2 Sheets—Sheet 1.

C. J. APPLETON.

EMBROIDERY KNITTING-MACHINE.

No. 176,455. Patented April 25, 1876.

Fig. 1

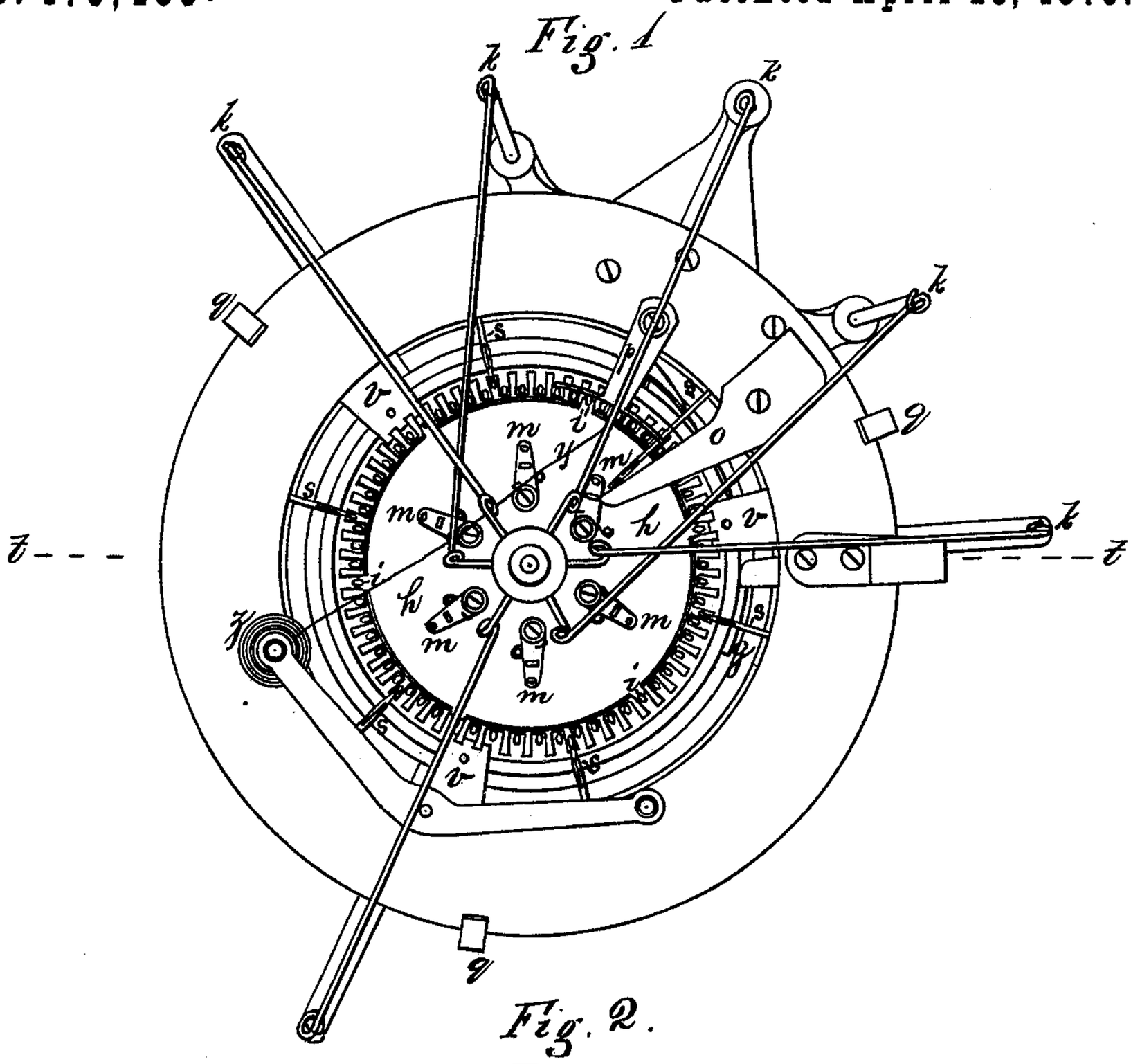
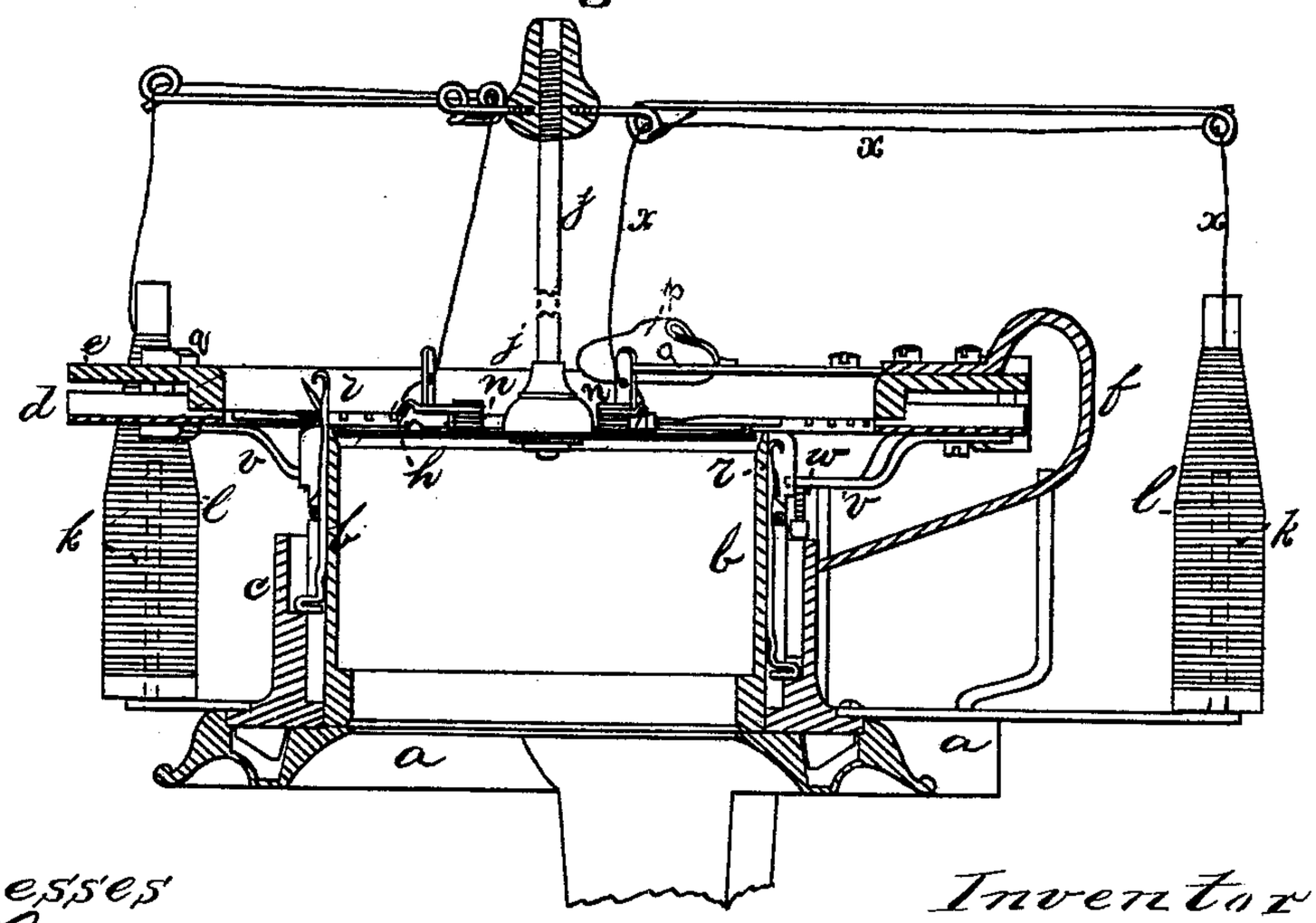


Fig. 2.



