2 Sheets—Sheet 1.

W. H. PEPPER.

Knitting-Machine.

No. 214,522. Patented April 22, 1879.

Fig. 1.

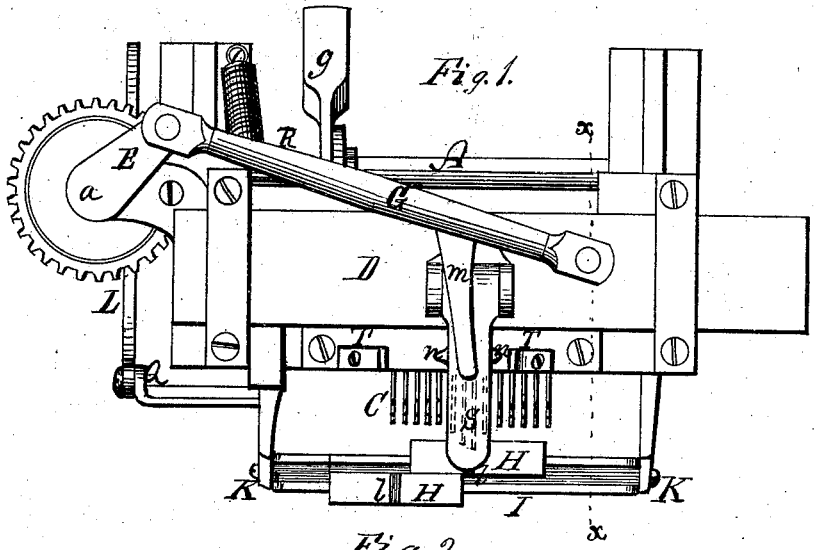
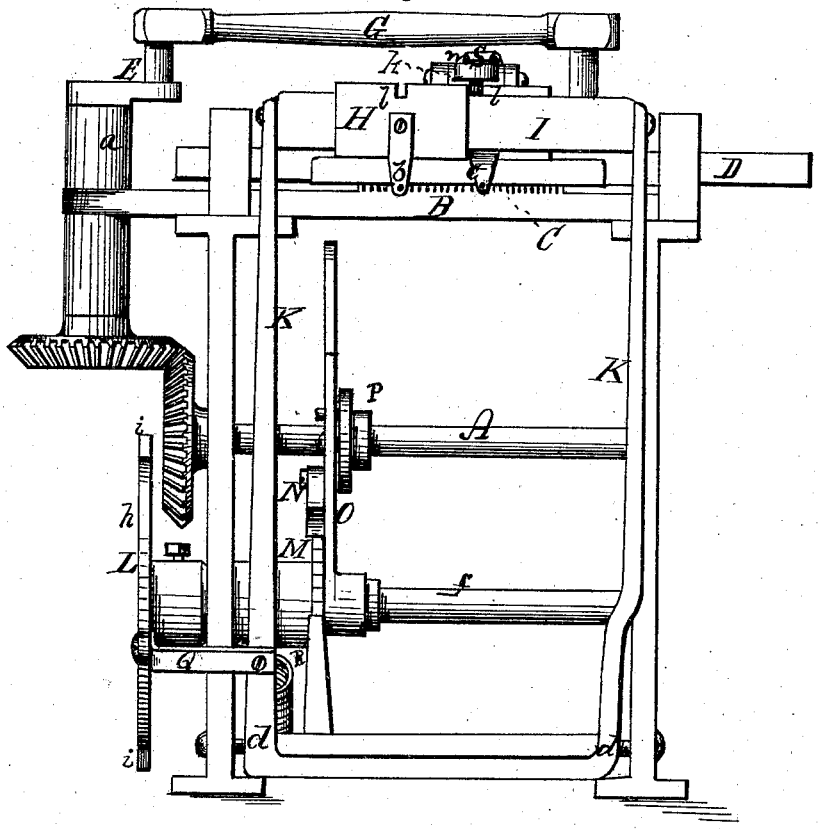


Fig. 2.



