

May 18, 1943

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2,319,340

METHOD OF PRODUCING DOUBLE-SIDED PLATED KNIT FABRICS

Filed Nov. 24, 1939

4 Sheets-Sheet 1

Fig.1

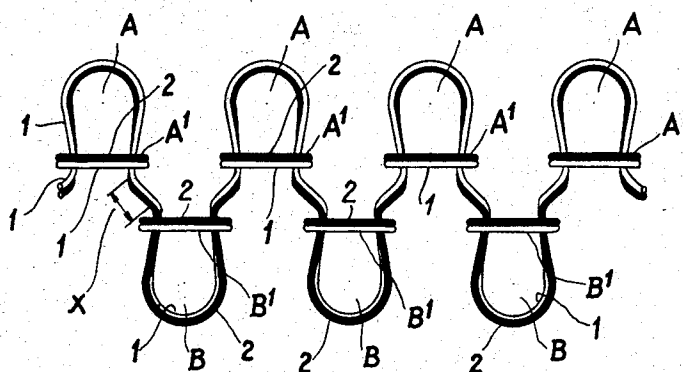
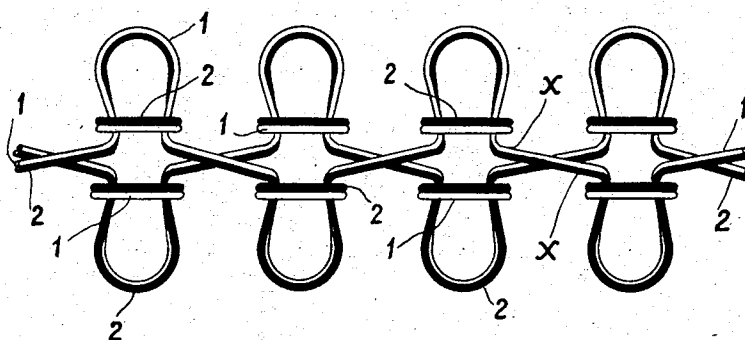


Fig.2



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Fig. 3

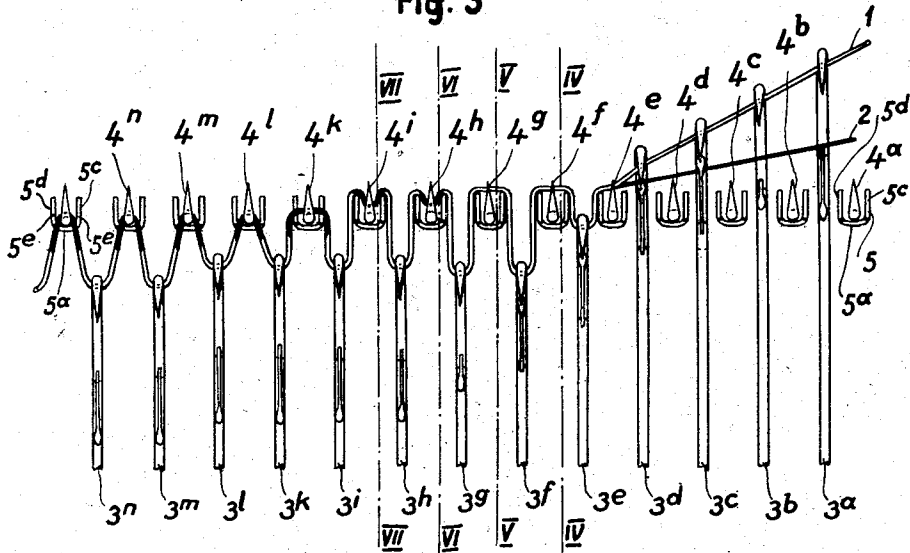
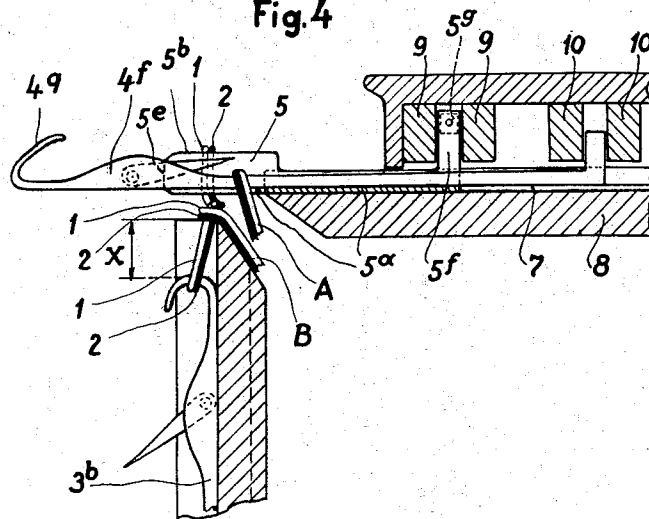


