

April 1, 1930.

W. NICOLET

1,752,804

LOOM

Filed Aug. 15, 1927

6 Sheets-Sheet 1

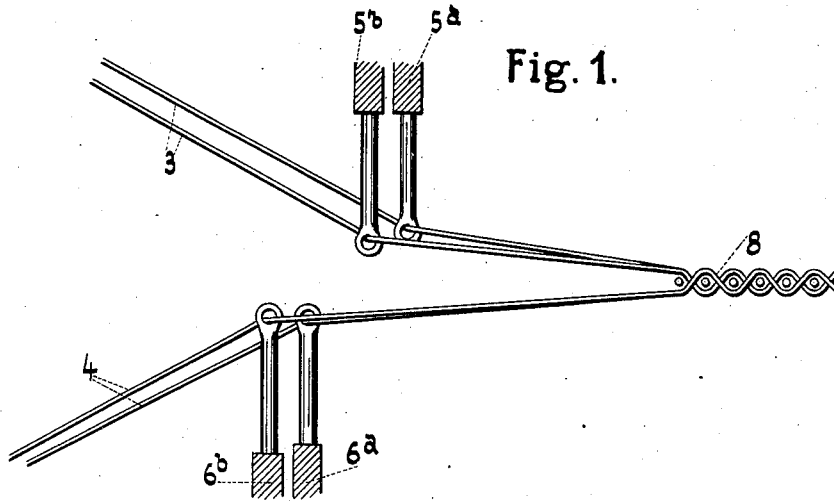


Fig. 1.

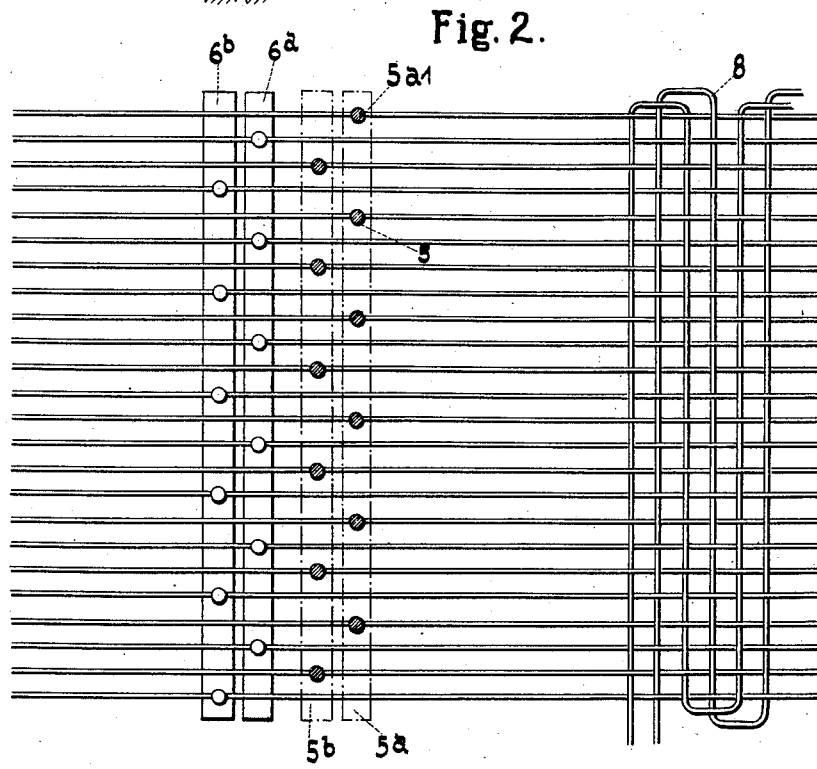


Fig. 2.

