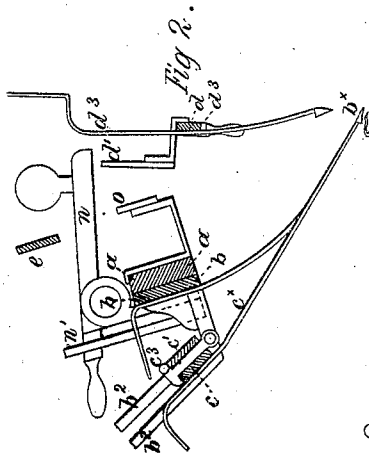


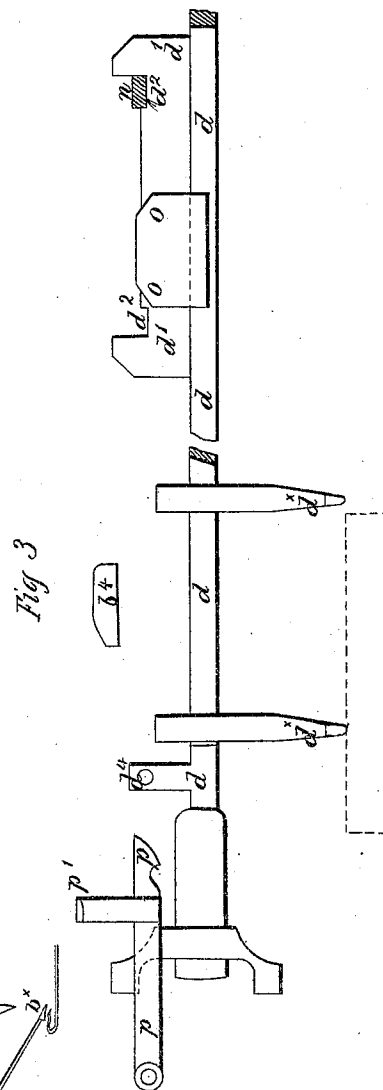
L. WOODWARD.
Knitting-Machines.

No. 145,079.

Patented Dec. 2, 1873.



Witnesses.
Fred Marrioll.
J. W. McGrath.



Inventor.

S. Woodward;

L. WOODWARD.
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Fig 4 Diagram C

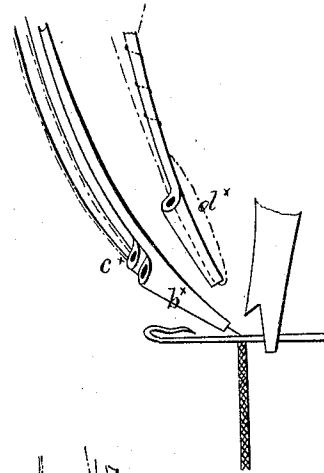
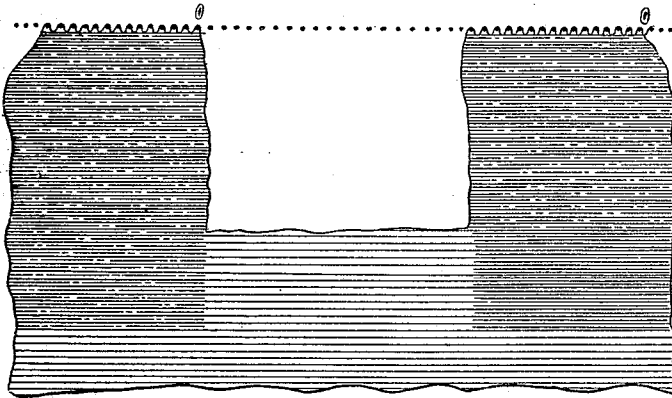


Diagram B

Fig 5.