Fig. 4



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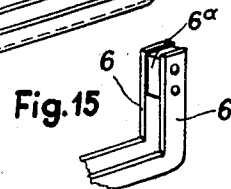
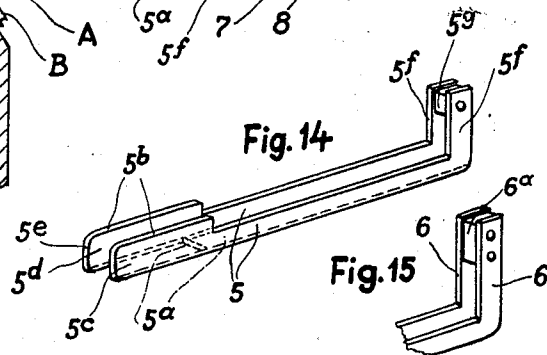
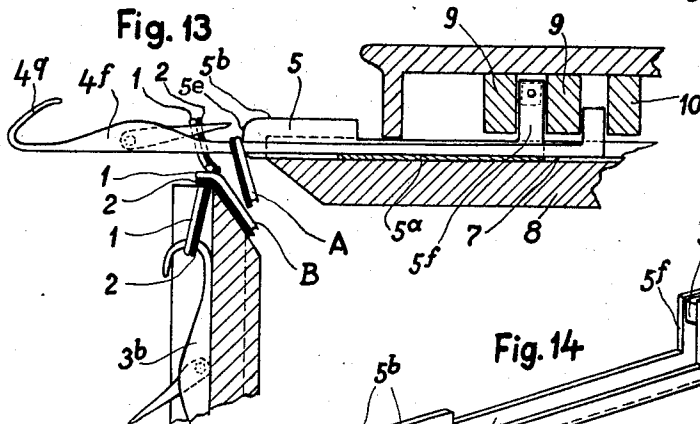
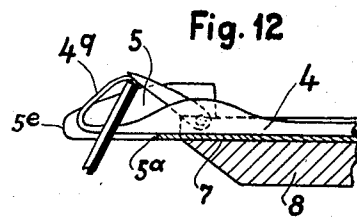
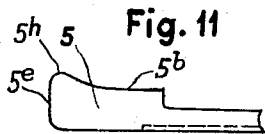
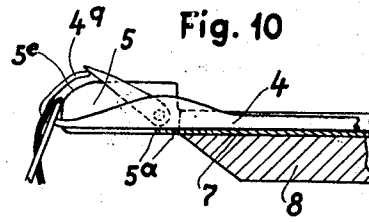
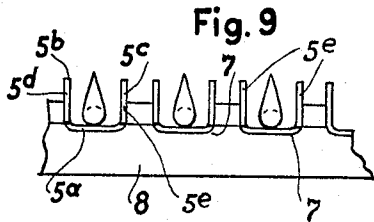
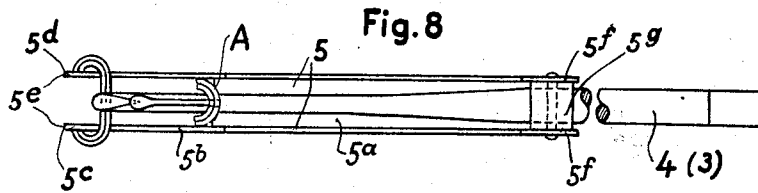
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METHOD OF PRODUCING DOUBLE-SIDED PLATED KNIT FABRICS

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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,319,340

METHOD OF PRODUCING DOUBLE-SIDED
PLATED KNIT FABRICSMax Nebel, Chemnitz, Germany; vested in the
Allen Property Custodian

Application November 24, 1939, Serial No. 305,976

2 Claims. (Cl. 66—90)

This invention relates to double-sided plated knit goods and to methods of and means for making the same, the knit goods covered by the invention comprising particularly ribbed goods generally as well as double ribbed goods of the interlock type.

