(No Model.)

J. K. CRAWFORD.

KNITTING MACHINE.

No. 267,063. Patented Nov. 7, 1882.

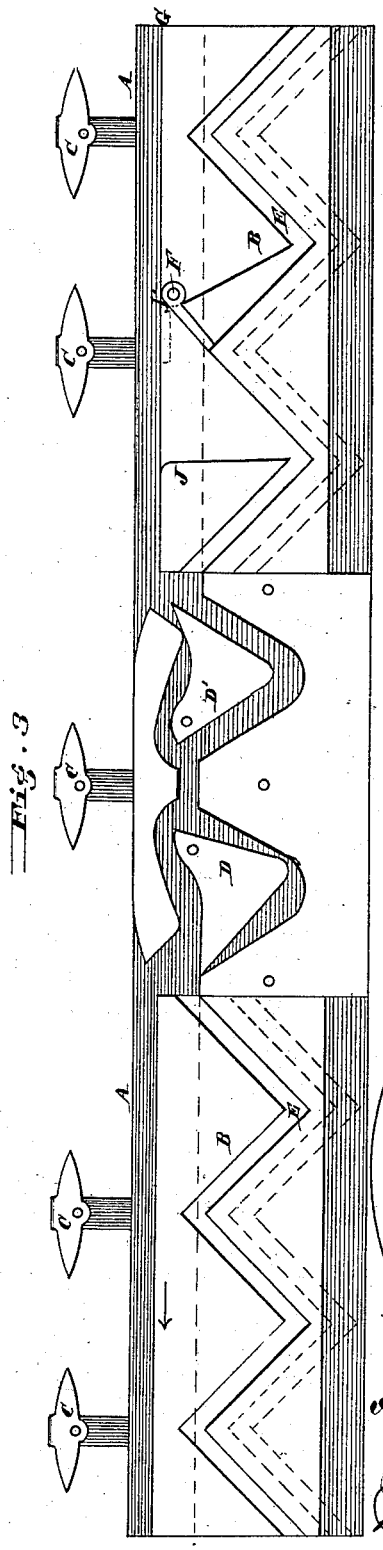

Fig. 3

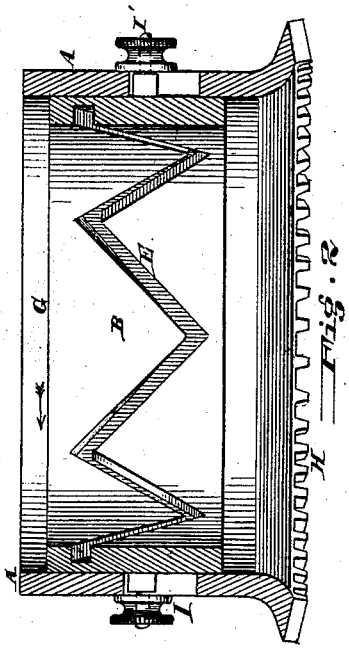

Fig. 2

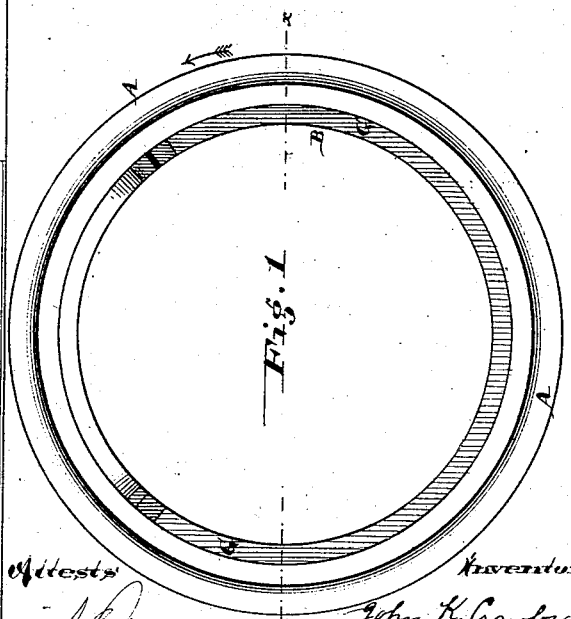

Fig. 1

Witnesses:
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UNITED STATES PATENT OFFICE.

JOHN K. CRAWFORD, OF PHILADELPHIA, PENNSYLVANIA.

KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 267,063, dated November 7, 1882.

Application filed May 29, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOHN K. CRAWFORD, of Philadelphia, Pennsylvania, have invented certain new and useful Improvements in Knitting-Machines; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the annexed drawings, making part hereof.

The nature of my invention will appear from the following specification and claims. It is an improvement in that class of knitting-machines employed to knit tubular seamless stockings, and is designed to knit such stockings.