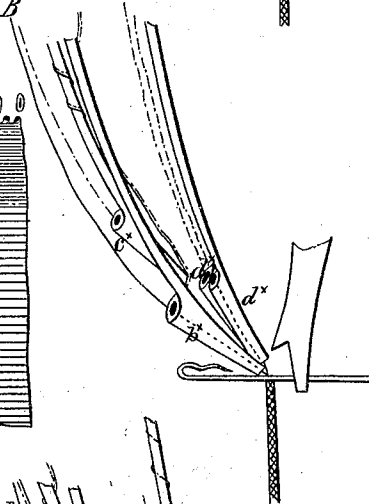
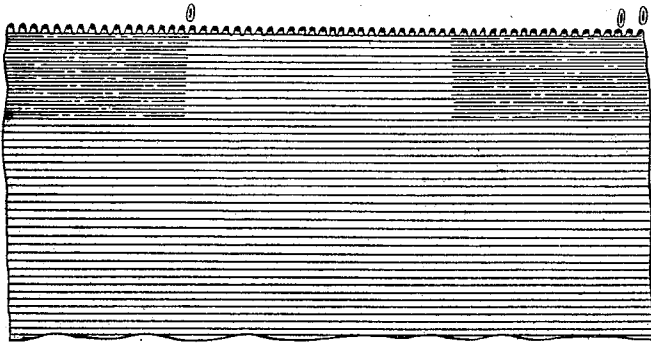
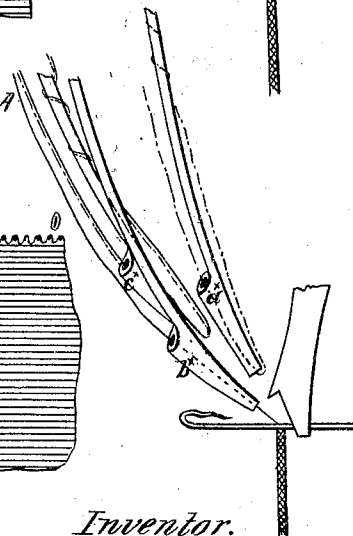
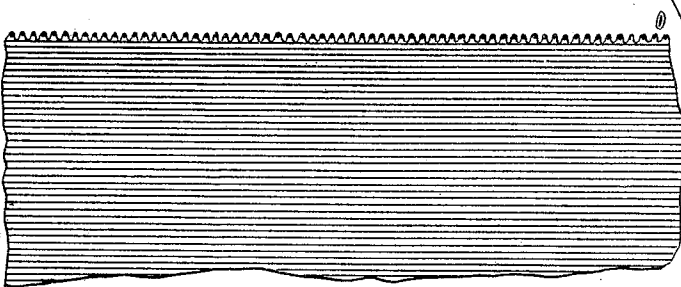


Diagram A

Fig 6



Witnesses.
Fred Marrioll.
J. W. McKeith

Inventor.
L. Woodward.

UNITED STATES PATENT OFFICE.

LUKE WOODWARD, OF NOTTINGHAM, ENGLAND, ASSIGNOR TO GEORGE-FOX.

IMPROVEMENT IN KNITTING-MACHINES.

Specification forming part of Letters Patent No. **145,079**, dated December 2, 1873; application filed November 13, 1872.

To all whom it may concern:

Be it known that I, LUKE WOODWARD, of the firm of Messrs. Moses, Mellor, and Sons, of Awkright street, Nottingham, England, a subject of the Queen of Great Britain, have invented or discovered new and useful Improvements in Apparatus for the Manufacture of Stockings and such like articles; and I, the said LUKE WOODWARD, do hereby declare the nature of the said invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement thereof—that is to say:

This invention has, mainly, for its object to construct apparatus for the manufacture of stockings, in such a manner that the leg-piece, with a cleared and selvaged heel, and a spliced ankle and heel, may be produced without removing the work from the needles on which the leg is formed. For this purpose I employ three sets of thread-carriers, carried on three thread-carrier bars, in place of two sets of thread-carriers, as heretofore employed in rotary flat frames for making the legs and heels of stockings. The main carrier-bar, with a thread-eye for each stocking, and having a variable throw, forms the leg and one side of the heel. The second carrier-bar, which moves with the main bar, also has an eye for each stocking, and the eyes are so arranged on the bar as to work one side of each heel while the main bar is working the other side. At other times the carriers on this bar are out of use. The third carrier-bar, with which the machine is also provided, has also two eyes for each stocking; and, when in use, they lay in what are called splicing-threads for a part only of the distance over which the main thread-carrier bar traverses, and so they thicken the work produced by the main thread-carrier immediately above the heel on either side of the leg-piece. The main carrier-bar and the second carrier-bar are connected to each other, so that the one bar travels with the other throughout. The third carrier-bar is driven by the main bar by a catch, which drops in as the main bar commences its motion, and is lifted out by an incline as soon as the third carrier-bar has been taken the distance required. This arrangement of apparatus for giving motion

