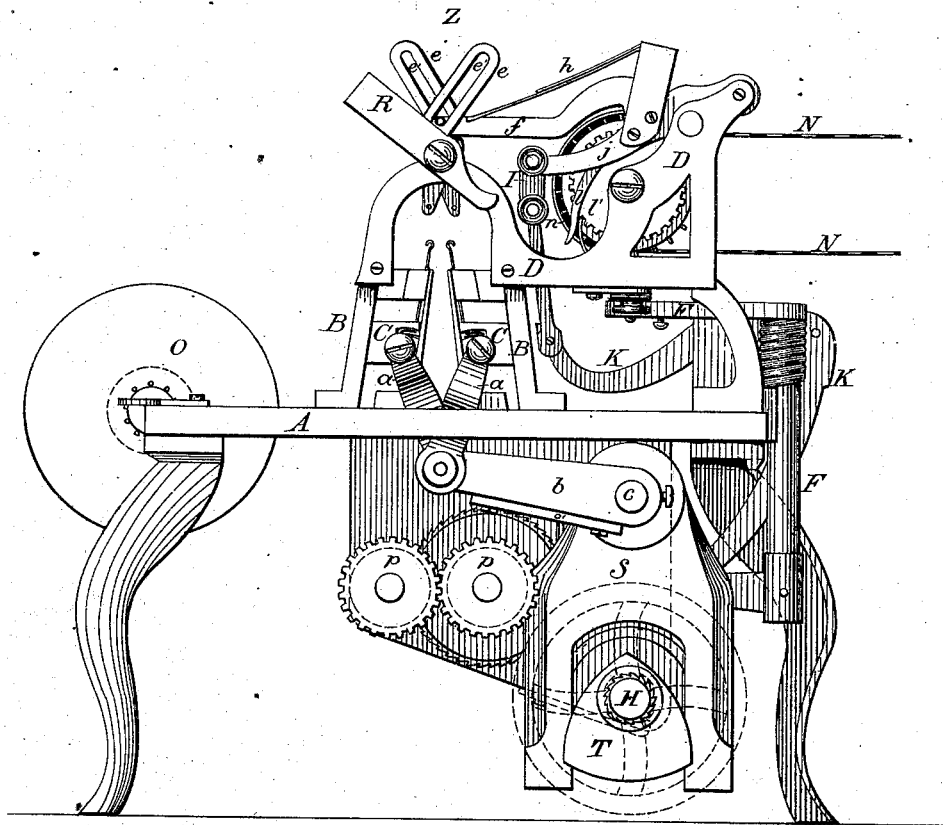


E. P. CURTISS.
Knitting-Machine.

No. 161,008.

Patented March 23, 1875.

Fig. 1.



