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G. H. DIETRICH ET AL

2,073,197

FLAT KNITTING FRAME

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Fig. 1.

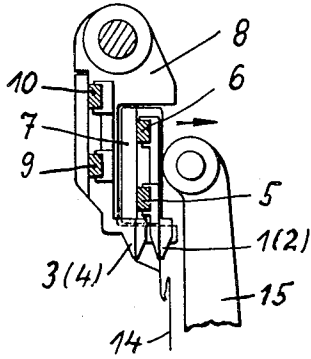


Fig. 2.

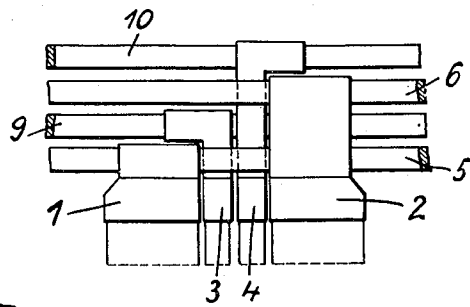


Fig. 3.

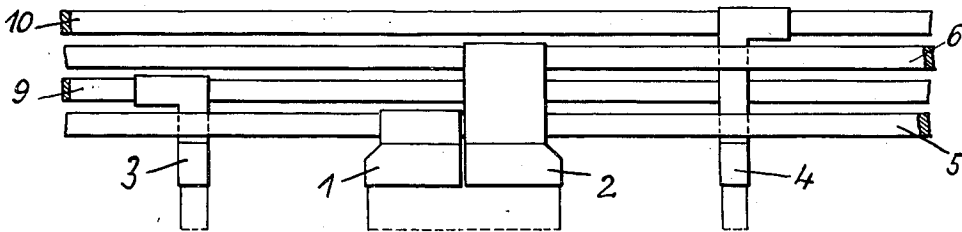


Fig. 4.

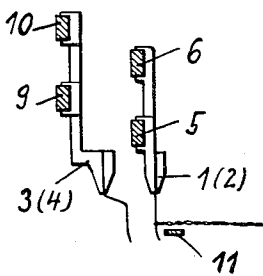
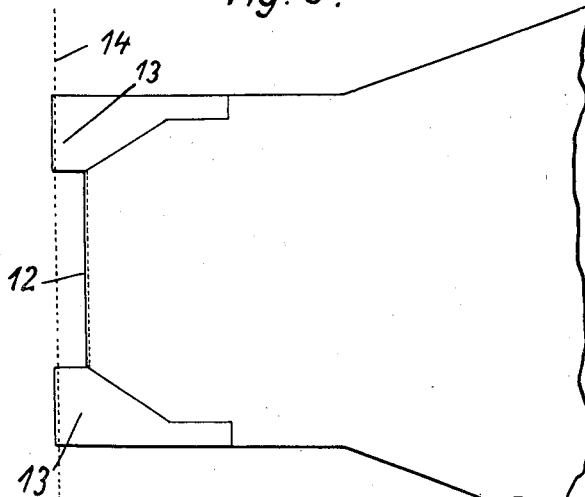


Fig. 5.



Inventors:
Gustav Herbert Dietrich and
Hugo Drechsel
By Emil Bömelcke
Attorney

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FLAT KNITTING FRAME

Gustav Herbert Dietrich, Meinersdorf in Erz Gebirge, and Hugo Drechsel, Oberlichtenau, Germany, assignors, by mesne assignments, to Kallo Inc., New York, N. Y.

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6 Claims. (Cl. 66—82)

This invention relates to a flat knitting frame for producing a stocking in one operation.

In flat knitting frames stockings are produced in one operation on undivided needle bars in such manner that work on the middle portion is temporarily interrupted during production of the heel portions. For this purpose, the meshes of the middle portion, prior to starting the heel portions, are taken from their frame needles by means of covering needles and placed before the row of frame needles to render the frame needles freed in the manner indicated unimpeded as to motion. When in this position, the meshes of the middle portion are kept in close formation until the heel portions are completed, whereupon they are transferred back to the frame needles for working the foot.