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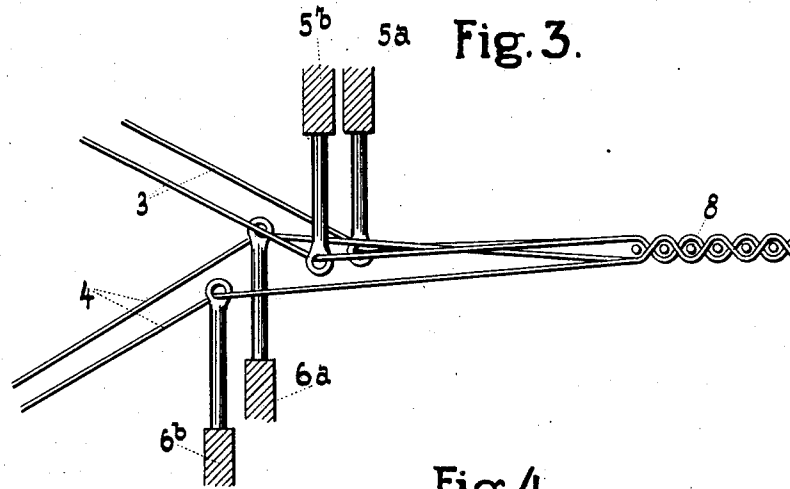
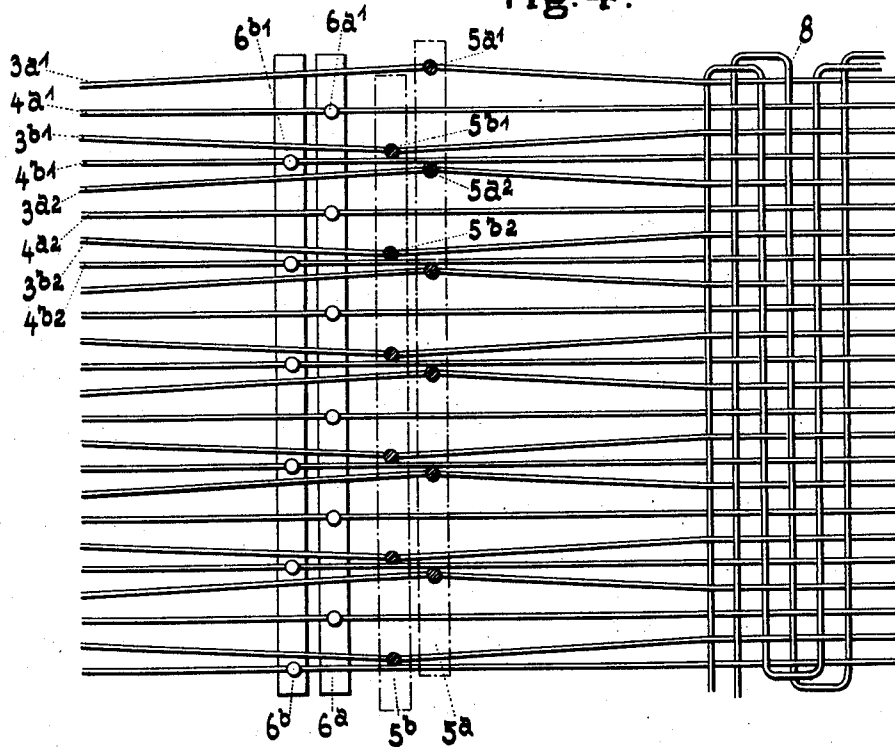


Fig. 3.



