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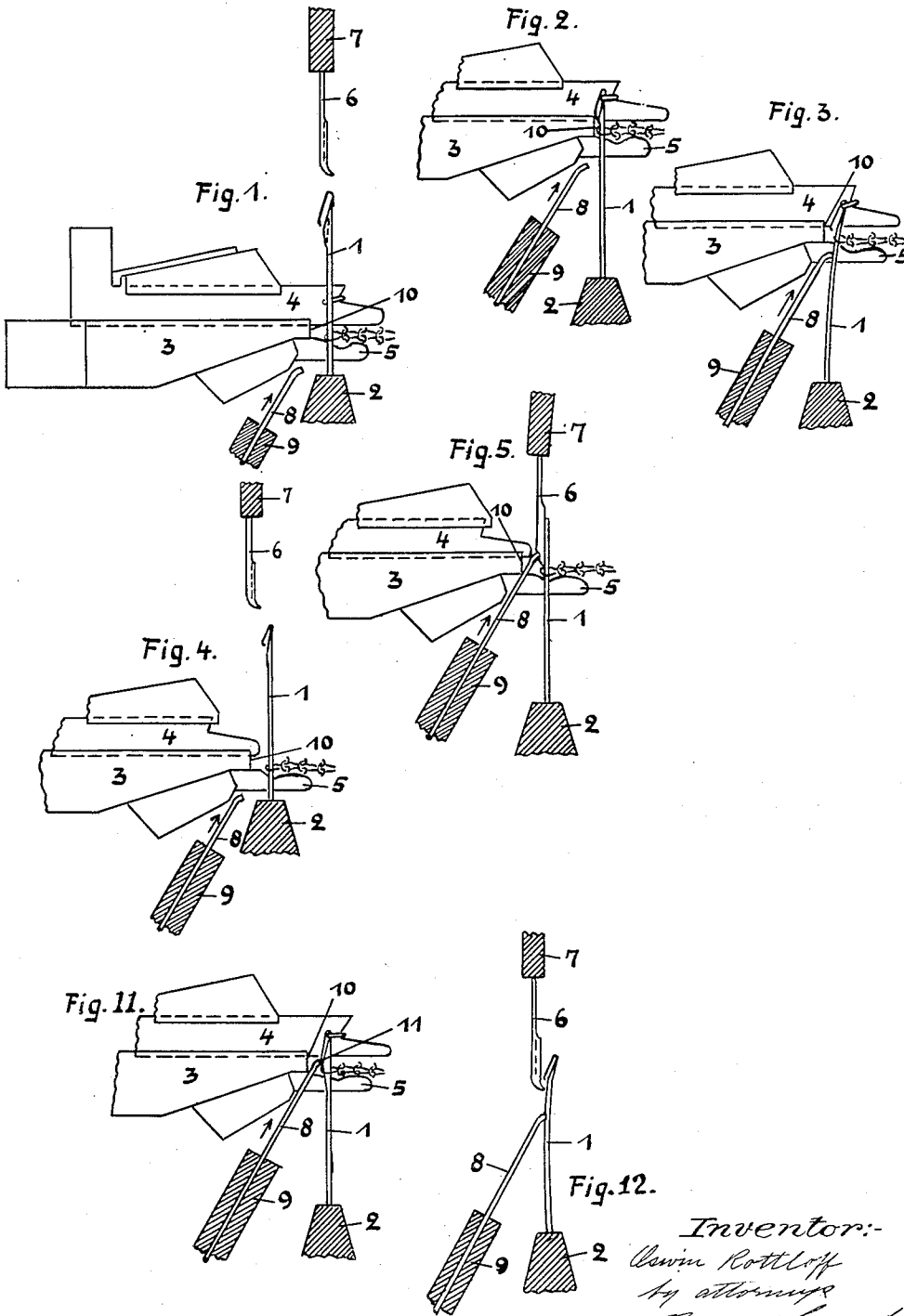
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FLAT KNITTING MACHINE WITH AUXILIARY DEVICE

Filed April 29, 1929

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

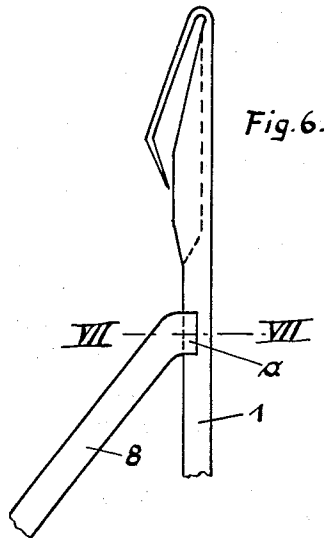


Fig. 6.

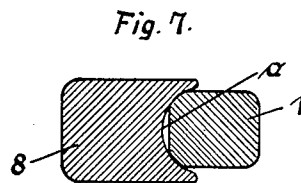


Fig. 7.

