

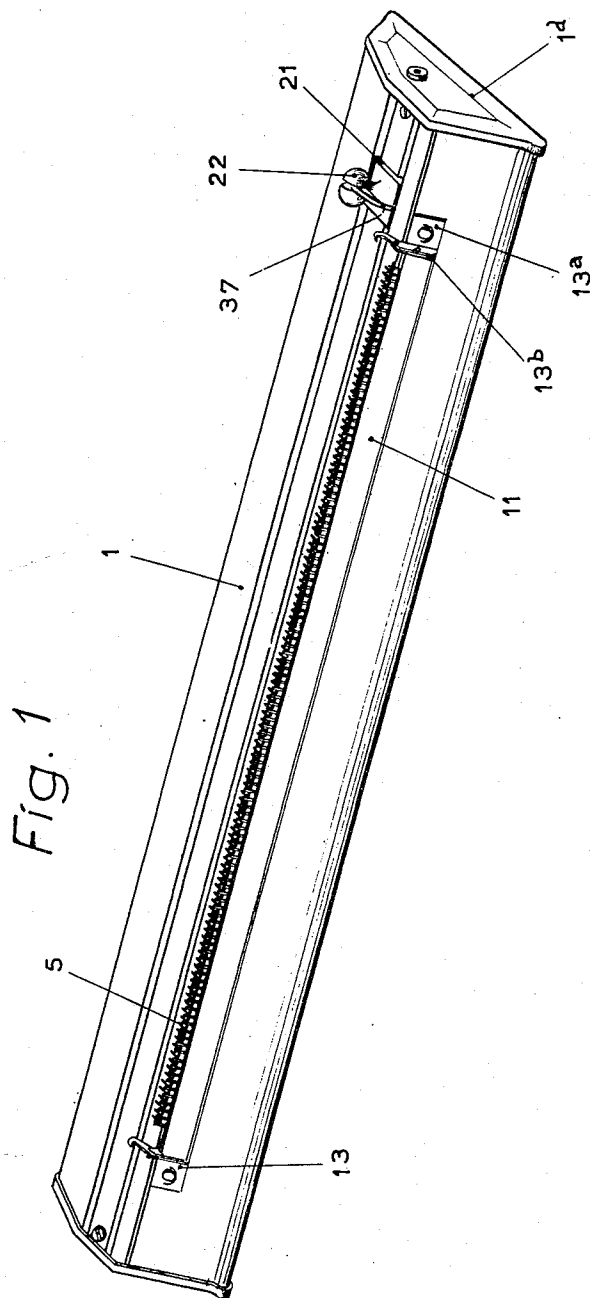
July 6, 1954

M. BABEAU
HAND-KNITTING MACHINE

2,682,761

Filed Aug. 19, 1950

8 Sheets-Sheet 1