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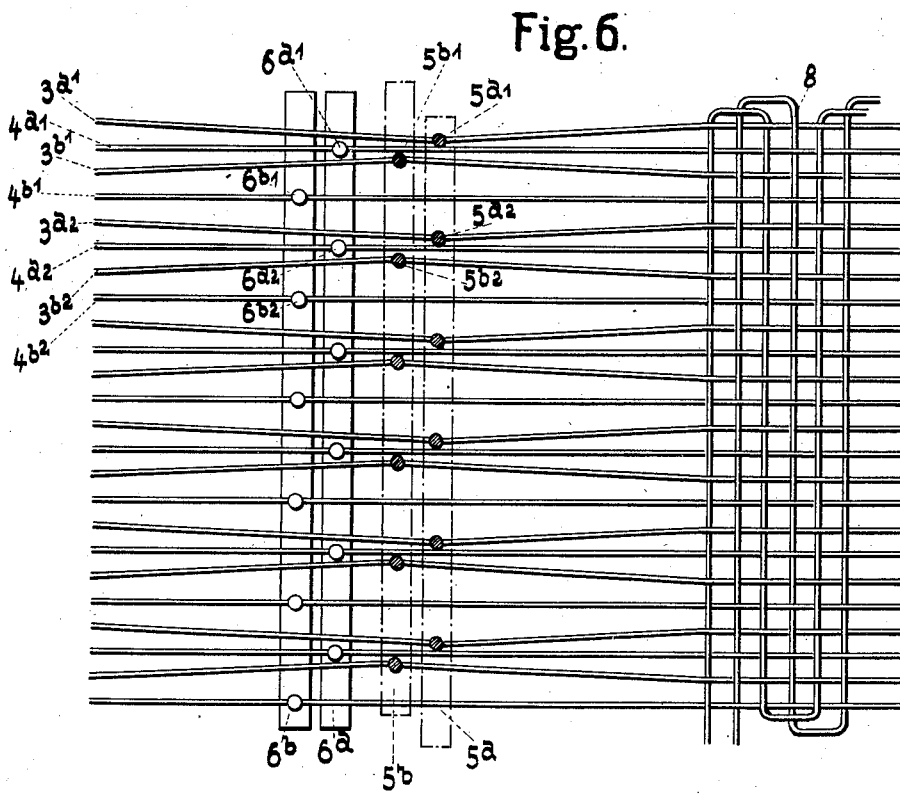
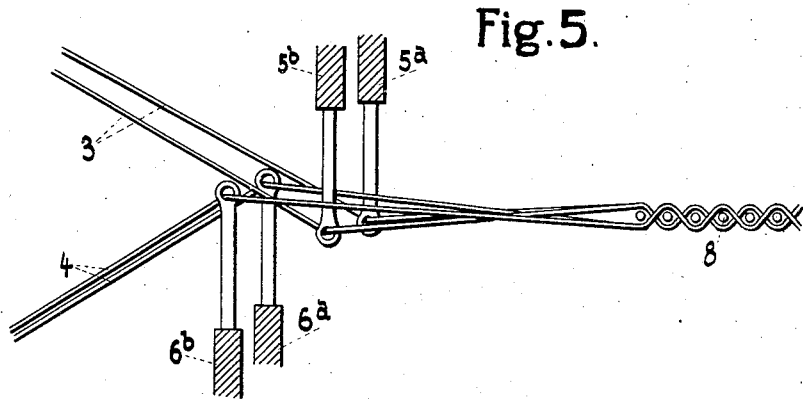
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1,752,804

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6 Sheets-Sheet 3



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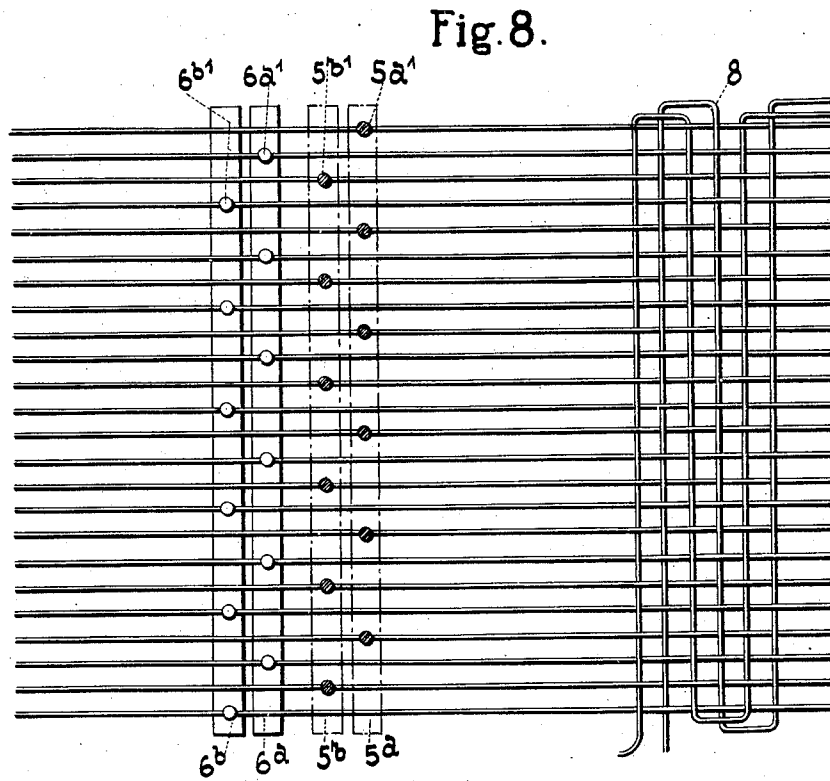
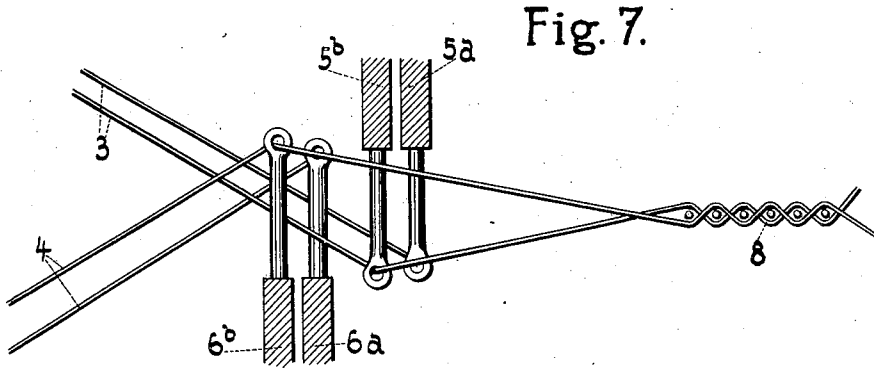
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LOOM