The known types of flat knitting frames are provided for this purpose with an additional covering needle bar either arranged independently of the usual narrowing machine in front thereof and fitted with a drive of its own or connected with the narrowing mechanism, in which latter case adjustability of the additional covering needle bar in horizontal direction must be insured. In both instances, however, the provision of a special tickler is necessary which is always disposed in front of the regular narrowing machine and thus interferes with the easy inspection of the latter.

The invention eliminates these drawbacks by employing for taking off and returning the loops of the middle part the two large narrowing fingers which, together with the small narrowing fingers, later on form the toe. For this purpose, these narrowing fingers or the carrying rails thereof are so disposed on the narrowing machine that the large narrowing fingers with their covering needles are temporarily brought out of the plane of the covering needles of the small narrowing fingers, pushed together towards the center of the section, and placed side by side, whereas the two small narrowing fingers are moved outside into inoperative position and the larger narrowing fingers, parallel to themselves, are moved forward for racking the meshes of the middle portion taken up by them in front of the frame needle row and displaced backward for returning them again.

In flat knitting frames for producing a stocking in one operation it is known to arrange the large narrowing fingers in such manner that they can swing out above the section and are in an interchangeable position relative to the small narrowing fingers. This is done to reduce the

width of the section in case such machines carry also a picot bar extending over the entire width of the section, so that the narrowing fingers, during operation of the picot bar, must be brought outside the section and, particularly with respect to the larger ones, would require a considerable widening of the section. This necessity can be obviated by placing the large fingers between the small ones and swinging them out. This arrangement is, however, unsuited for the present purpose because the racking of the meshes of the middle portion hanging on the large fingers would have to be effected by inclining the latter, which would cause the meshes to slip off.

It is further known to return meshes hanging on auxiliary needles in front of the frame needles in flat knitting frames to the frame needles by means of the existing covering means which are placed closer together. These meshes are, however, those of the inner longitudinal edges of the heel, which after being knocked off from the frame needles are picked up by the auxiliary needles and moved away rectangularly to the section according to the further working of the heel portions. When the heel portions are completed, the auxiliary needles are placed parallel to the frame needles, and the meshes hanging on these auxiliary needles are then returned to the frame needles. A machine of this type is, however, not suited for the purposes of the invention for the reason that the meshes are not taken off from the frame needles by the available coverers which merely serve for returning them. Furthermore, as this known machine is intended only for returning heel loops, it does not teach how to proceed if the meshes of the middle portion are to be brought in front of the frame needles by the existing covering means, since no provision is made for the exchange of the two kinds of narrowing fingers.

By way of example, one embodiment of the invention is illustrated in the accompanying drawing, in which

Figure 1 is a cross section of the narrowing machine;

Fig. 2, a front view of the position of the large and small narrowing fingers during production of the toe;

Fig. 3, a front view of the position of the narrowing fingers when work is interrupted on the middle portion of the stocking;

Fig. 4, a side view of the position of the large narrowing fingers holding the loops of the middle portion relative to the small narrowing fingers; and

Fig. 5 shows a formed part, seen from above, on which the heel portions are produced.

Referring to the drawing, the flat knitting frame is provided with two large narrowing fingers 1, 2 and two small narrowing fingers 3, 4 arranged on the carrying bars 5, 6, 9, 10. The narrowing fingers 1, 2, 3, 4 ordinarily occupy the position according to Fig. 2, so that the small narrowing fingers 3, 4 are located between the large narrowing fingers 1, 2. According to the invention, the large narrowing fingers 1, 2 are to be utilized, instead of resorting to a special coverer, for taking up the loops of the middle portion 12 of the stocking and for placing them, during production of the heel portions 13, behind the row of frame needles 14 and returning them after completion of the heel portions 13. For this purpose, the narrowing fingers 1, 2, 3, 4 and their carrying bars 5, 6, 9, 10 are so arranged on the covering machine that the large narrowing fingers 1, 2 with their covering needles can be temporarily moved out of the plane of the covering needles of the small narrowing fingers 3, 4 and, pushed together towards the center of the section, placed side by side. The two small narrowing fingers 3, 4 are then brought into inoperative position outside the section, so that the large narrowing fingers 1, 2 are positioned between the small narrowing fingers 3, 4 and, as it were, form a single coverer, as indicated in Fig. 3. When in this position the large narrowing fingers 1, 2 are lowered to the row of frame needles 14 at the beginning of the production of the heel portions 13 to take up the meshes of the middle portion, which are then brought over the heads of the frame needles in front of the row 14 by corresponding racking of the large narrowing fingers 1, 2. This step requires adjustability of the large narrowing fingers 1, 2 in horizontal direction, which is also necessary to push the fingers 1, 2 together. In the example shown this is attained by guiding the carrying bars 5, 6 of the large narrowing fingers 1, 2 in a special bearing 7 which is horizontally adjustable in the actual bearing 8 for the carrying bars 9, 10 of the small narrowing fingers 3, 4, as indicated in Fig. 1. The covering needles of the large narrowing fingers 1, 2 usually lie in the same plane as the covering needles of the small narrowing fingers 3, 4, but if the coverers are to be mutually interchanged or the large narrowing fingers 1, 2 have to bring the meshes of the middle portion taken up by them in front of the frame needle row 14, the bearing 7 is drawn off in the direction of the arrow in Fig. 1 by the lever 15.