from the main thread-carrier bar to another carrier-bar for laying in thickening or splicing threads is also applicable to machinery for the production of other articles of hosiery in which thickening-threads have to be introduced at places. Also, when three thread-carrier bars are used, as above described, the third thread-carrier bar may be driven from the main bar by a frictional clip, and its motion be limited by stops; or all the bars may be connected by frictional clips with a driver having a motion equal to or exceeding that of the main bar, and the throw of each bar may be limited by stops to the amount required.

In order that my invention may be fully understood and readily carried into effect, I have, in the drawings hereunto annexed, shown an arrangement of thread-carrier bars such as is above described, and I have described it as applied to a flat or rotary stocking-frame with a stationary needle-bar; but I would remark that a similar arrangement of thread-carrier bars may also be applied to other flat or rotary frames, whether with fixed or movable needle-bars, or sliding needles.

Figure 1 is a front view of the thread-carrier bars, taken at the left-hand end of the machine. Fig. 2 is a transverse section of the same; and Fig. 3 shows, separately, the thread-carrier bar for laying in the splicing-threads, and the mechanism in connection therewith.

In these figures, *a* is the ordinary bar or rail, which passes from one end of the machine to the other, and carries the hereinbefore-mentioned first and second thread-carrier bars *b* and *c*, in a similar manner to what has heretofore in some cases been adopted. *d* is the third-mentioned thread-carrier bar for laying in the splicing-threads. In Fig. 2 of the drawings this carrier-bar is shown to be raised and held out of action, the threads which are passed through its thread eyes or layers being then turned up, so as to be out of the way of the needles. In the arrangement shown in the drawing, the bars *b* and *c* have motion given to them in a similar manner to what has heretofore in some cases been adopted, and which is as follows: When the needle-bar is fixed, the rail *a* turns on pins or axes at its upper edge, and is caused to rock on these pins, by a cam at one end of the machine, at the times required,

to cause the thread-eyes of the carrier-bars to dip down between the needles. The bar *b* at its two ends is formed to pass over and embrace the rail *a*, and at these points carries friction-rollers *b'*, which run upon the top of the rail, as seen in Fig. 1. The bar *b* has also forked brackets *b''*, standing out from it at the front, into which forks the bar *c* is received. This bar has bolted to it spring clip-pieces *c'*, which embrace one limb of the forks, as shown at Figs. 1 and 2, and form friction-clips to cause the bar *c* to be moved to and fro together with the bar *b*, while at the same time they allow of the bar *c* being raised and kept out of work whenever the thread-carriers carried by it are not required to lay their threads onto the needles, and they also allow of the movement of the bar *c* being controlled when narrowing without interfering with the movement of the bar *b*. The first carrier-bar *b* receives motion from a sliding bar, *e*, which is supported in forked bracket-pieces *b''*, standing out from the back of the bar *b*, and which has a to-and-fro sliding motion imparted to it by cams on the driving-shaft at one end of the machine. In Fig. 1 the bar *e* is shown in the position just as it commences to move from the right toward the left hand end of the machine. After a short movement, the notch *e'* in the bar *e* comes against the fork-piece *b''*, and carries forward with it the bar *b* until the incline *e''* at the end of this bar comes against one or other of the rollers *f* or *f'*. The end of the bar *e* is then lifted until the notch *e'* is clear of the bottom of the fork *b''*, and the bar *e* is set free to move forward without carrying with it the bar *b*. At the same time that the forward end of the bar *e* is lifted by the roller *f* or *f'*, the latch *g*, which is pivoted to the bar *b*, is lifted by coming against the pin *h* or *h'*; and just as the bar *e* is set free from the bar *b*, the notch *g'* of the latch comes over the pin, and the latch, being pressed down by its spring *g''*, hooks over this pin and prevents any backward movement of the bar at the same time that any further forward movement is arrested by the end of the bar then coming against the end either of the stop *m* or the stop *k*, by which the rollers *f* *f'* and pins *h* *h'* are carried. While the leg-pieces of the stockings are being made, the thread-carrier bar *c* is raised in the forked bracket-pieces which carry it, so that its thread eyes or carriers shall be out of the way of the needles. The bar then rests on the top of catch-pieces *c''*, and is thus retained in its raised position. The movable stop *k*, carrying the roller *f'* and pin *h'*, is also turned back on its pin-joint *k'*, so as to be out of the way, and allow the stop *m*, carrying the roller *f* and pin *h*, to come into action. The bar *b* then traverses a distance equal to the width of the leg-piece of a stocking. When the two sides of the heel-piece of each stocking are to be made, the stop *k* is turned down into the position shown in Fig. 1, so bringing into action the roller *f'* and pin *h'*, and thereby giving a shorter throw to the thread-carrier bar *b*, so