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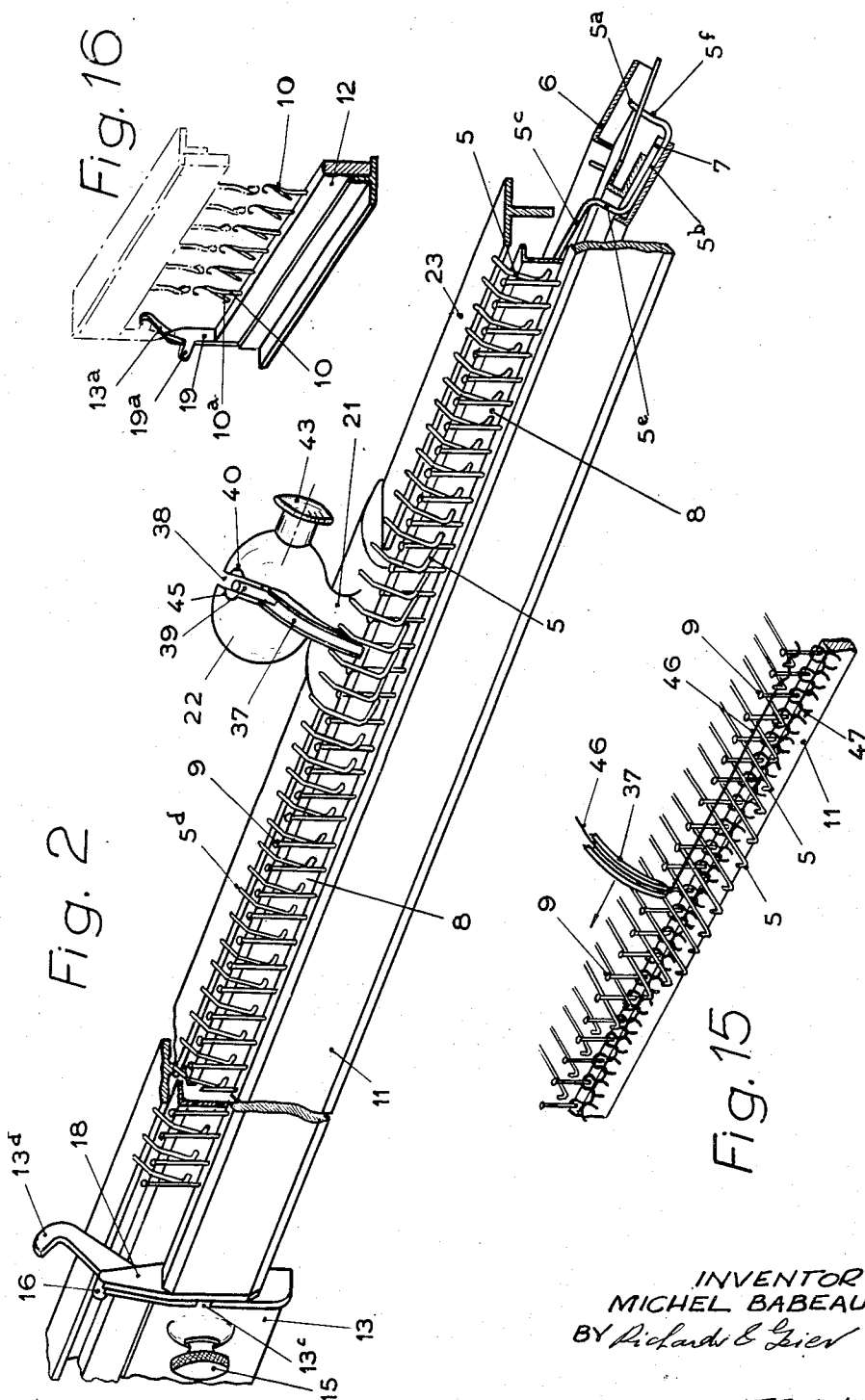
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8 Sheets-Sheet 2



