Jan. 15, 1935. K. R. LIEBERKNECHT 1,987,690

NARROWING MECHANISM FOR FLAT KNITTING MACHINES

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Fig. 1

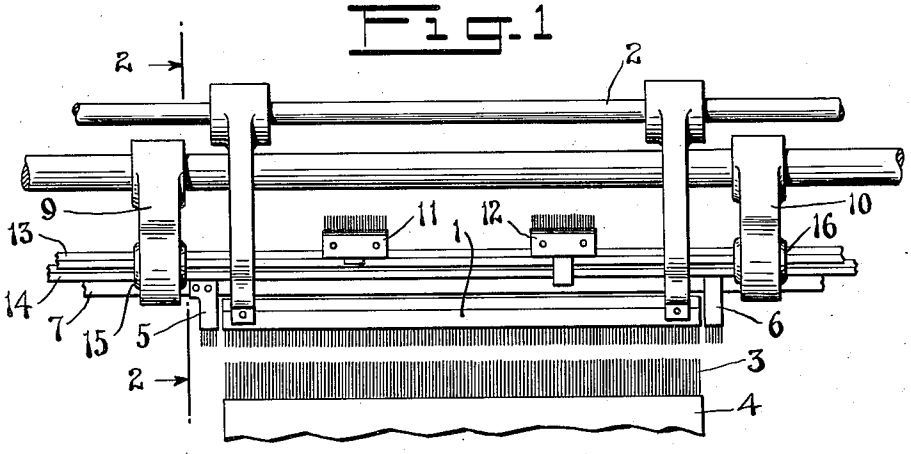


Fig. 2

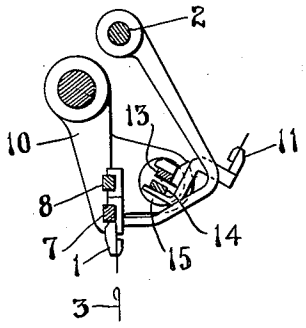


Fig. 3

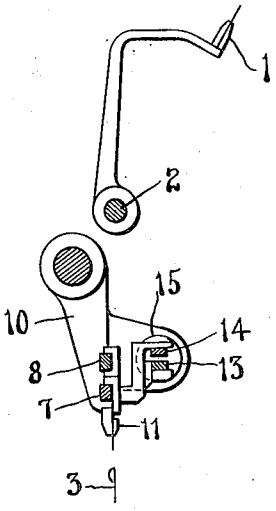
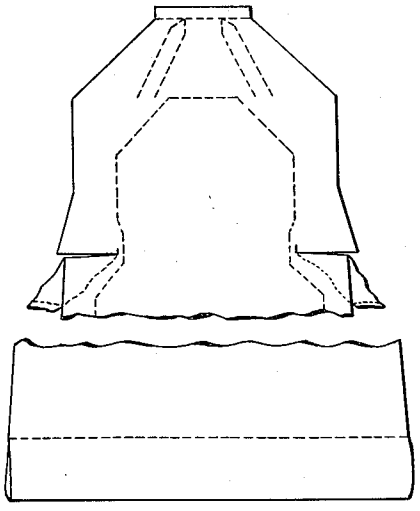


Fig. 4



INVENTOR
KARL RICHARD LIEBERKNECHT
BY
ATTORNEY

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NARROWING MECHANISM FOR FLAT KNITTING MACHINES

Karl Richard Lieberknecht, Oberlungwitz, Germany, assignor to Kalio, Inc., New York, N. Y., a corporation of New York

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5 Claims. (Cl. 66—89)

This invention covers a new and useful improvement in flat knitting machines and particularly in the narrowing mechanism thereof, with the general object of making it possible to knit complete full fashioned stockings including those having the French foot upon a single machine, thus dispensing with the footer and the difficult and time wasting operation of transferring the fabric thereto.

The advantages derived from knitting stockings complete on one machine are well known but the large investment heretofore made in leggers and footers which are still in first class condition, as well as the greater cost of single unit machines, render the substitution of single unit for present equipment impractical in many instances. This invention makes it perfectly practicable to employ standard leggers as single unit machines through a few simple and inexpensive alterations.

The ordinary modern legger is equipped with picot bars which when in use extends the full length of the needles of each section. Since the picot bars operate in space which is required for the narrowing fingers when narrowing, space is provided at either end of each section beyond the range of the picot bar into which the narrowing fingers are retired when idle. Ordinarily each section of a legger is provided with a single pair of narrowing fingers since that is all that is required for the leg narrowing. Consequently, the space for these fingers at the ends of each section is, for obvious reasons, limited to that required for these fingers and also to limit the overall length of the machine as much as possible.

