

(No Model.)

2 Sheets—Sheet 1.

W. ESTY.  
KNITTING MACHINE.

No. 276,146.

Patented Apr. 17, 1883.

*Fig. 1.*

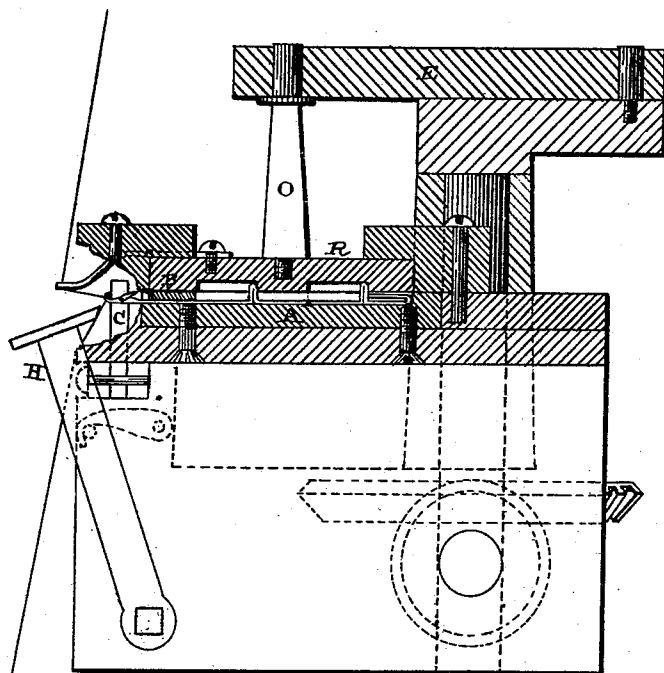
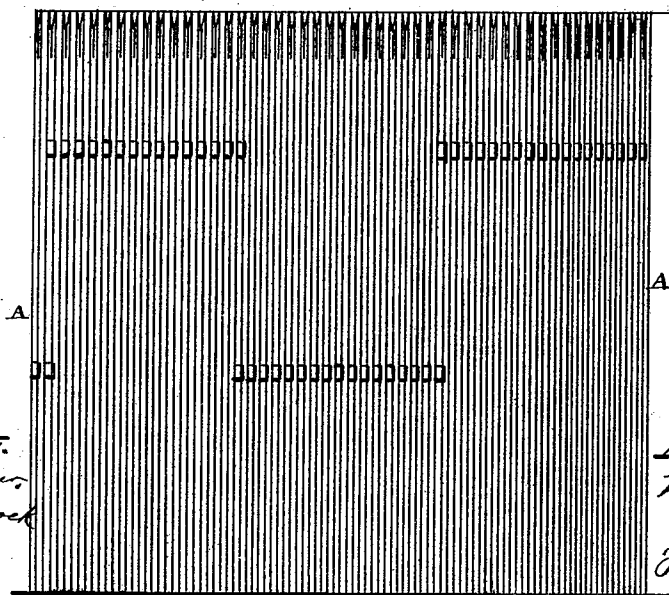


*Fig. 2.*



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2 Sheets—Sheet 2.

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*Fig. 3.*

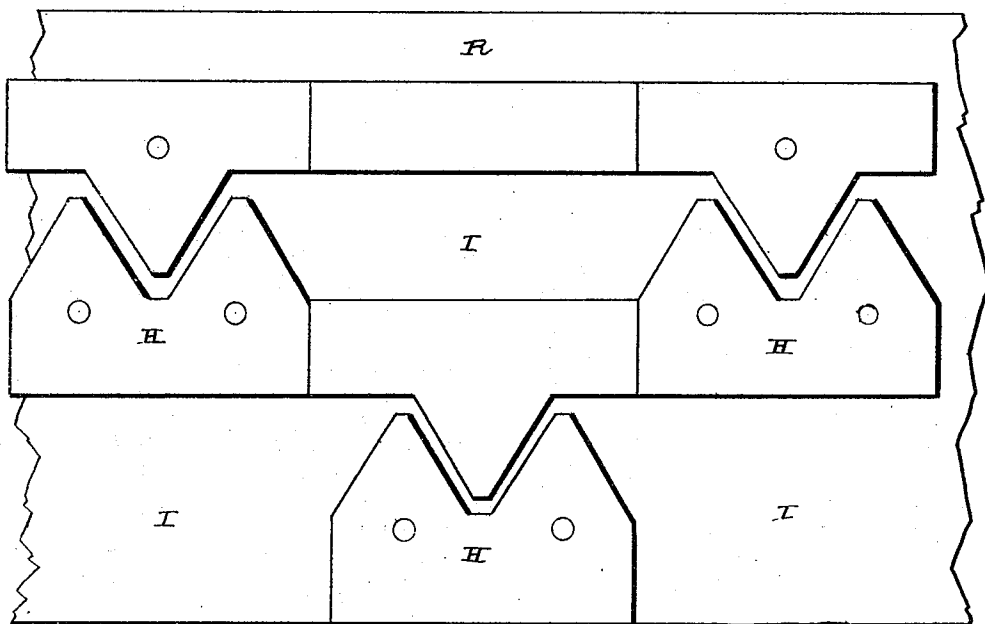
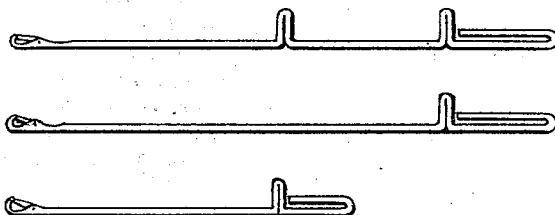