According to the invention, ribbed fabric of this class is plated in such manner that on one side thereof one thread serves as ground thread and the other one as plating thread whilst on the other side the plating thread of the first side is worked as ground thread and the ground thread as plating thread, so that all meshes formed of one thread and knocked over to one or the other side lie therefore on one side and all meshes formed of the other thread and knocked over to one or the other side on the other side.

One of the advantages afforded by this method is that on one side of the fabric a warmth-giving material like wool or cotton is worked and on the other side a finishing material like silk or rayon can be used for plating without causing any variation in the structure, stretchability and elasticity of the fabric compared with the corresponding properties of known ribbed goods.

The method according to the invention is such that after the two threads have been sunk to form meshes on one needle row and, in plating position to each other, loops on the other needle row they are reversed while these loops are made into meshes, so that for instance on one side of the fabric a cotton thread and on the other side an artificial silk thread will be on the outside.

The method according to the invention may be applied with the aid of a knitting machine having two rows of needles, in which one row forms the threads in plating position into loops above the upper edges of turning tools arranged with and on both sides of the needles of the other row, whereupon while these loops are made into meshes the two superposed finished loops formed from the ground and plating threads are brought in reversed order into the needle head by the turning tools and are thereby reversed by being guided by the side edges of these tools and sliding in the needle head, proceeding from the hook, inside along it.

This method makes it possible to produce plating according to the invention not only in one and one but also in two and one, three and one, three and two, etc., ribbed goods. Furthermore, any known pattern can be worked in such goods for the first time at any possible arrangement of the meshes knocked over to one side relative

to those knocked over to the other side, and any reversedly plated pattern may be worked in combination with such patterns or separately.

The invention is illustrated by way of example in the accompanying drawings which shows fabrics and examples of mesh arrangements according to the invention and means for producing them and in which

Figure 1 shows ordinary ribbed fabric made by the method according to the invention;

Fig. 2 shows fabric of the interlock type made according to the invention;

Fig. 3 shows the two needle rows of a knitting machine and the various needle positions required for forming meshes;

Figs. 4 to 7 show different working positions of two associated needles of both needle beds seen from the side, i. e., on the lines IV—IV, V—V, VI—VI and VII—VII, of Fig. 3;

Fig. 8 shows the position of the turning tools relative to the respective needle;

Fig. 9 is a front view of the needle bed of a needle row provided with turning tools;

Fig. 10 shows a different position of the turning tools for turning both threads;

Figs. 11 and 12 are detail views of differently shaped working edges of the turning tools;

Fig. 13 shows the turning tools in inoperative position;

Fig. 14 shows the construction of a turning tool, and

Fig. 15 shows a higher foot for driving such a turning tool.

Ordinary ribbed goods as shown in Fig. 1 comprises a thread 1 serving as ground thread and a thread 2 acting as plating thread. The upper meshes of the piece of fabric shown are seen from above, so that only one or the other thread is visible. Of the meshes A on one side only the thread 1 can be noticed and of the meshes B on the other side only the thread 2, so that of the old meshes A' and B' the mesh A' and the mesh B' always appear on the front side of the fabric as made of the plating thread 2 whilst on the rear side the mesh A' and the mesh B' always appear as made of the ground thread 1. This applies also to the interlock fabric shown in Fig. 2, with the difference, however, that on one side of this fabric only the meshes formed of thread 2 and, on the other side, only the meshes of thread 1 are visible, since in interlock fabric every mesh is covered by a mesh.

In order to produce such goods the two loops on one needle row, for instance all meshes B, have to be reversed prior to being worked out

into meshes. This reversing point is indicated in Figs. 1 and 2 by the letter x.