My object is to produce a machine which will knit stockings with variously-colored continuous spiral stripes around the stockings, from the top to the toe, with the enlargement for the heel, knitted seamless, and to thus produce a stocking truly seamless and spirally striped from the top to the toe.

In the drawings, Figure 1 is a top view of my device with the needle-cylinder omitted; Fig. 2, a vertical cross-sectional view of the same, showing the slots and thumb-screws for raising and lowering the interior cam-cylinder; Fig. 3, an interior view opened out to show the inner cam and the swing-cams.

A is the outer cylinder; B, the interior movable cam cylinder; C, the yarn-carriers; D D′, the two reversible swinging cams; E, the continuous scalloped cam for raising and lowering the needles in forming the stitches; F, a movable switch for throwing the whole line of needles, preparatory to making the seamless heel, up to the plain surface G of the scalloped cam E.

This machine is an improvement on the well-known seamless knitting-machines now in common use; and the needle-cylinder is of the ordinary construction, well known to those skilled in the art, for knitting tubular seamless goods. The needle-cylinder is set into the cam-cylinder A and fits into a stationary bed-plate. The cam B is so attached to the interior of the cylinder A as to move with the latter when the latter is revolved. The cog-rack H engages with a revolving cog-wheel, which operates the machine. Now, as the cylinder A is turned in the direction of the arrows the heels of the needles in the needle-cylinder, which are designed to engage in the cam E, pass over the swing cam block D and down under the swinging cam block D′. Thence they fully enter and traverse the scalloped cam E as the latter revolves. The machine is now ready for operation.

The construction of the needle-cylinder and the arrangement of the needles therein is about the same as that shown in United States Letters Patent No. 127,954, of January 18, 1872, and the operation of the machine, with the exception of the differences named by me in my specification, is the same as that set forth in said patent in knitting tubular seamless fabrics. I therefore have not extended my description to an operation so well known to those skilled in the art.

The yarn in various colors, two or more, is passed through the holes in the carriers C, each carrier of course having yarn or yarns of but one color, unless it is desired to knit a mottled stocking, when threads of various colors can be used in each carrier. The knitting then proceeds, and the various colors from the carriers appear in the knitted tube as it forms in continuous spiral stripes. Now, when the heel is reached the switch-cam F is depressed, as shown in Fig. 3, and the needles, as it reaches them in revolving, are successively thrown up to the level of the plain surface G of the top of the cam-cylinder B. This switch is operated by means of a pin projecting through a slot in the cylinder A, furnished with a thumb-screw to hold the switch in position, similar to the pins and thumb-screws I I′, Fig. 2, or a thumb-screw is secured to its elongated pivot to turn and tighten it. After all the needles have thus been thrown up, this switch is thrown up again. The cam-cylinder B is then thrown down by slightly loosening and depressing the thumb-screws I I′, which move in the slots through which they project. The needles, being thus elevated, are retained in that position by the spiral spring wire band, which is well known in connection with these needle-cylinders. I then push down about one-half of the needles, depending upon the sized heel I desire to make, and the machine is then again set in motion by reciprocating the outer cylinder, A, and at each half partial revolution in either direction one needle is drawn up first upon one side then upon the other until the middle of the heel is reached, then at each subsequent revolution one needle (first

on one side and then on the other) is pushed down until all but one of the original number upon each side are down. This feature of the process prevents the formation of a small hole upon each side. The seamless heel is then complete. The cam-cylinder is now raised to its original position, thus raising the needles which are down, and all the needles rest upon it. The switch F is in a raised position, but is not long enough to cover the whole opening between points J and J′. The cylinder A is now again revolved, and as the needles reach this open space between the point J and the point of the raised switch they are successively pushed down by the operator into the scalloped cam E. The operation of knitting the foot then proceeds in the same manner as above described for knitting the leg. At the toe the threads are broken off after knitting it in the same manner as I have described for the heel, with the difference that after the toe is formed I push all the needles down and then knit two more rows around. These two extra rows are put on so that the yarn can be unraveled until the double stitch forming the toe is reached. The loops of the last double stitches then stick forward prominently, and the opening is closed by knitting the two edges together by hand, thus leaving no seam whatever.

I propose in a separate application to claim the new article of manufacture produced by my machine—viz., a variously-colored continuously spirally-striped seamless stocking having a seamless heel.

What I claim as new is—

1. The combination of the reversible swinging cams, D D′, with the vertically-movable scalloped cam E, and two or more yarn-carriers, C C, whereby the several carriers can be supplied with different colors and a continuously spirally-striped stocking can be knitted with a seamless heel, substantially as described.

2. The combination of the upwardly and downwardly movable cam-cylinder B, reversible swinging cams D D′, with the vertically-movable scalloped cam E, and two or more yarn-carriers, C C, whereby the several carriers can be supplied with different colors and a continuously spirally-striped stocking can be knitted, substantially as described.

JOHN K. CRAWFORD.

Witnesses:

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