WITNESSES

E. W. Gallaher.

W. E. Kennaugh

INVENTOR,

Wm. H. Pepper,

By J. S. Brown,

his ATTORNEY.

2 Sheets—Sheet 2.

W. H. PEPPER.

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Fig. 3.

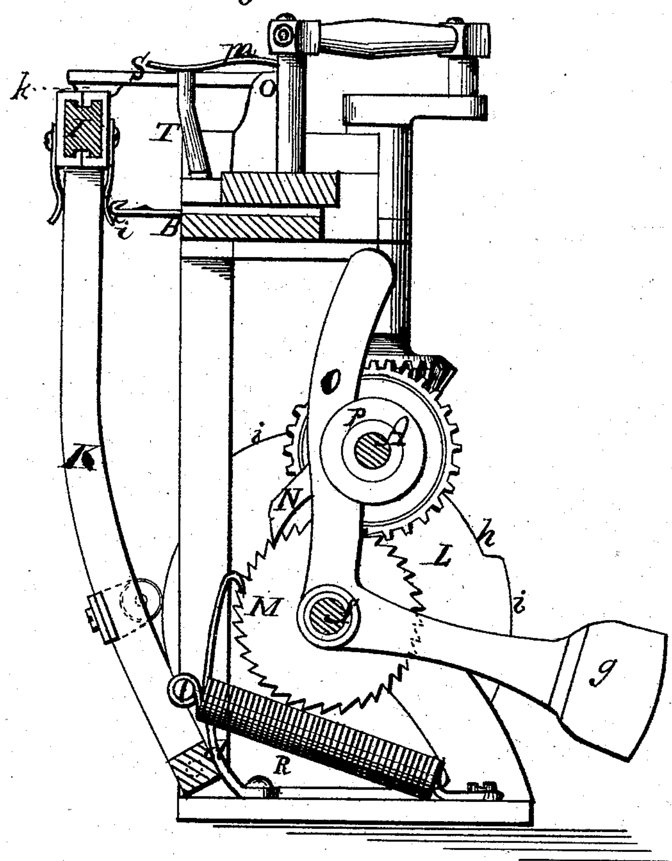
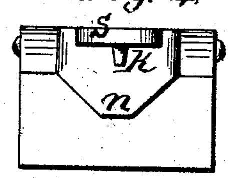


Fig. 4.



WITNESSES

E. M. Gallaher

W. E. Kinnaugh

INVENTOR,

William H. Pepper,

By J. S. Brown,

his ATTORNEY.

UNITED STATES PATENT OFFICE.

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

IMPROVEMENT IN KNITTING-MACHINES.

Specification forming part of Letters Patent No. **214,522**, dated April 22, 1879; application filed September 28, 1877.

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 Improved Straight-Knitting Machine; 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—

Figure 1 being a top view of a knitting-machine provided with my improvements; Fig. 2, a front view of the same; Fig. 3, a vertical section thereof in a plane indicated by the line *x x*, Fig. 1, and Fig. 4 a view of a part detached.

Like letters designate corresponding parts in all of the figures.

My improvements belong to the class of flat-frame sliding-needle knitting-machines, and are applied for the purpose of automatically changing the colors when two or more colors of yarn are used for knitting striped work. The improvements are applicable to all straight machines.

My invention consists in a device for shifting the yarn-guides of knitting-machines to knit with different colors in succession, consisting of sliding blocks bearing the yarn-guides, the said blocks having notches, or their equivalent, in their upper faces, by which a driving-arm is coupled thereto or uncoupled therefrom, and the said driving-arm being provided with a cam-projection, whereby it is operated by coming in contact with stationary cam studs or projections, substantially as hereinafter set forth.

In the drawings, A represents the driving-shaft of a straight-knitting machine; B, the needle-bar; C, the set of needles mounted thereon, and D the reciprocating cam-bar which throws the needles forward to perform the knitting. The said cam-bar is driven by a crank, E, on a vertical shaft, *a*, geared to the driving-shaft, the said crank being connected with the cam-bar by a connecting-rod, G.