that the thread-eyes carried by it are only moved to and fro a sufficient distance for forming one side of the heel-piece of each stocking. At the same time the thread-carrier bar *c* is lowered into the position shown at Figs. 1 and 2, so as to bring the thread-eyes carried by it into action for forming the other side of the heel-piece, and the thread-carrier bar *c*, being held to the thread-carrier bar *b* by the friction-clips *c'*, moves to and fro with it. In order to arrest the motion of the thread-carrier bar *c* at the end of its traverse at the same time that the traverse of the bar *b* is arrested, the thread-carrier bar *c* carries a latch, *l*, which passes under and hooks onto a stop, *h''*, at the same time that the latch *g* passes over and hooks onto the pin *h'*, while at the same time the end of the lump *e''*, which carries the latch *l*, and which is fixed to the bar *c*, comes against the end of the sliding stop *m*, and is by it prevented from moving farther forward. When the narrowings are to be made at the end of the heel-pieces, the sliding piece *m*, which is connected to the ordinary narrowing mechanism at the end of the machine, is caused to move inward, and thereby the movement of the bar *c* is arrested before the bar *b* has completed its movement, the latch carried by the bar *c* being free to move without interfering with the action of the latch carried by the bar *b*. At the opposite or right-hand end of the machine is a similar sliding piece, *m*, acted on by narrowing mechanism, and the bars *b* and *c* are at this end similarly provided with latches *g* and *l*. As the bars *b* and *c* move toward the right-hand end of the machine, the bar *c* comes up to a fixed stop, while the bar *b* comes against a movable stop similar to *m*, and connected with the narrowing mechanism. In order that, when the bar *c* commences its movement from either end of the machine, the latches *g* and *l* at that end may be tripped to set the bars *b* and *c* free to move with the bar *e*, one or other of the projections *e''* upon this bar comes against a stop, *g''*, upon the latch *g*, and thereby lifts this latch and releases the bar *b*. The latch *l*, being coupled with the latch *g*, is also simultaneously freed, so that the bar *c* is ready to move back with the bar *b*, the notch *e'* at that end then carrying back with it the bar *b*.

I will now describe the arrangement of mechanism shown in the drawing for imparting motion to the third thread-carrier bar *d*, which is for putting in the splicing-threads just above the heel-pieces, and which carries two thread layers or eyes for each stocking. This carrier-bar is for convenience carried in forked brackets from the lead sinker-bar, and receives motion, as before stated, from the carrier-bar *b*, but has given to it only a sufficient traverse for laying in the splicing-threads above the two heel-pieces. To effect this the bar *d* has fixed upon it a plate, *d'*, in which are two notches, *d''*, for a catch, *n*, to drop into. The catch *n* is jointed to the bar *b*, and can be held up by a spring-catch, *n'*, whenever the bar *d* is

not required to be in action. When the catch is thus held up, the bar remains at rest, and it can be raised away from the needles and retained in its raised position by a spring-catch.