Witnesses
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2 Sheets—Sheet 2.

C. J. APPLETON.

EMBROIDERY KNITTING-MACHINE.

No. 176,455. Patented April 25, 1876.

Fig. 3.

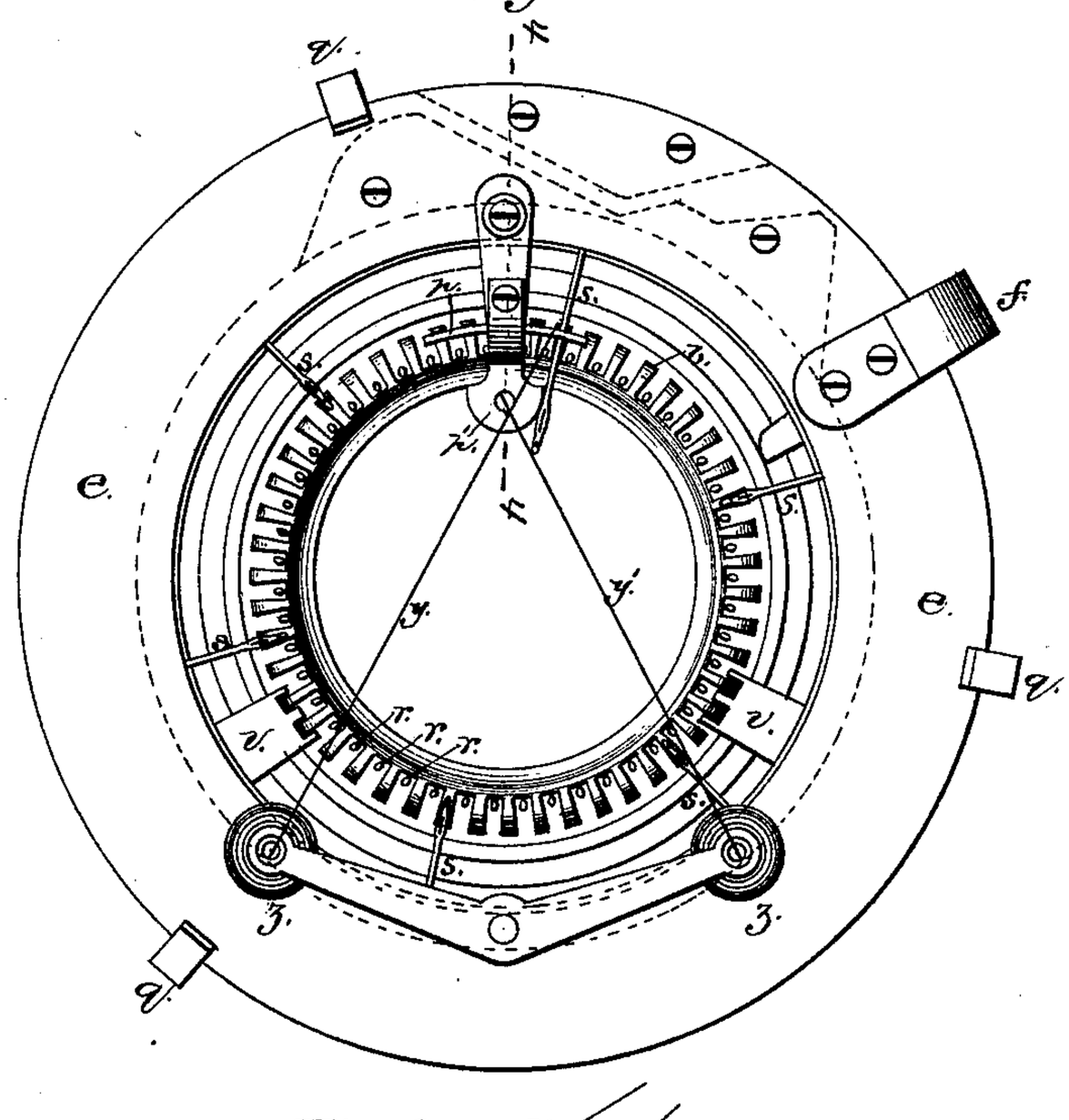


Fig. 6.