Attest:
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S. M. Foul

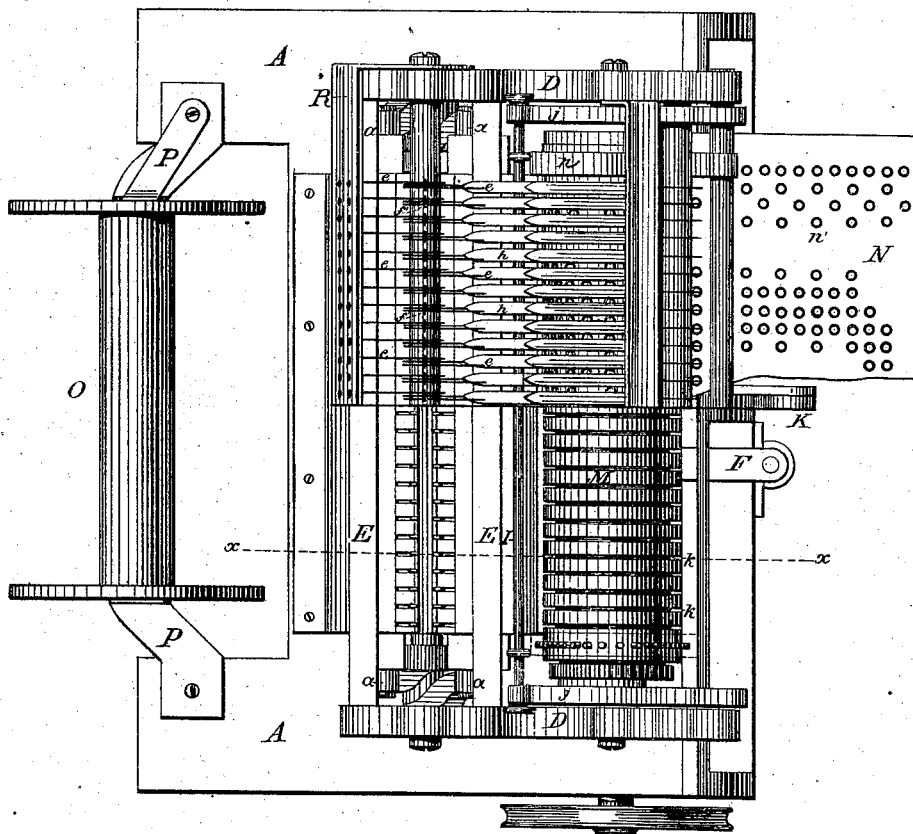
Inventor:
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Fig. 2.



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Fig. 3.

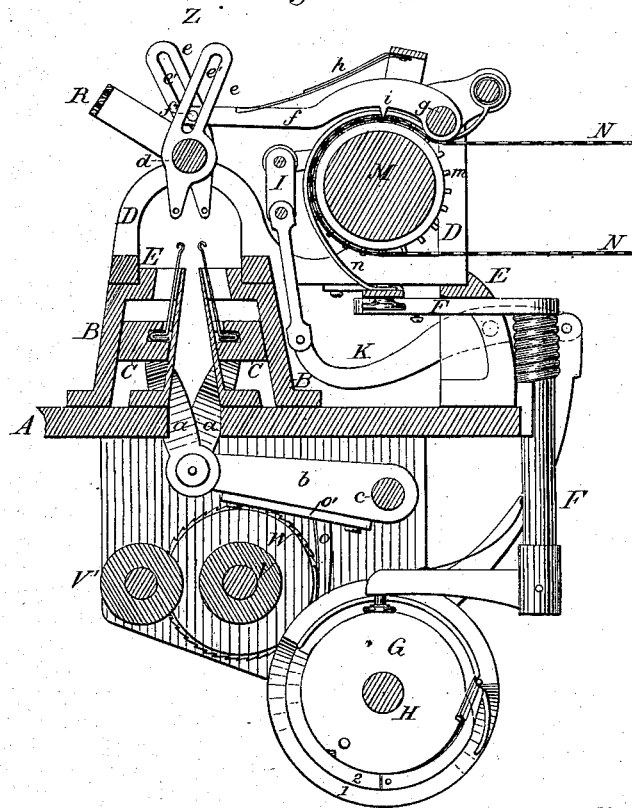


Fig. 4.

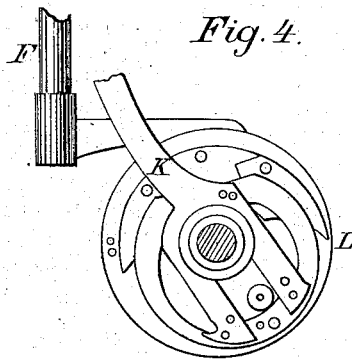
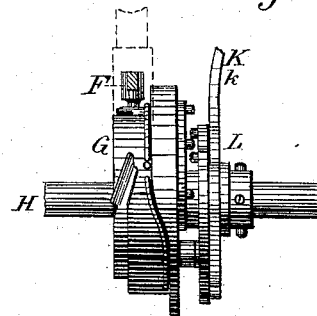


Fig. 5.



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UNITED STATES PATENT OFFICE.