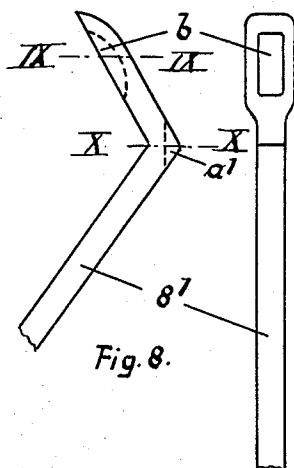


Fig. 8.

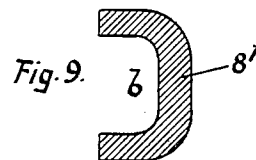


Fig. 9.

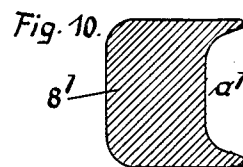


Fig. 10.

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UNITED STATES PATENT OFFICE

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FLAT KNITTING MACHINE WITH AUXILIARY DEVICE

Application filed April 29, 1929, Serial No. 359,087, and in Germany May 3, 1928.

The invention relates to an auxiliary device for flat knitting machines by which both open work designs as well as tuck stitch designs or both together may be obtained.

5 Devices for the production of open work designs are known, likewise machinery with a device for tuck stitch designs, but both have been hitherto very impractical and uneconomical, since only open work designs can
10 be produced on machines with the open work device. If one desired to use both kinds of designs on one and the same machine, then two separate devices are necessary, which however make the machine so complicated
15 and expensive that their use is prohibitive in practice. Moreover, the double arrangement also makes the working of such a machine very unreliable and imperfect.

The novelty of the present invention consists in using one and the same auxiliary device for the production of open work designs as well as tuck stitch designs. By this means an essentially simpler construction of the machine is obtained on the one hand,
20 and both kinds of designs may be produced on the same machine without detriment to the reliability of working on the other hand.

Some constructional examples of the new device are shown diagrammatically in the
30 accompanying drawings, in which

Fig. 1 shows certain principal operative parts of a flat knitting machine in sinking position;

Fig. 2 shows the parts in press position;

35 Fig. 3 shows the pressing off of the frame needles by means of the presser element while in press position;

Fig. 4 shows the position of the parts immediately before the covering process, i. e.,
40 the coming down of the transfer points;

Fig. 5 shows the action of the presser element on the transfer points for the purpose of making open work designs;

45 Fig. 6 shows the arrangement of a presser element when advanced into working position in relation to the frame needle;

Fig. 7 is an enlarged section along the line VII—VII of Fig. 6;

50 Fig. 8 shows a modified form of presser element;

Fig. 9 is an enlarged section along the line IX—IX of Fig. 8;

Fig. 10 is an enlarged section along the line X—X of Fig. 8;

Fig. 11 shows the pressing of the frame
55 needle points by means of the presser element for the purpose of forming tuck stitch designs; and

Fig. 12 shows the pressing off of the frame
60 needle from the transfer point by means of the presser element when producing open work designs.

Referring to Fig. 1, the various working parts of a flat knitting machine are shown herein in their normal positions. In the figure, 1 is the frame needle, 2 the frame needle
65 bar, 3 the sinker bar, 4 the sinker, 5 the knock-off plate, 6 the transfer point, 7 the fashioning rack, 8 the presser elements, 9 the bed for the presser elements in which they are arranged so as to be individually movable,
70 and 10 is the presser edge of sinker bar 3 against which, as is known, the hooks of needles 1 are pressed when the old row of stitches is to be removed over the freshly run thread loops. Presser elements 8, as already mentioned, are fixed in bed 9 so as to be individually movable. In a known manner certain presser elements 8 (corresponding to the design to be worked) are raised in the direction of the arrow and this enables these to act
75 upon the remaining working parts, especially frame needles 1 or transfer points 6.

Bed 9 is of course also arranged so as to be movable in the known manner in the frame
85 of the machine, so that presser elements 8 on being raised may follow exactly the movements of the other working parts during the formation of the design. U. S. Patent No. 939,328, to Salzer et al., may be taken as illustrative of the mechanism used to give the movement referred to.

In order to obtain a perfectly reliable co-operation of the presser elements with the frame needles or transfer points, presser elements 8 are provided, as shown in Figs. 6
95 and 7 on an enlarged scale, with a resting surface, for instance a groove *a* at their upper forwardly bent end, against which the frame needles or transfer points can rest, i. e.,
100

into which they can be inserted during working.

Without going beyond the scope of the invention, the presser elements 8' may be formed also according to Figs. 8 and 10. At the front bend there is again provided a resting surface, for instance a groove *a'* for the frame needles. The upper backwardly bent end is however provided with a spoon-shaped cavity *b* (Figs. 8 and 9) into which the transfer points can be inserted during fashioning.

Referring to Figs. 2 and 3, the method will now be described of operating the new device when working with tuck stitch designs.