*Fig. 4.*



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# UNITED STATES PATENT OFFICE.

WILLIAM ESTY, OF LACONIA, NEW HAMPSHIRE.

## KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 276,146, dated April 17, 1883.

Application filed April 11, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM ESTY, of Laconia, in the county of Belknap and State of New Hampshire, 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 invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to knitting-machines, and is equally adapted for flat and circular machines; and it consists, first, in a knitting-machine, a set of long needles and a set of short needles, combined with a needle-bar in which the needles are placed side by side, a seaming-needle, which is placed between each two sets of needles, and a cam-bar which will operate all three kinds of needles at the same time; second, in a knitting-machine, a set of long needles, a set of short needles, a needle-plate in which the needles are arranged side by side, and a seaming-needle placed between each two sets of needles, and which is provided with two shanks, combined with a cam-bar for operating all of the needles, the seaming-needles being made to operate twice as often as any of the other needles; third, in a knitting-machine, a set of long needles and a set of short needles, combined with a needle-bar having a separate and distinct cam for each set of needles, and a seaming-needle, which is placed between each two sets of needles; fourth, in a knitting-machine, a needle-bar having grooves to receive the needles, and having a groove lengthwise to receive the plate which holds the needles in place, combined with the cam-bar having two sets of cams, so as to move two sets of needles having different lengths of shanks, and seaming-needles, which are placed between the sets of long and short needles, all of which will be more fully described hereinafter.

The object of my invention is to produce a knitting-machine in which the needles are arranged in sets, and a cam-bar provided with a cam for each set of needles, the sets of needles being divided by seaming-needles, so as to unite the strips which are knit by different sets of needles into one solid fabric.

Figure 1 is a vertical cross-section of my in-

vention. Fig. 2 is a plan view of the needle-bar, showing the needles in position. Fig. 3 is an inverted view of the cam-bar. Fig. 4 is a detached view of the different needles used.

The machine used by me is of that construction in which the needles provided with heels are placed side by side in a grooved needle-bar, and are then forced outward and retracted by a cam-bar, and in which no novelty is claimed, with the exception of the cam-bar and the arrangement of the needles, and hence no claim is made to any of the other working parts of the machine.

A represents the needle-bar, which will be of any desired width, and which is provided with suitable grooves, in which the different needles move. Near the front edge of this bar is made a suitable groove, in which is inserted a flat metallic plate, B, which rests upon the tops of the needles and holds them in position, and thus dispenses with the usual caps and other devices used for this purpose. By means of this construction the cam-bar R can be made nearly as wide as the needle-bar itself and it can be brought in direct contact with the top of the needle-bar, as shown in Fig. 1. This cam-bar R is operated by the usual standard, O, the connecting-rod E, and crank, and, with the exception of the cams made in the under side of the bar, and the bar having a much shorter movement than is common, operates in the same manner as the cam-bars now in use in flat-knitting machines. In connection with the needles are used the usual sinkers, C, and the comb-bar H, both of which operate in the usual manner.