When the splicing-threads are to be laid in, the catch d^3 is released, and the bar d is lowered; the catch n is also allowed to drop onto the plate d^1 . As the bar b commences to move from one side of the machine, the catch n is in one of the notches d^2 , and so carries forward with it the bar d . When the bar d has been traversed the required distance, the catch n comes against an incline, o , fixed to the rail a , by which it is lifted out of the notch d^2 , and the bar b will continue its movement without carrying along with it the bar d . The bar d will then be held stationary by a pin, d^4 , upon it being caught by a latch, p . This prevents any backward movement of the bar, while any further forward movement of the bar is arrested by a stop. As the bar b continues its movement, and just before it arrives at the end of its course, an incline, b^4 , carried by it comes under the projection p' on the latch p , and so lifts this latch, in order that on the return movement of the bar b the bar d may be free to move back with it. As the bar b completes its traverse, the catch n drops into the other notch d^2 , so that the bar b is again connected with the bar d .

In the diagram views A, B, and C of the drawings I have illustrated the action of the thread-carriers when making a stocking. Diagrams A illustrate the position of the thread-carriers while making the leg-pieces, the thread-eyes b^* on the bar b being alone in action, and having a traverse given to them equal to the width of the leg-piece. Diagrams B illustrate the laying in of the splicing-threads, the thread-eyes b^* of the bar b still continuing in action, and traversing from side to side of each stocking. The thread-eyes d^* of the bar d are also brought into action, there being two thread-eyes or thread-layers for each stocking, and a shorter traverse being given to them than to the bar b . Diagrams C represent the forming of the heel-pieces. The bar d is raised, so that its thread-eyes d^* are out of action, and the bar c is lowered, so that its thread-eyes c^* come into action; at the same time a shorter throw is given to the bar b , so that its thread-eyes b^* form one side of the heel-pieces of the several stockings while the thread-eyes c^* are laying in the threads for forming the opposite side of the heel-pieces. A splicing-thread is also attached to the thread passing through the eyes b^* . The eyes c^* have always threaded through them a splicing-thread and a thread of the same thickness as the thread of which the leg-piece is

formed; or in some cases one single thick thread is threaded through these eyes. In this case the thread passed through the eyes b^* , and which formed the leg-piece, would be changed for a thicker thread, corresponding to the thread carried by the thread-eyes c^* , before commencing to make the heel-pieces.

The arrangement of mechanism hereinbefore described, and shown at Fig. 3 of the drawings, for giving motion from the thread-carrier bar b to the carrier-bar d , may, as before stated, be employed when making other articles of hosiery in which it is required to introduce thickening-threads at places for giving motion from one thread-carrier bar to another at the same time that it gives to it a traverse shorter than its own; also, as before stated, when three thread-carriers, acting in the manner hereinbefore described, are employed for forming a stocking, the third thread-carrier bar d may be driven from the bar b by a friction-clip, and its motion limited by stops—as, for example, the latch n , carried by the bar b , might be arranged to drop into a notch in a friction-clip embracing the bar d , and when the bar d was not required to be in action this latch might be turned up out of the notch; also, as before stated, the bar b might be driven by a friction-clip from the bar c , and its motion limited, as hereinbefore described, by the stops h and k , so that all of the bars would then receive motion from the bar c by friction-clips.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that I claim as my improvements in apparatus for the manufacture of stockings and such like articles—

1. The combination and arrangement of mechanism, substantially as herein described, and shown in the drawings annexed.

2. The employment, in machinery for the manufacture of stockings, of three thread-carrier bars, acting substantially in the manner herein described, two bars to form the leg and heel pieces, and a third bar to lay in the splicing-threads, whereby the leg-piece of a stocking, with a cleared and selvaged heel and spliced ankle and heel, is produced without removing the work from the needles on which the leg is formed.

3. The combination and arrangement of mechanism, substantially as herein described and shown, for giving motion from one thread-carrier bar to another thread-carrier bar, so as to give it a traverse shorter than its own traverse.

Witnesses:

L. WOODWARD.

FRED. MARRIOTT,
J. W. McCRAITH.