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6 Sheets-Sheet 4



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April 1, 1930.

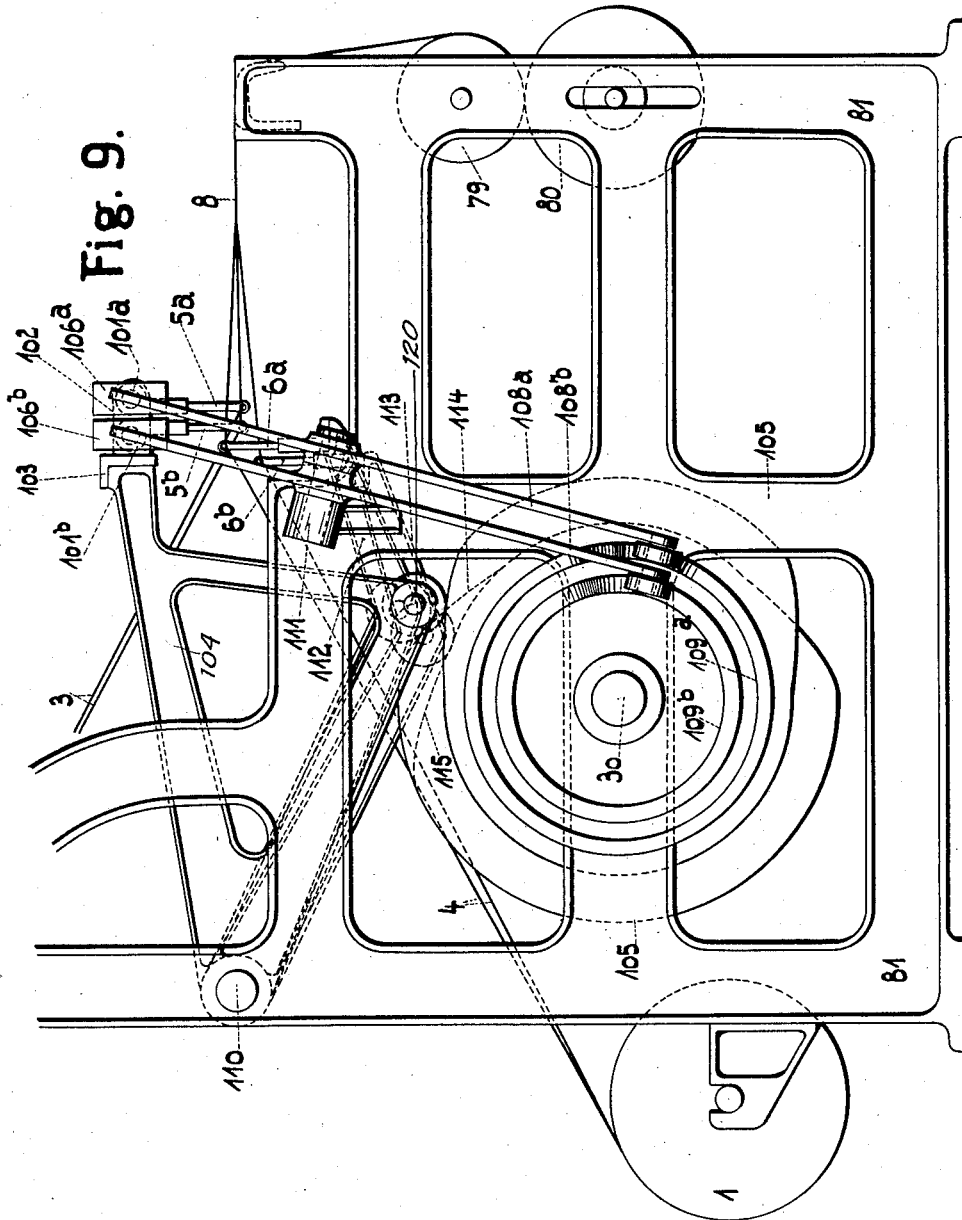
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6 Sheets-Sheet 5



