. While the needles are ascending, the pressure-rollers *t' u*, which firmly clamp the thread, hold the loops which are under the hooks of the raised needles in the same horizontal position—i. e., on top of tube *p*—and thus cause them to travel over the open latches to the shanks of the needles, where they are now in readiness to repeat the operation of the first

lower set of loops at the next revolution. The thread-guide, which revolves twice as fast as the wheel *f*, then lays the thread around the upper portion of the open needles, as in Fig. 2, and the operation is then continued as before. The repetition of this movement produces a cord having two sets of meshes—one from each of the needles *m m*; but several threads may be used at the same time, and the number of needles may also be increased.

The pressure-roller arrangement described by me is a well-known device, and any other device may be used therefor whereby the thread will be firmly clamped and pulled.

The thread, instead of being led to the shaft *k* through the opening *c*, may be conducted directly from the spool.

I claim as my invention—

The combination of the frame *A*, shaft *e*, bearing the eccentric *f*, and the bevel-wheel *g*, shaft *i'*, bevel-wheel *i*, toothed wheels *j j' j''*, hollow shaft *k*, thread-guide *l*, knitting-needles *m*, sliding tube *n*, stationary tube *p*, box *o*, spring *p'*, and bolt *q*, substantially as described.

ANTHONY WARD.

Witnesses:

GUSTAV SCHNEPPÉ,
HARRY M. TURK.