If the legger is to be used as a single unit machine two sets of narrowing fingers per section are required in some instances, as when knitting stockings with French feet which include the diamond toe. Hence space must be found for the extra narrowing fingers. This is accomplished by this invention the nature of which is made clear by the following description and drawing, of which

Figure 1 is a diagrammatic front elevation of one section of a flat knitting machine equipped with the invention;

Fig. 2 is an end view along the line 2—2 of Fig. 1 looking in the direction of the arrows with the picot bar in operating position and the narrowing fingers in idle position;

Fig. 3 is a similar view with these parts transposed; and

Fig. 4 is a diagrammatic view of a stocking having the French foot including the diamond toe.

As shown in Fig. 1 the section is provided with a standard picot bar 1 swingable upon or with shaft 2, the bar extending the full length of needles 3 in needle bar 4. The usual pair of narrowing fingers are shown at 5 and 6 in the storage space provided for them beyond the ends of the picot bar. Narrowing fingers 5 and 6 are supported upon the usual flat narrowing rods 7 and 8 respectively, which are slidably mounted in suitable bearings in brackets such as 9 and 10.

In the ordinary footer the other pair of narrowing fingers are similarly mounted upon additional rods and storage space for them is provided alongside the other pair of fingers beyond the ends of the picot bar and needles. In the machine of this invention this second pair of fingers 11 and 12 are likewise mounted upon flat narrowing rods 13 and 14 also slidably supported in suitable bearings. These in turn are contained within rotatable cylindrical bearings 15 and 16 also supported by brackets 9 and 10 so that fingers 11 and 12 may be moved to the right or left by rods 13 and 14 and may also be swung into and out of operating position by turning rods 13 and 14 in bearings 15 and 16.

At the beginning of the knitting of a stocking the picot bar is usually placed in operating position. That is to say it is swung down into the position shown in Fig. 2 so that its points are properly aligned with the needles. At that time the narrow narrowing fingers 5 and 6 are in their storage spaces and wide narrowing fingers 11 and 12 are swung into the position shown in Figs. 1 and 2 out of the way of the picot bar 1.

After the picot is completed the picot bar is swung into its inoperative position as shown in Fig. 3 and the usual leg, heel and sole gusset narrowing performed by narrow narrowing fingers 5 and 6 which have been pushed into proper position. Wide narrowing fingers 11 and 12 remain in inoperative position (Figs. 1 and 2).

When wide narrowing fingers 11 and 12 are required as in the narrowing of the diamond toe they are swung down into operative position with their points in alignment with those of the narrow fingers 5 and 6, as shown in Fig. 3, the picot bar remaining in inoperative position and the two sets of points pushed into their correct relative positions. For the diamond toe the wide fingers are customarily used to produce the outside and the narrow fingers the inside narrowing.

It will be understood, of course, that the above description of the use of the invention in knitting the French foot type of stocking is by no means the only use for it. In fact it may be used in any knitting which can be performed upon a single unit machine or a legger and footer combined.

During narrowing the narrowing fingers are guided and controlled by the usual mechanisms known to those skilled in the art and not requiring description here.

In this way an ordinary legger can be concerted into a single unit machine and at negligible

extra cost and with practically no alteration of its standard parts and without affecting in the least either the construction of the operating mechanism, its manner of working, or the construction or use of any of the numerous attachments with which flat knitting machines are usually equipped.

I claim:

1. Narrowing mechanism for a flat knitting machine having four longitudinally alignable narrowing fingers each mounted on a separate and independently slidable flat rod, bearings for each rod, those for two of the rods being fixed and those for the other two rods being symmetrically mounted in rotatable bearings.

2. Narrowing mechanism for a flat knitting machine having four independently slidable narrowing rods, bearings for said rods those for two rods being fixed and those for the other two rods being mounted in rotatable bearings.

3. A narrowing mechanism for a flat knitting machine having four independently slidable rectangular narrowing rods, rectangular guide bearings for each of said rods, those for two of said rods being fixed and those for the other two rods being mounted within other cylindrical and rotatable bearings.

4. Narrowing mechanism for a flat knitting machine having two pairs of longitudinally alignable narrowing fingers, each finger being mounted upon a separate and independently slidable flat rod, and means whereby one pair of fingers may be swung out of alignment with the other pair so that each of the first mentioned pair may be independently moved to the other side of either one of the other pair.

5. Narrowing mechanism for a flat knitting machine having two pairs of longitudinally alignable narrowing fingers, each finger being mounted upon a separate and independently slidable flat rod, the bearings for the rods upon which one pair of fingers is mounted being fixed, and the bearings of the other rods being supported in rotatable bearings so that the fingers on said last mentioned rods can be swung out of alignment with the other fingers and slid longitudinally of the machine past the other fingers.

KARL RICHARD LIEBERKNECHT.