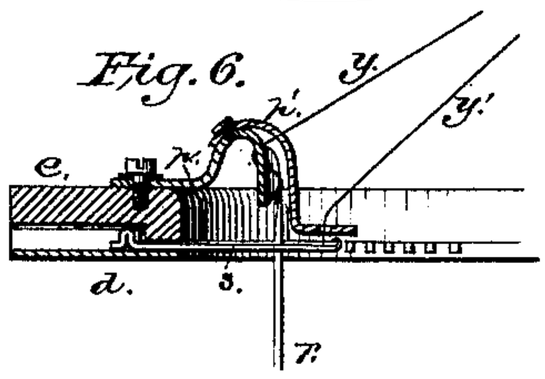


Fig. 4.

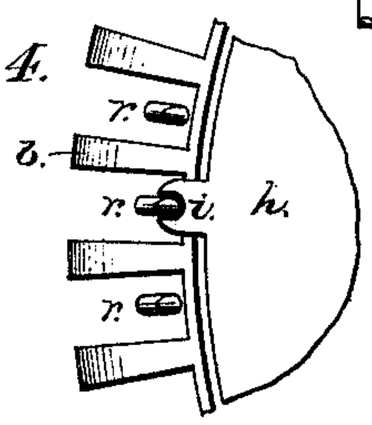


Fig. 5.

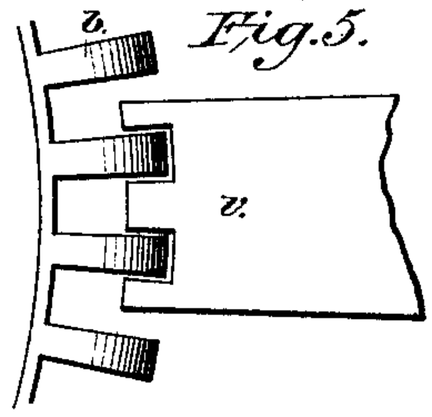
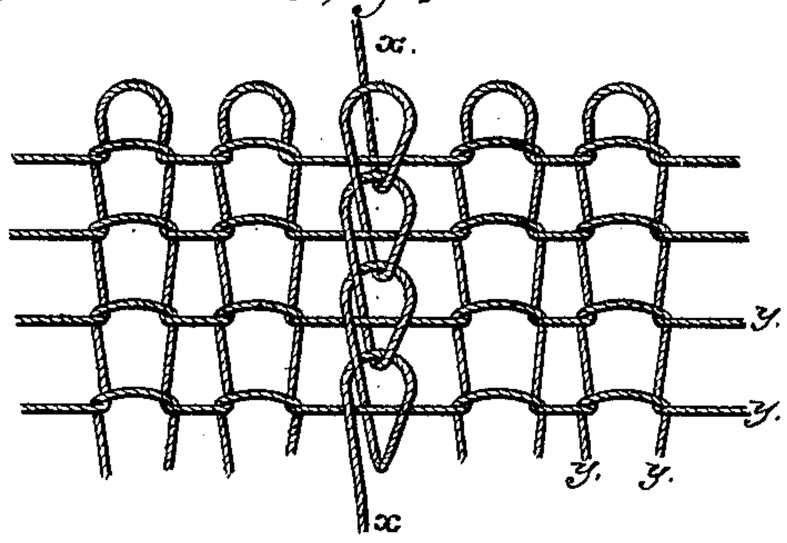


Fig. 7.



Attest:

S. J. Gordon

John M. Ripley

Inventor:

Charles J Appleton

UNITED STATES PATENT OFFICE.