For reversing the threads a sinkerlike tool 5 constructed so that it can be moved in the needle guide of the needle bed together with the needle but independently thereof is used.

The turning tools 5 are arranged in one needle row, one tool being provided for each needle. The two lateral edges of each tool 5 are positioned on both sides of each needle, and the sinkerlike tool 5 is constructed so that the two side walls 5c and 5d running along a bottom portion 5a form a U-shaped channel at one end of which the two side walls are united by a connecting member 5g to produce a foot member 5f. At the free end of the channel opposite the foot 5f the bottom 5a is recessed, and the side walls 5c, 5d form there flat sinkerlike members. The U-shaped turning tool 5 is so arranged that it is positioned in the needle guide 7 of the needle bed 8 with its bottom 5a facing downwards on which the needles are placed with their backs and are guided between the two sides 5c, 5d the upper edges 5b of which are still located within range of the opening of the needle hook.

The free side members 5c, 5d are the main portions of the tools 5. They effect and permit the reversing of the loops hanging on them and formed of the ground and plating threads in the needle head as well as the formation and knocking over of meshes on the needle positioned between them. The point of the upper edges 5b of the side members 5c, 5d where the threads are sunk to form loops lies below the hook end 4q of the needle head to permit gripping of the loops by the needle hook. The cams 9 driving the foot 5f of the tool 5 are preferably disposed in front of the cams 10 driving the needles 4 as indicated in Figs. 5 to 8.

To make possible the insertion of the needles 4 in the tool 5 in view of the arrangement of the cams 9 in front of the needles 4 it is necessary to place the connecting member 5g in the foot 5f so high that the butt or the head of the needle passes between the bottom 5a and the connecting member 5g and can be moved into and out of the channel of the tool 5.

Fig. 15 shows a foot for a tool 5, which is higher than the one shown in Fig. 14 so as to alternately render the tools operative or inoperative when working patterns or in interlock knitting machines.

For applying the method according to the invention a knitting machine may be used having two needle rows which are shown in Fig. 3. The needles of one row are designated 3a-3n and those of the other row, 4a-4n, the latter row remaining in initial position during laying of the threads 1, 2 as shown in Fig. 4, and the reversing tools 5 are so positioned that the threads 1, 2 are formed into loops not above the needle breast but above the front edge of the upper longitudinal edges 5b of each side member 5c, 5d. When the respective needle 3 has drawn out the loop as shown in in Fig. 3 with respect to the needle above the turning tool of the needle, the associated needle of the needle row 4 provided with turning tools commences its return motion to work out the meshes while the tools 5 remain in initial position as shown in Fig. 4. Due to further return motion of the needles 4, accompanied by a slight return motion of the reversing tools 5 (cf. the motion of the needle from the position shown in Fig. 4 to those positions shown in Figs. 5 and 6), the loop formed of the threads 1, 2 and

hanging on the upper edges 5b of the tools associated with the needles is moved into the needle hook not from the needle breast along the connecting inner edge of the hook but along the inner edge of the hook located toward the open side of the needle head, so that in the course of operation, as indicated in Figs. 3 and 7 with respect to the needle 4k, the two loops are reversed relative to each other. The old meshes A and B on the needles 3 and 4 in Figs. 4 to 7 show that the black thread 2 of the mesh B appears on the front side and the white thread 1 on the rear side of the fabric, whereas the black thread 2 of the mesh A lies on the rear side and the white thread 1 on the front side of the fabric in unchanged position.

During the operation following after the position shown in Fig. 7 the needle 4, synchronously with its turning tools 5, moves back. The two loops formed from the threads 1 and 2 are guided between the upper edges 5b of the side members 5c, 5d and the front edges 5e thereof inside along the hook 4q, so that the new loop, turned down to its shanks, slides off in turned position from the front edge 5e of its tool and then hangs on the needles between the side members 5c, 5d as shown in Fig. 3 with respect to needles 4l to 4n. Figs. 7 and 8 also show that the old mesh A, prior to being knocked over, hangs on the needle between the side members 5c, 5d of the turning tool whilst the newly formed loop is placed over the front edge 5e of the tool before it slides off.