EDWARD P. CURTISS, OF NORWALK, ASSIGNOR OF ONE-HALF HIS RIGHT
TO THEODORE C. FOOTE, OF CLEVELAND, OHIO.

IMPROVEMENT IN KNITTING-MACHINES.

Specification forming part of Letters Patent No. **161,008**, dated March 23, 1875; application filed
February 13, 1875.

To all whom it may concern:

Be it known that I, EDWARD P. CURTISS, of Norwalk, in the county of Huron and State of Ohio, have invented certain new and useful Improvements in Straight-Knitting Machines, of which the following is a specification:

This invention relates to that class of straight-knitting machines wherein all the needles are operated simultaneously; and the invention consists, first, in a straight-knitting machine, constructed with two sets of needles, operated simultaneously in inclined ways, so as to bring the heads of the needles together, thus insuring the catching of the yarn. The invention also consists in a straight-knitting machine, constructed with slotted thread-guides, mounted on a shaft above the needles, in pairs, each pair operated by a single thread-guide-operating lever, all of which levers are mounted on a common shaft and operated independently by means of a jacquard. The invention still further consists in a straight-knitting machine, having a tripping-lever for raising the several thread-guide-actuating levers at the same time, and for operating the jacquard cylinder. Finally, the invention consists in a knitting-machine provided with a paper jacquard, having the pattern made therein by eyeleted holes, all as hereinafter fully set forth.

In the accompanying drawings illustrating my invention, Figure 1 is a side elevation with part of the framing removed. Fig. 2 is a top plan view with half of the levers and thread-guides removed. Fig. 3 is a vertical section on line *x x* of Fig. 2. Figs. 4 and 5 are side and edge views, respectively, of the operating-cams.

The letter A represents a bed-plate; B B, needle-ways, set at an angle thereupon; C C, needle-carriers, sliding in said ways, and having a number of ordinary latch-needles removably secured therein. One set of such needles is arranged in each of these carriers, with their backs opposite each other, so that, as the carriers are raised, the heads of the needles almost meet, the opposite needles of the two sets thus working as pairs. These carriers receive a vertically-reciprocating mo-

tion from arms *a a*, hung on cranks *b*, projecting from a rock-shaft, *c*. Above these needles is a frame, D, traveling back and forth across the machine on ways E, and having a shaft, *d*, on which are secured a number of crossed arms, *e e*, separated from each other, but working in pairs; and having eyes through their lower ends through which the threads are passed, and slots *e'* in their upper extremities. These arms constitute thread-guides, and are moved back and forth like the blades of a scissors, so as to properly present the threads to the needles by levers *f*. These levers *f* are mounted on a shaft, *g*, at one end, while the other end extends between and has a cross head or pin, *f'*, projecting into the slotted ends of the pairs of thread-guides. Springs *h*, secured to the frame D, bear upon the levers *f* to hold them in proper position; and each lever is made with a downwardly-projecting tongue, *i*, for a purpose hereinafter indicated. The frame D is made to slide back and forth on its ways by an inverted L-shaped rock-shaft, F, which receives its motion from a cam, G, on the driving-shaft H. This cam is of such form as to give the frame two motions in the same direction in going each way; and it may be constructed as indicated in Figs. 3 and 5—that is, with two connected or communicating cam-grooves, 1 and 2. A bar or frame, I, composed of two parallel connected rods, and suspended in arms *j*, hinged to the frame D, is arranged to rise and fall underneath the levers *f*. This frame is operated by a jointed lever, K, which receives its motion from a cam, L, on the driving-shaft, and its office is to simultaneously trip all the levers *f*; hence I have denominated it the “tripping-lever.” In the rear of the frame D is hung, in suitable bearings, a cylinder or drum, M, having a number of grooves, *k*, around it corresponding in number with the levers *f*, and designed to receive the tongue *i* of the levers. This drum is rotated intermittingly by a pawl and ratchet, *l l'*, and has arranged on its periphery, at its ends, a series of pegs, *m*, closely over which rise fenders *n*. This drum receives on its pegs a jacquard, N, which is made of paper, having a row of eyeleted holes on each edge, so as to work on the pegs *m*, and having the pattern to be knit