Instead of having the needles all of one length, two separate and distinct sets of needles are used, but which differ from each other only in the point at which the heels are formed on the needles. One set of these needles is short, while the other is long; but both sets are operated by the same cam-bar, though by different cams formed in the under side of the bar. These sets of long and short needles will be arranged alternately, and side by side upon the same needle-bar, and there will be a separate thread or yarn for each set of needles used, and in the under side of the cam-bar there will be made a cam for each set of needles. Each set of needles will operate in the usual manner, and will knit a portion of

the fabric that is wide in proportion to the number of needles used.

Were no provisions made for uniting the width knit by each set of needles with the strips formed by the adjacent set, each set would knit a strip of fabric which would be entirely separate and distinct from the others. In order, however, to unite these strips in one solid fabric, each set of needles is divided or separated from the next adjoining set of a different length by means of a seaming-needle, which is made as long as the long needles, and which has two heels formed upon it instead of one. These seaming-needles are to be operated by both sets of cams in the cam-bar, and thus made to operate twice as often as the needles in either one of the sets. As the sets of needles each knit a width, this seaming-needle is made to operate twice as often as any needle in any of the sets, so as to take, as it were, a stitch first in one edge of one strip and then a stitch in the edge of the next adjoining strip, and thus unite the two strips together. In order to thus operate three distinct sets of needles, the cam-bar is provided with two rows of cams, H, which are placed diagonally in relation to each other, so that just opposite to each cam there is left an open space, I, which will have no effect upon the needles while it is passing over them, and hence the needles will remain at rest. As the bar moves over each set of needles first one needle is pushed out, so as to make it knit its stitch, and then it is retracted as the bar moves on, and the needles which have knit their stitch have their heels passed into the open space I, and hence remain at rest until the next stroke of the cam-bar. These cams are so placed in relation to each other that those cams which are nearest to the front edge of the cam-bar will operate only the short needles, while the cams nearest to the rear edge of the cam-bar will operate only the long needles; but both sets of cams will operate the seaming-needles, for the seaming-needles have two sets of heels which fit in both sets of cam-grooves. As the seaming-needles are operated by both sets of cams, it will readily be seen that they take just twice as many stitches as any of the needles of the different sets.

As the needles are arranged side by side in the same needle-bar, and as there is a separate and distinct cam for each set of needles, it will readily be seen that the cam-bar need only move the width of each set of needles, and hence a much shorter stroke is necessary than where the cam-bar has but a single cam and must make its movement across all of the needles used. As a consequence the machine can be made to knit much more rapidly, a greater variety of colors can be used, and plaids or stripes in great variety can be knit in one solid piece of fabric. One set of needles can be made to knit with one color and

the next set with another color, and the seaming-needle will take first a stitch in a thread of one color and then in a thread of the other color, and unite them together in one solid piece. Where each yarn is made of a number of colors each strip will be composed of squares or oblongs of different colors, and when these different-colored strips are united plaids are formed. These seaming-needles, being moved in and out by both first and last cams in the cam-bar, will be the first and last needle to knit at each stroke of the cam-bar.

Should it be desired at any time to leave a slit between the strips or an opening—as, for instance, an armhole in knitting a shirt—it will only be necessary to throw a seaming-needle out of operation or remove it from the bar, and the two strips will be left separate and distinct for any desired distance, and then when it desired to unite again at any point farther on it is only necessary to throw the seaming-needle in operation again, when it will continue to unite the two edges of the strips together, as before.

Having thus described my invention, I claim—

1. In a knitting-machine, a set of long needles and a set of short needles, combined with a needle-bar in which the needles are placed side by side, a seaming-needle which is placed between each two sets of needles, and a cam-bar which will operate all three kinds of needles at the same time, substantially as described.

2. In a knitting-machine, a set of long needles, a set of short needles, a needle-plate in which the needles are arranged side by side, and a seaming-needle placed between each two sets of needles, and which is provided with two shanks, combined with a cam-bar for operating all of the needles, the seaming-needles being made to operate twice as often as any of the other needles, substantially as set forth.

3. In a knitting-machine, a set of long needles and a set of short needles, combined with a needle-bar having a separate and distinct cam for each set of needles, and a seaming-needle which is placed between each two sets of needles, substantially as specified.

4. A needle-bar having grooves to receive the needles and having a groove lengthwise to receive the plate which holds the needles in place, combined with the cam-bar having two sets of cams, so as to move two sets of needles having different lengths of shanks, and seaming-needles which are placed between the sets of long and short needles, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM ESTY.

Witnesses:

FRANK COLLIER,  
A. E. SMITH.