Inventor:
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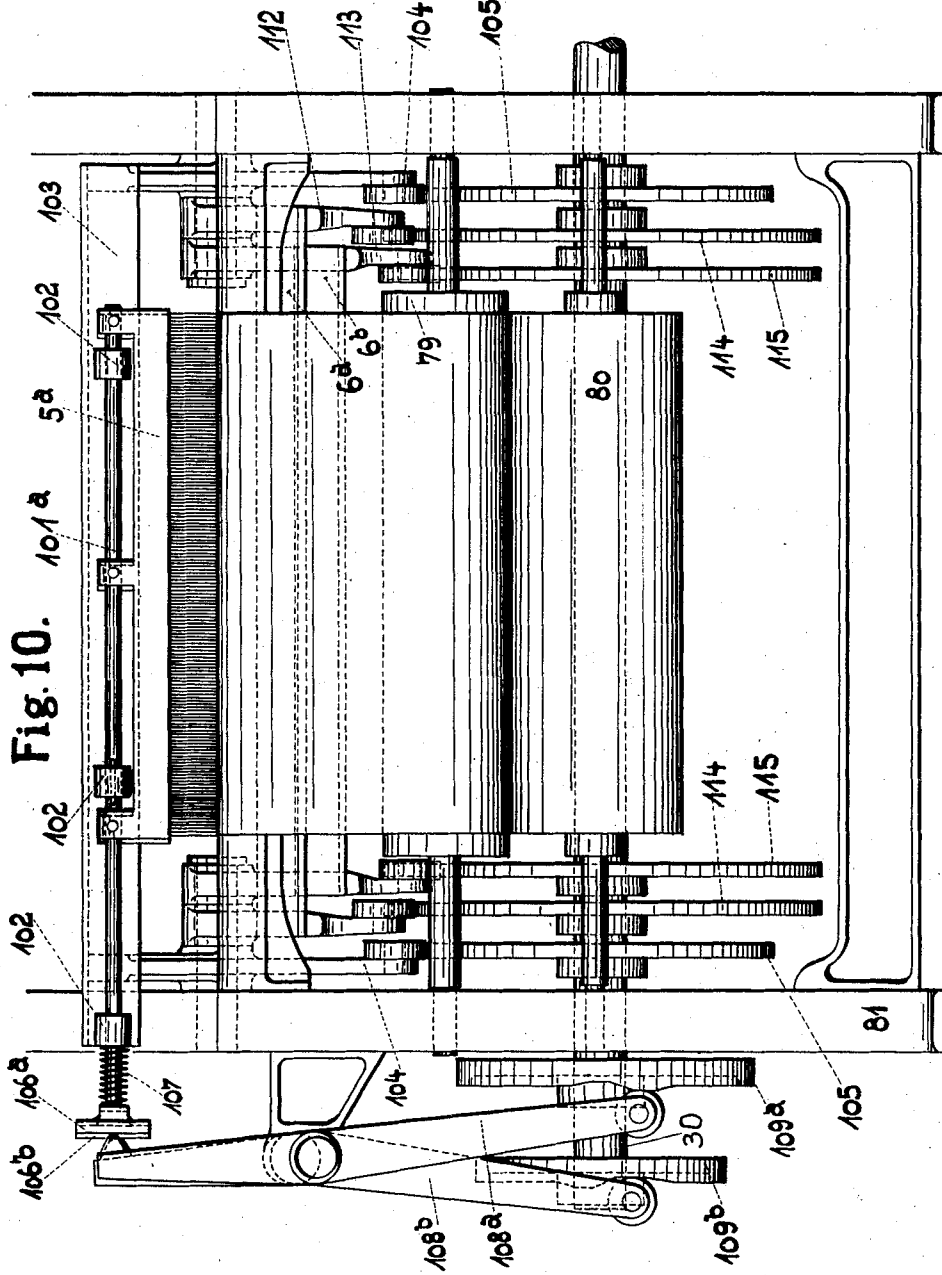
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1,752,804