formed therein by eyeleted holes *n'*. By arming the jacquard holes with eyelets, said jacquard is rendered more durable. The fenders *n* serve to hold the jacquard on the pegs. *O* is the thread-spool, hung in tension-bearings *P*, and *R* is a stationary thread-guide frame, secured to the traveling frame *D*. The rock-shaft *c* receives its motion from a forked pitman, *S*, operated by an eccentric, *T*, on the driving-shaft. *V V'* are rubber rollers, hung in bearings in the frame of the machine directly under the needles, and serving to catch the fabric as it is knit and draw it with proper tension. These rollers are geared so as to operate together, by toothed wheels *p p*, and are given an intermittent motion by means of a ratchet, *W*, and pawl *o*, the latter secured to the crank-arm *b* of the rock-shaft. The pawl *o* is attached to the crank-arm *b* by means of a plate, *o'*, which may be adjusted on said arm *b* so as to increase or lessen the throw of the pawl, which, causing an increased or diminished rapidity of rotation of the rollers, the fabric is drawn through more or less quickly. By this means the fabric is knit more or less loosely. These rollers are composed of rubber cylinders secured on metallic shafts by pins passed diametrically through them.

My machine being thus constructed, its operation is as follows: The threads or yarns are supplied from the spools through guides *R* to the guides *Z*—which, as before described, are composed of the arms *e e*—one thread for each needle. Motion being applied, the frame *D* is moved half-way across its ways, the levers *f* are raised, and, operating the thread-guides *L*, cross the threads to opposite needles. During this time the needles have been moved in one direction, and when moved in the opposite direction the frame *D* completes its travel across the machine in the direction of the first move. At each movement it carries the thread from one pair of needles to the next.

This knits a solid fabric, alike on both sides. The figure or pattern on the jacquard is formed in the fabric by the tongues *i* on the levers falling in the eyelets, forming this pattern. The levers *f* thus engaging with the jacquard, are pressed down by their springs *h*, and operate the thread-guides with which they are

engaged, independently of the tripping-lever *I*, so as to change the threads to opposite needles.

It will be understood that the jacquard drum is rotated in harmony with the motion of the tripping-lever, and this latter with that of the frame *D*.

It will also be seen that the tongues *i* readily slip out of the eyelets in the jacquard as it moves, and that the metal of said eyelets preserves the jacquard pattern from injury.

The backward and forward movement of the thread-guides, and the crossing the threads over the needles, insure the certainty of the formation of the stitches.

The drawing-rollers *V V'* operate simultaneously with the needles, so as to properly carry the fabric as it is knit.

What I claim as new is—

1. In a machine for knitting a straight solid fabric, two sets of needles arranged in inclined ways, and all of the needles in each set operated simultaneously, so as to bring the heads of the pairs of needles together, substantially as and for the purpose described.

2. The combination of the thread-guides *Z*, spring-levers *f*, and jacquard *N*, constructed and operating substantially as described, for the purpose specified.

3. The combination of the tripping-lever *I*, jointed lever *K*, and cam *L*, with the levers *f* and jacquard cylinder *M*, substantially as and for the purpose described.

4. In a knitting-machine, a jacquard, having the pattern formed therein with eyeleted holes, for operating the threads, substantially as specified.

5. In a knitting-machine, the cylindrical grooved jacquard carrier *M*, operating substantially in the manner and for the purpose described.

6. The sliding frame, *D*, carrying the jacquard, thread-guides, tripping-lever, and levers *f*, in combination with a cam, *G*, and rock-shaft *F*, substantially as and for the purpose set forth.

E. P. CURTISS.

Witnesses:

A. C. BRADLEY,
WM. H. FINCKEL.