CHARLES JAMES APPLETON, OF ELIZABETH, NEW JERSEY.

IMPROVEMENT IN EMBROIDERY-KNITTING MACHINES.

Specification forming part of Letters Patent No. **176,455**, dated April 25, 1876; application filed March 1, 1876.

To all whom it may concern:

Be it known that I, CHARLES JAMES APPLETON, of Elizabeth, Union county, and State of New Jersey, have invented a new and Improved Embroidery-Knitting Machine; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, and the letters of reference marked thereon, in which the same letter represents the same thing in each figure.

Figure 1 represents a plan view of my embroidery-knitting machine. Fig. 2 represents a vertical central section of the same. Fig. 3 represents a plan view of my machine arranged for producing tuck-work, having extra yarn-guide, with the central yarn-guide plate and yarn-standard removed, and showing, in dotted lines, the operating-cams in the needle-cam plate. Fig. 4 is an enlarged view of the yarn-guide-plate-holding device. Fig. 5 is an enlarged view of the needle-plate-holding device. Fig. 6 is a vertical cross-section on the line 4 4 of Fig. 3. Fig. 7 is an enlarged view of the fabric, showing the formation of the vertical stripe.

The several letters represent the following parts, viz: *a*, bed-plate; *b*, needle-cylinder; *c*, cam-ring; *d*, needle-plate; *e*, needle-cam plate; *f*, needle-cam-plate dog; *g*, needle-cam-plate-driving block; *h*, yarn-guide plate; *i i*, yarn guide-plate holders; *j*, yarn-standard; *k k*, embroidery-bobbin holders; *l l*, the bobbins; *m m*, embroidery-yarn guides; *n n*, embroidery-yarn-guide springs; *o*, yarn-guide-driving cam; *p*, needle-cylinder yarn-guide; *p'*, extra yarn-guide for tuck-work; *q q*, cam and needle plate holders; *r r*, cylinder-needles; *s s*, plate-needles; *t t*, line of the vertical central section; *v v*, needle-plate holders; *w w*, needle-plate-holder screws; *x x*, embroidering yarn or threads; *y*, needle-cylinder yarn; *y'*, needle-plate yarn for tuck-work; *z z*, revolving yarn-bobbins.

The object of my invention is to produce plain knitting with embroidered vertical stripes of any color, each stripe being made from separate yarns, and worked by particular needles into the fabric. It is applicable to all plain-knitting machinery, circular or straight, and it may be attached to machines having a number of feeds, as balmoral-machines, producing horizontal stripes—the combination of the two stripes, vertical and horizontal, producing plaids.

Arranging the horizontal needles to knit with, and when the cylinder-needles knit, both sets using yarn from the same guide, the fabric knit may be widened or narrowed by taking out or putting in needles in the needle-plate. By adding an extra yarn-guide, placed over the horizontal needles, in the rear of the cylinder-needles, and another thread arranged to knit, running in the same direction as the cylinder-thread, what is known as tuck-work will be knit. In Figs. 3 and 6 of the drawings I have shown this extra yarn-guide *p'* pivoted to and overlapping the needle-cylinder yarn-guide *p*—the plate *h* and its yarn-standard *j* being removed, as is necessary in the production of tuck-work.

The operation of the machine is as follows: Work being on the cylinder-needles *r r*, and needle-cylinder yarn-guide *p*, threaded up, motion is given to the cam-ring-driving gear, causing needles *r r* in cylinder *b*, fixed to bed-plate *a*, to slide up and down, and in their downward motion to take yarn from yarn-guide *p* off of revolving bobbin *z*. Bobbin *z* and yarn-guide *p* revolve with needle-cam plate *e* inside of stationary embroidering-yarns *x x*. Stationary embroidery-bobbins are placed on holders *k k*, and yarn is drawn off perpendicularly through eyelets over them, passing horizontally to corresponding eyelets near yarn-standard *j*, then directly to embroidery-yarn guide *m*. Standard *j* and yarn-guides *m m* are secured to guide-plate *h*, held in position by plate-holders *i i* and some of cylinder-needles *r r*. Each yarn-guide *m* feeds yarn into a particular needle, located in its groove in plate *d*, which is held in position by holders *v v*, adjusted by screws *w w*, resting on cam-ring *c*.