LOOM

Filed Aug. 15, 1927

6 Sheets-Sheet 6



Inventor:
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UNITED STATES PATENT OFFICE

WALTER NICOLET, OF LEIPZIG, GERMANY

LOOM

Application filed August 15, 1927, Serial No. 213,035, and in Germany August 16, 1926.

My invention refers to the art of weaving and more especially to the method and means for producing a fabric disclosed in my copending application for patent of the United States Serial No. 73,718, according to which two groups of warp threads are moved alternately in such manner that two sheds are formed in each alternate operation, one to the rear of the other, a weft thread being passed through each shed either simultaneously or in quick succession, whereupon first the front and thereafter the rear weft is cast on. In the loom described in the prior application for the carrying out of the new method, a separate comb is provided for each group of warp threads, the two combs being arranged one to the rear of the other and their teeth being directed towards each other. The two groups of warp threads are so guided that they diverge from the finished fabric towards the warp beams, whereby an angle is formed between the threads of the two groups, this angle forming one shed, the other being formed by moving the two combs in opposite directions so as to effect the crossing of the two groups of warp threads, whereby the apex of the angle enclosed between the two groups of threads is shifted from the edge of the finished fabric to the rear of the combs and in the direction towards the warp beams.

In the practice of my method as above described I prefer providing the combs with needles and needle bars of the kind known in the art of knitting. If one or both needle bars are moved, the warp threads guided by one row of needles will enter the spaces between the needles of the other needle bar. The closer together the needles are arranged in a bar, the greater will be the difficulty of introducing the threads guided by the other row of needles in the spaces between the needles of the first-mentioned bar and the greater will be the probability that a thread is entered in the wrong place. This is particularly likely in the case where in order to produce a particularly dense fabric each needle bar has mounted thereon a plurality of rows of needles arranged one behind the other.

The present invention has particular ref-

erence to looms in which each comb has a plurality of rows of needles arranged thereon, and its particular object is to facilitate the introduction of the warp threads guided by one such comb in the spaces between the needles of the other comb, when the two groups of warp threads are moved in opposite directions to effect a crossing thereof.

According to my invention the two rows of needles forming part of a comb are shifted relative to each other in opposite directions, the bars of one group in longitudinal, the bars of the other group in transverse direction, before effecting the crossing of the two groups of warp threads, so that the spaces between the threads guided by these needles are alternately widened and narrowed.

In the drawings affixed to this specification and forming part thereof the new method according to my invention and the respective parts of a loom for carrying this method into effect are illustrated diagrammatically by way of example.

In the drawings

Figs. 1, 3, 5, and 7 are side elevations,

Figs. 2, 4, 6, and 8 are plan views of the two groups of warp threads and the needle bars and needles guiding same, the threads and needles being shown in four different positions in order to clearly illustrate the new process.

Fig. 9 is a side elevation, and

Fig. 10 is a front elevation of the mechanism adapted to control the operation of the needles and threads in accordance with this invention.