To keep the heel portions 13 tight during their production it is advisable to move the two large narrowing fingers 1, 2 away from the frame needle row 14, in accordance with the progress of the work on the heel portions 13, the fingers 1, 2 remaining at such height that the meshes of the middle portion rest on the covering needles. In this case it is necessary to detach the large narrowing fingers 1, 2 from the narrowing machine prior to the covering of the heel caps so as to set the narrowing machine free for shaping the heel caps. The large narrowing fingers 1, 2 must then be passed to a special guide which may be formed of the levers 15 of the bearings 7.

It is further possible to place in known manner a special needle bar in front of the frame needle row 14 for the reception of the meshes of the middle portion from the large narrowing

fingers 1, 2, the meshes being taken up from this special bar again by the fingers 1, 2 to be returned to the row 14. The special needle bar can be moved away from the row of needles 14 according to the progress of work on the heel portions 13. This affords the advantage that the meshes of the middle portion during production of the heel portions 13 cannot jump off from their holding needles, which in the first-described construction may be prevented, however, by placing under the fabric of the middle portion a bar 11 or similar means which cooperates in the horizontal adjustment of the large narrowing fingers 1, 2, as indicated in Fig. 4.

We claim:—

1. In a flat knitting frame for producing a stocking in one operation a plurality of frame needles, a narrowing machine, two large horizontally adjustable narrowing fingers for taking up the meshes of the middle portion of the stocking from the frame needles during production of the heel portion and returning them thereto after completion of the heel portion, two small narrowing fingers ordinarily disposed between the large fingers, covering needles for said narrowing fingers, carrying bars for said narrowing fingers disposed on the narrowing machine, a bearing for the carrying bars of the small fingers, said large fingers with their covering needles being temporarily brought out of the plane of the covering needles of the small fingers, pushed together towards the center of the section and placed side by side while said small fingers are pushed in inoperative position outside the section with the large fingers positioned between them, said large fingers, parallel to themselves, being moved forward for racking the meshes of the middle portion taken up by them in front of the frame needles and displaced backward for returning them to the frame needles.

2. A flat knitting frame according to claim 1, wherein the two large narrowing fingers during holding of the meshes of the middle portion brought before the frame needles are moved away from the latter in accordance with the progress of work on the heel portions.

3. A flat knitting frame according to claim 1, comprising a separate bearing for the carrying bars of the large narrowing fingers, said bearing being horizontally adjustably guided in the bearing for the carrying bars of the small narrowing fingers.

4. A flat knitting frame according to claim 1, wherein the large narrowing fingers, at least prior to the covering of the heel caps, are detached from the narrowing machine and passed to a special horizontal guide to free the narrowing machine for covering the heel caps.

5. A flat knitting frame according to claim 1, comprising a separate needle bar arranged in front of the frame needle for receiving the meshes of the middle portion taken up by the large narrowing fingers from the frame needles and holding them until the large narrowing fingers take them off again for returning them to the frame needles.

6. A flat knitting frame according to claim 1, wherein means cooperating in the horizontal adjustment of the large narrowing fingers and disposed under the middle portion taken off by the fingers hold the middle portion on the covering needles of the large fingers.