The sliding blocks H H, which respectively carry the thread or yarn guides *b c*, (two being represented in the drawings,) are mounted on a bar, I, situated over the needles C, and parallel with the needle-bar B. This guide-bar is attached at its ends to two swinging arms, K K, pivoted at their lower ends, *d d*, to the frame of the machine, so that the guide-bar may have a movement forward and backward over the needles in the direction of their length, to bring the respective yarn-guides *b c* alternately into position for laying the yarn upon the needles. This forward and backward movement of the guide-bar I is automatically effected by means of a cam or pattern wheel, L, attached to a shaft, *f*, on which is a ratchet-wheel, M, wherein plays a pawl, N, on a vibrating arm, O, whose vibratory movement forward is effected by a cam, P, on the driving-shaft A acting directly against it to move the said pawl once at each revolution of the driving-shaft. The backward movement of the arm O may be effected by a counter-weight, *g*, or any equivalent means. Thus the pattern-wheel L has a constant movement on its shaft, step by step, at every revolution of the driving-shaft and knitting of each double row of stitches. Against the periphery of this pattern-wheel bears a stud or arm, Q, on one of the guide-bar-supporting arms K K, as shown, and it is lightly pressed or held thereto by a spring, R, or its equivalent.

Sections *h* of the periphery of the pattern-wheel have a radius just sufficient to hold the rear yarn-guide, *b*, in right position over the needles to knit with its yarn or thread, and other sections, *i i*, of the periphery have a radius just sufficient to hold the forward yarn-guide, *c*, in position for the knitting over the needles. These different sections are of varied lengths, so as to hold the respective yarn-guides in position during the knitting of more or fewer rows of stitches, according to the pattern designed, since it is obvious that, as the pattern-wheel is turning with a constant movement, the longer one of the sections is the more rows of stitches are knit with the yarn then in position. As the arm Q rides from one section of the periphery to another the guide-bar I is shifted in position forward or backward.

The sliding blocks H H are arranged to embrace different parts of the guide-bar I, to keep them in place and not interfere with each other, substantially as shown, or in any equivalent way. They slide with only sufficient friction to stay in any position in which they may be left. Their sliding movement on the guide-

bar is effected by the cam-bar D through means of an arm, S, pivoted or hinged to the said cam-bar, and reaching forward to either one of the sliding blocks which may be in position for the knitting at the time. On the under side of this arm is a finger or projection, *k*, which fits into a notch, *l*, in the upper face of either sliding block, and when this projection falls into one of said notches it slides the block as the cam-bar moves and carries the said arm. The arm falls by its own weight into the notches, or may have a spring, *m*, to assist or insure its descent.

To lift the arm so as to detach it from the notch of the block, for shifting from one block to the other, two studs or stationary cam-projections, T T, are attached to the needle-bar at the proper points, as shown, and on the under side of the arm is a double cam, *n*, which rides over these studs at the termination of the knitting movements, and thereby lifts the arm-projection entirely out of its notch, holding it thus raised while the sliding blocks are shifted in position for changing the yarn, and at the proper time it again allows the projection on the forward end of arm S to descend into and couple with the notch of the sliding block then in position for the knitting. Thus not only are the sliding blocks automatically shifted in position, but the driving-arm is raised and lowered for coupling and uncoupling therewith automatically, and always at the proper times.

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

The combination of the sliding blocks H H, having notches *l l* in their upper faces, with the hinged driving-arm S, provided with a downward projection, *k*, and cam *n*, and the cam-studs T T, and controlling and driving mechanism, substantially as and for the purpose herein specified.

The foregoing specification signed by me this 21st day of August, 1877.

WM. H. PEPPER.

Witnesses:

C. P. S. WARDWELL,

HENRY B. QUINBY.