Referring first to Figs. 1-8, 3, 3 are the warp threads of one group and 4, 4 are the warp threads of the other group. 5^a, 5^b are the needle bars belonging to group 3 and 6^a, 6^b are the needle bars belonging to group 4 of warp threads. On each needle bar is carried a row of needles 5^a₁ 5^b₁ 5^a₂ 5^b₂ and 6^a₁ 6^b₁ 6^a₂ 6^b₂, respectively. As shown in the drawings, the even needles are designated by the affix "a₂" or "b₂", the odd needles by the affix "a₁" or "b₁".

If the needle bars are moved apart, as shown for instance in Fig. 1, the warp threads

3 and 4 diverge from the fabric 8 in the direction towards warp beam 1.

The needle bars 5^a and 5^b can move parallel to each other and in opposite longitudinal directions, as shown for instance in Fig. 4; while the needle bars 6^a, 6^b can be moved transversely and in opposite directions, as shown for instance in Fig. 3. The distance between two adjoining needles on each bar is large enough to allow three warp threads to be readily accommodated between them. The two needle bars forming part of each comb are mounted in close juxtaposition in such manner that in the position of rest the warp threads 3 alternate regularly with the warp threads 4, all the threads, if viewed from above, extending in parallel (Figs. 2 and 8). If with the needle bars in this position the two groups of threads were crossed by imparting an up and down movement in opposite directions to the needle bars 5^a, 5^b relative to the bars 6^a, 6^b, the close juxtaposition of the threads shown in Figs. 2 and 8 would involve the danger of some of the threads entering wrong spaces of the other bars. In order to prevent this from arising, the warp threads guided by the needles on bar 6^a are first inserted between the needles and threads on the bars 5^a and 5^b, and only thereafter the threads guided by the needles on bar 6^b are thus inserted. In order to effect this previous to the insertion on the warp threads 4 the needle bars 5^a and 5^b have imparted to them a longitudinal movement in opposite directions in such manner that the warp threads guided in these needles on the one hand and in the needles mounted on the bars 6^a and 6^b, are united in two groups leaving wider spaces between them, in which the threads guided by the vertically moved bars 6^b and 6^a respectively are isolated.

Fig. 1 illustrates the position of rest, from which the two needle bars 5^a and 5^b are first moved in the direction towards needle bars 6^a, 6^b, until the eyes of the needles are substantially in line with the fabric 8. During this movement the bars 5^a, 5^b are at the same time imparted a longitudinal movement in opposite directions, this movement extending over one quarter of the needle division, whereby the needles on the bars 5^a, 5^b and 6^b are approximately aligned in such manner that for instance their needles 5^a₂, 5^b₁, and 6^b₁ are substantially positioned in a straight line. In consequence of this displacement, as shown in Fig. 4, groups of three warp threads, 3^b₁, 4^a₁, 3^a₂ are drawn towards each other on the level of the respective needles positioned in one plane, while between two adjoining groups of such threads a single warp thread, for instance 4^a₁, 4^a₂ and so on is isolated, so that the movement of the needle bar 6^a towards the needle bars 5^a, 5^b will cause this isolated warp thread to be correctly inserted in the spaces between needles 5^a₁, 5^a₂ and 5^b₁, 5^b₂ respective-

ly, the other warp threads being united into groups and being thus moved out of the way. After this has been effected, the needle bars 5^a, 5^b are once more shifted in the longitudinal direction, however in the opposite direction, the displacement of each bar extending one half of a needle division, so that the needles on the bars 5^a, 5^b are carried onto a level with the needles on the bar 6^b. In consequence of this displacement, however, other warp threads, for instance 3^a₁, 4^a₁, 3^b₁, are crowded together on the level of the needles on bars 5^a, 5^b, 6^a, so that between two adjoining groups of needles a warp thread such as 6^b₁ is isolated for free insertion (Fig. 6). If now the needle bar 6^b is shifted upward towards the needle bars 5^a, 5^b up to the level of the needle bar 6^a previously displaced (Fig. 5), the warp threads 4^a₁ and so on are inserted with absolute certainty in the spaces between needles 6^a₁, 5^a₂, and 5^b₁, 5^b₂, respectively, not being hampered in their movement by the other warp threads united into groups.