The needles in plate *d* receive reciprocatory motion from cam-plate *e*, driven by dog *f* striking against block *g*, secured to ring *c*, and revolving with it. Cam-plate *e* and needle-plate *d* are held in position by holders *q q*.

The needles slide out a little in advance of yarn-guide *m*, and, when out, the cylinder-

needles draw their yarn and knit through their loops, leaving the connecting-thread behind the latches of the embroidery-needles in needle-plate *d*. The instant the thread is secured behind the latch yarn-guide-driving cam *o* drives embroidery-yarn guides *m m* successively across the embroidery-needles and holds them until they slide back with yarn in their hooks. The head of an embroidery-needle is now in front of the cylinder-needles, and the cylinder-thread placed behind the latch is thrown off the head of the needle upon the embroidery-yarn, between the head of needle *s* and yarn-guide *m*. At this moment, driving-cam *o* passes and releases embroidery-yarn guide *m*, which is returned to its original position by spring *n*. This action is repeated as cam-ring *c* and plate *e* revolve.

When it is desired to knit on both sets of needles from yarn-guide *p*, to widen or narrow a circular tube of knitting, the yarn-guide plate and yarn-standard are removed, driving-block *g* is turned half round to put needles *s s* in proper position with needles *r r*, and certain needles are arranged to knit with cylinder-needles *r r*. When narrowing is required, the needle to be dispensed with is pushed back and its loop taken off and placed on a cylinder-needle, the butt of the needle, when pushed back, being outside of cam-plate *e* and out of the action of cams in plate *e*. This operation is repeated until all the plate-needles *s s* are thrown back out of operation.

Widening is accomplished by needles *s s* being placed in action, one or more at a time, each needle making the circular knitted fabric one wale wid

To produce tuck-work, the driving-block *g* is in the same position as when embroidering, yarn-guide plate and yarn-standard being removed, and needles *s s* being placed in proper relation to cylinder-needles *r r*. Cylinder yarn-guide *p* feeds cylinder-needles *r r* and leaves a portion of yarn between the cylinder-needles, behind the latches of plate-needles *s s*. An extra yarn guide, *p'*, is arranged in the rear of the cylinder-needles, and over the horizontal needles, to feed the extra thread *y'* to the plate-needles *s s*, and as they are drawn back the loop of yarn behind the latch is thrown over the head of the needle to the inside of the fabric.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a knitting-machine, the combination of two independent sets of needles and cams, arranged at nearly right angles to each other, as described, whereby plain work is produced by the joint operation of the two sets of needles, substantially as specified.

2. The combination of embroidery-needles *s s* with cylinder-needles *r r* and embroidery-yarn guides *m m* and operating mechanism, whereby the loop is laid behind the latch, to be thrown over upon the embroidery-yarn and interlocked between the loops of embroidery, the parts operating together substantially as described.

3. The combination of cam-ring *c*, needle-cylinder *b*, cam-plate *e*, plate *d*, yarn-guide-driving cam *o*, and embroidery-yarn guide *m* with needles *r r* and *s s*, operating together substantially as described.

4. The combination of yarn-guide plate *h*, holders *i i*, and needles *r r*, operating together substantially as described.

5. The combination of needle-cylinder *b*, needle-plate *d*, and needle-plate holders *v v*, operating together substantially as described.

6. The method of forming embroidery on knitted fabrics herein described, which consists in interlocking the embroidery thread or yarn with and around the thread or yarn of the fabric, whereby the thread or yarn of the fabric is entirely concealed, and the embroidery thread or yarn brought to the face of the fabric in the form of a wale, as and for the purposes described.

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