Casting off of the meshes on the needles 4 may be effected either at the front end of the bottom 5a between the side members 5c, 5d or at the front edge of the needle bed 8.

As on one needle row, which in the example shown is the row 3, the threads are formed into loops not on the other needles 4 but on the turning tools 5 which are broader than the needles, these loops are drawn out somewhat larger than the loops formed on the needles. Fig. 3 shows that for this reason the needles 3f, 3g have formed shorter loops. When the needles of the row 4 (in Fig. 3 the needles 4h and 4i) engage the threads, the corresponding needles 3h, 3i of the other row 3 move slightly upwards to make possible the reversing of the loops on the needles 4. After the loops have slipped off the tools 5 the needles 3m, 3n, etc., descend again to equalize the loops formed on the needles 4 and 3.

When the fabric is to be knit 2:1 or 3:2, the cylinder needles (needles 3 in the drawings) must form still longer meshes than in 1:1 knitting to supply the ribbing needles with sufficient thread for working out their meshes.

All known patterns, as tuck, cardigan, racked, etc., may be produced while applying the method according to the invention.

The turning tool may also be formed so that the upper edge of the free side members 5c, 5d thereof, as shown in Fig. 10, is removed from the inner edge of the needle head to such an extent that the threads are forced to pass in reversed direction through the slot formed by the inner edge of the needle head and the end edge of the turning tool 5. Furthermore, the turning tool may have a free end of a shape shown in Fig. 12, in which case the two threads are first forced into a slot formed by the needle hook and the upper edges 5b of the tool and then turned laterally of the needle hook by the front edge 5e of the tool.

If it is desired to use the ground thread 2 on the side of the fabric where the plating thread

1 serves as ground thread for patterning purposes, the turning tool 5, as indicated in Fig. 13; is retracted with respect to the patterning needles and the loops are sunk in the usual manner on the latches of the needles 4 and not on the upper edges 5b of the turning tools.

A modification is shown in Fig. 11. For the purpose of lowering the sinking point of the upper edge 5b of the tools 5 to form loops that are not longer than if sunk on the needles 4 and to insure safe reversing of the loops, the upper edge 5b of the side members 5c, 5d at the free ends thereof ascends up to the highest point 5h of the front edge 5e, whereby the tension of the loops between the hook 4g and tool 5 as required for reversing is maintained.

In order to facilitate turning the needle hooks are preferably not bent throughout in the usual way but have their ends arranged obliquely to the needle stem in a rectilinear or almost rectilinear manner.

It is further possible to equip both needle rows with turning tools 5, in which case loops may of course be formed on one row and turned on the reversing tools of the other row so that turning and plating may alternately be performed in any desired order by one or the other of the two rows of needles and turning tools.

I claim:

1. A method of producing a double-sided plated knit fabric on knitting machines having two needle rows, said method comprising working a plating thread with a ground thread in such manner that the ground thread lies on the outside in the meshes of one side of the fabric and that the plating thread lies on the outside in the meshes of the other side of the fabric, said

working consisting in that one of said needle rows forms the threads into loops in plating position over the upper edges of turning tools arranged on both sides of the needles of the other one of said needle rows, whereupon during the working of loops lying over the needles of said other row into meshes, the two superposed completed loops of the ground thread and plating thread are brought in reversed order by the turning tools into the needle heads, and are reversed, by being guided by the upper edges of the turning tools and sliding within and along the needle heads, proceeding from the free ends of the needle hooks.

2. A method of producing a double-sided plated knit fabric on knitting machines having two needle rows, said method comprising working a plating thread with a ground thread in such manner that the ground thread appears on the outside in the meshes on one side of the fabric and the plating thread appears on the outside in the meshes on the other side of the fabric, said working consisting in forming the ground thread and the plating thread into meshes on one needle row and into loops on the other needle row, and reversing the two threads relatively to each other while said loops are worked into meshes, said loops being formed over the upper edges of turning tools arranged on both sides of the needles of the other one of said needle rows, whereby in the case of needles on which the loops are not to be turned, the turning tools are retracted to such an extent that the loops are formed not on the upper edges of the tools but in the usual way on the needles of the other needle row.

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