After this has been effected the needle bars 5^a, 5^b are again returned into their original position, so that in looking onto the warp threads from above they will be found to extend in parallel, as shown in Fig. 8. In this position of the threads the needle bars 5^a, 5^b and 6^a, 6^b are jointly moved towards each other, thereby bringing the crossing movement to a finish (Fig. 7). In order to avoid the output of the loom being impaired by the shifting of the needle bars 5^a, 5^b in opposite longitudinal directions, I prefer effecting this shifting simultaneously with the shifting of the bars 5^a, 5^b relative to the bars 6^a, 6^b. The returning of the needle bars into their original position (Fig. 1) is effected in the usual manner and at the same time without any interruption or relative displacement.

In Figs. 9 and 10 the mechanism for operating the needle bars is disclosed. The bars 5^a and 5^b are each fixed to a guide bar 101^a, 101^b, respectively, which are supported in parallel juxtaposition in bearings 102 forming part of a rail 103 for longitudinal displacement, being however secured against circumferential movement. The rail 103 is mounted on the upper arms of two angle levers 104 pivoted at 120 to the machine bed 81, the lower arms engaging by means of rollers a cam disc 105 mounted on the eccentric shaft 30 and arranged to lift and lower the angle levers 104 and the needle bars 5^a and 5^b fixed thereto. The ends of the bars 101^a and 101^b project from one side of the machine bed and have discs 106^a, 106^b mounted thereon. Springs 107 serve for holding the bars 101^a, 101^b in the projecting position. The end faces of the discs 106^a, 106^b are acted upon by the upper arms of levers 108^a, 108^b, respectively, pivoted to a support 111 and having their other ends applied against cam discs 109^a, 109^b, respectively, which cause the levers 108^a,

108^b to be rocked in such manner as to effect a relative displacement of the bars 101^a, 101^b, as required for shifting the needle bars 5^a and 5^b as above explained.

5 The needle bars 6^a and 6^b are supported by the levers 112, 113, respectively, pivoted to the machine bed at 110 and engaging cam discs 114, 115, mounted on the eccentric shaft 30 so as to be lifted and lowered as required in the operation above described.

10 The position of the several parts illustrated in Figs. 9 and 10 corresponds to the phase of the operation illustrated in Figs. 3 and 4.

15 I wish it to be understood that I do not desire to be limited to the exact details of construction and operation shown and described for obvious modifications will occur to a person skilled in the art.

I claim:—

20 1. A loom comprising a row of needles for positively guiding one group of warp threads, two cooperating rows of needles for positively guiding the other group of warp threads, means for moving the needles guiding one group in the longitudinal direction of the needles towards and away from the needles guiding the other group and means for imparting to said cooperating rows of needles alternating substantially horizontal movements relative to each other in opposite directions at right angles to the threads, the distances which any one group of needles moves away from the needles of the other group, being less than the distance between contiguous needles.

35 2. A loom comprising two rows of needles for positively guiding one group of warp threads, two cooperating rows of needles for positively guiding the other group of warp threads, means for moving the needles guiding one group in the longitudinal direction of the needles towards and away from the needles guiding the other group and means for imparting to said cooperating rows of needles alternating substantially horizontal movements relative to each other in opposite directions at right angles to the threads, the distances which any one group of needles moves away from the needles of the other group, being less than the distance between contiguous needles.

40 3. A loom comprising two rows of needles for positively guiding one group of warp threads two cooperating rows of needles for positively guiding the other group of warp threads, means for moving the needles guiding one group in the longitudinal direction of the needles towards and away from the needles guiding the other group and means for simultaneously imparting to said cooperating rows of needles alternating substantially horizontal movements relative to each other in opposite directions at right angles to the threads, the distances which any one group of needles moves away from the needles of the other group, being less than the distance between contiguous needles.

dles of the other group, being less than the distance between contiguous needles.

4. A loom comprising means for holding two groups of warp threads at an angle to one another, two rows of needles for positively guiding one group, two cooperating rows of needles for positively guiding the other group of threads, means for moving the needles guiding one group in the longitudinal direction of the needles towards and away from the needles guiding the other group and means for imparting to said cooperating rows of needles alternating substantially horizontal movements relative to each other in opposite directions at right angles to the threads, the distances which any one group of needles moves away from the needles of the other group, being less than the distance between contiguous needles.

In testimony whereof I affix my signature.
WALTER NICOLET.

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