When a fresh row of stitches is run off, needle bar 2, as is known, moves downwards as shown in Fig. 2, to withdraw its frame needles, and at the same time abuts against the presser edge 10 of sinker bar 3 to the extent that the hooks of the frame needles 1 are thereby pressed in and the old stitches on the frame needles slide over the hooks and are thrown off. At the same time the freshly run threads loops are drawn through the old stitches and thus converted into a complete row of stitches.

As soon as the downward movement of the frame needles 1 begins, all the presser elements 8 which happen to be opposite those frame needles on which the stitches for the design are to be formed, are raised into the position shown in Fig. 3. The raised presser elements 8 now press with their upper ends on the frame needles 1 opposite to them and displace the latter somewhat from their direction into the position in Fig. 3. As these cannot abut with their hooks against the presser edge 10 of sinker bar 3, they cannot consequently throw off their old stitches over the hook owing to the stitches coming under the hooks. Consequently, the known double stitches are formed on these frame needles.

Further, in the working of tuck stitch designs, as in Fig. 11, the arrangement may be such that the frame needle bar together with the frame needles does not go as far as the presser edge 10 of the sinker bar 3 during pressing as in Fig. 2, but the hooks of the frame needles 1 are pressed by presser elements 8. All presser elements 8 which belong to such frame needles, which form the design and therefore must not press off, then remain in their normal position. All the remaining presser elements are raised.

The procedure during fashioning, that is, in the production of open work designs, will be described with reference to Figs. 4 and 5.

The article hangs with its finally formed row of stitches on frame needles 1, Fig. 4.

Before running off the next row of stitches, the known fashioning process is first introduced. The transfer points intended for the formation of the design are selected in a known manner. The presser elements 8 corresponding to the design are again raised in

the direction of the arrow (Fig. 5). But in addition, the whole bed 9 moves upwards in such a manner that the raised presser elements 8 are brought with their upper ends within the field of the transfer points. By this means the transfer points are pressed into the cavities or grooves of frame needles 1, Fig. 5, and in the next following downward movement of the frame needles the transfer points 6 as well as presser elements 8 accurately follow the movements of the frame needles 1 until the stitches have slid from the frame needles on to the transfer points. The presser elements 8 thereupon return to their position of rest, whilst during the further descent of the frame needles 1 and transfer points 6 the corresponding stitches are lifted from their frame needles and suspended on other frame needles in the known way by corresponding movements of the frame needles and transfer points and by longitudinal displacement of the latter to the left or right.

When using presser elements however the arrangement according to Figs. 8, 9 and 10 may be adopted if desired, in such a way that by means of the raised presser elements the transfer points 6 are prevented from inserting into the cavities or grooves of machine needles 1 and from lifting off the stitches from them. For this purpose the presser elements must be provided at their front bend with a resting surface, for instance a groove *a'*, against which when working with tuck stitch designs the hooks of the frame needles, or the frame needles themselves may rest, or into which they may enter.

It is also possible however, when fashioning, not to allow the presser elements 8 to act on the transfer points 6, as previously described and shown for example in Fig. 5, but to cause the presser elements to act on the frame needles as shown in Fig. 12. The movement of the fashioning machine must then be maintained in such a way that all transfer points 6, the frame needles 1 of which are not pushed back, lift off the stitches from their frame needles, but the stitches of the frame needles which are pushed back cannot be engaged by the transfer points.

Thus it can be seen that the new idea of the invention, of allowing one and the same auxiliary device to act both on the frame needles 1 and also on the transfer points 6 in the formation of designs, enables the most varied designs to be obtained, while the said idea is capable of almost illimitable development. At the same time this inventive idea greatly facilitates the decreasing or the increasing for the purpose of altering the form of the article as may be desired, and also the temporary putting out of action of certain groups of needles.

The possibilities described and illustrated in the figures can, therefore, only be regard-

ed as examples of carrying out the invention since more detailed construction of the auxiliary device together with its elements, as well as the movements thereof when co-operating with the remaining working parts, will entirely conform to the remainder of the construction and to the method of working of the machine. The substance of the invention remains always the use of only a single auxiliary device in the working of open work and tuck stitch designs on a single machine. But the possibility is also therewith obtained of combining both kinds of designs with one another and thus of attaining the most varied and new results.

What I claim is:—

1. In a flat knitting machine of the character described, frame needles, transfer points and presser elements, said elements being separately movable and operable to act either upon the frame needles or upon the transfer points for producing tuck stitch work or open work interchangeably in the same machine.

2. In a flat knitting machine of the character described, frame needles, transfer points and presser elements, said elements being bent backwardly at their upper ends, provided with a cavity adapted to receive the tips of the transfer points, and provided with a contact surface shaped to engage the frame needles.

3. In a flat knitting machine of the character described, frame needles, transfer points and presser elements, said elements being individually operable to press selected frame needles away from their corresponding transfer points, to such an extent that the stitches on the selected frame needles cannot be engaged by the transfer points, whereby plain work is produced at said selected needles while open work is produced at the other needles not thus pressed away.

In testimony that I claim the foregoing as my invention, I have signed my name this 16th day of April, 1929.

OSWIN ROTTLOFF.