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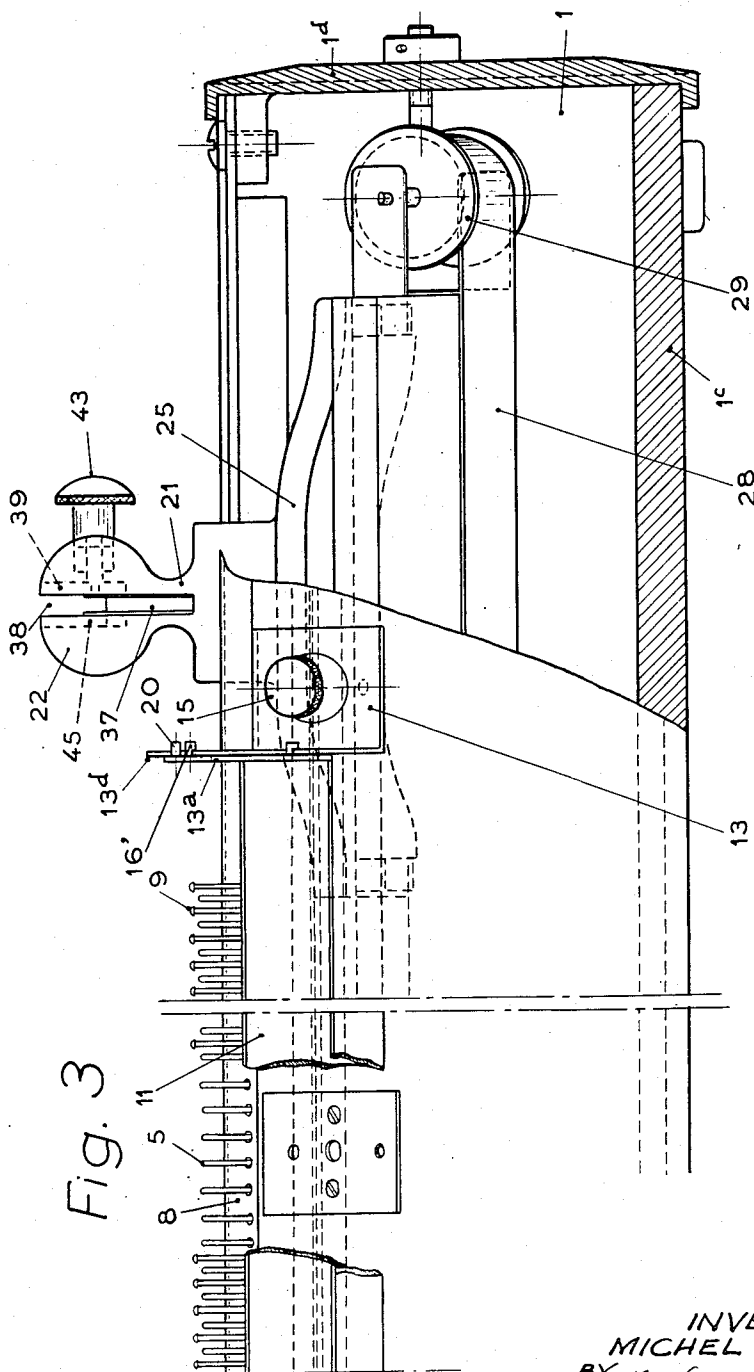
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Filed Aug. 19, 1950

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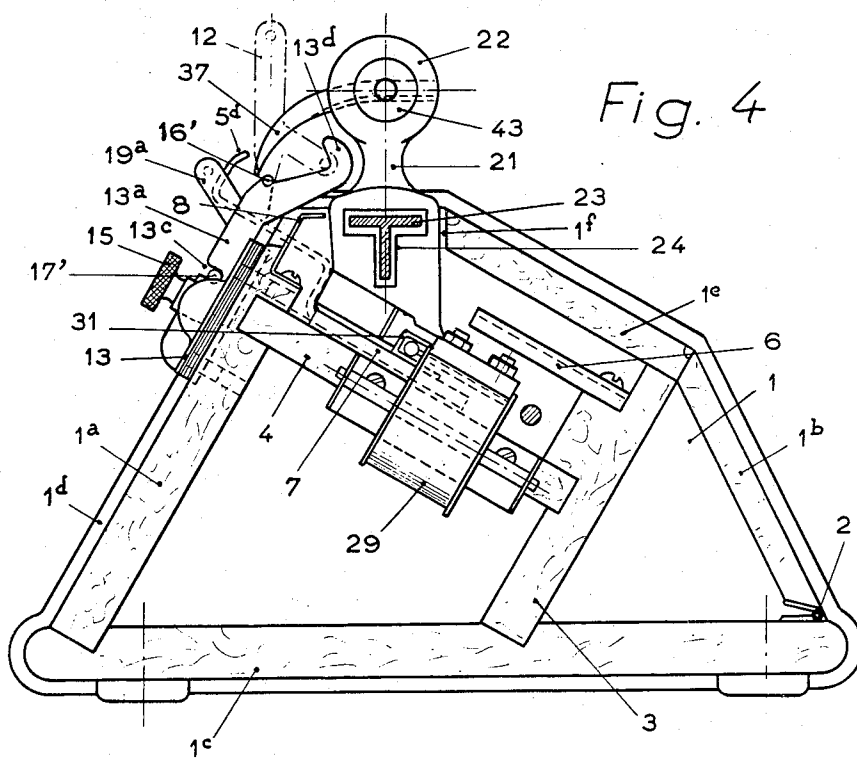
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M. BABEAU
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Filed Aug. 19, 1950

8 Sheets-Sheet 4



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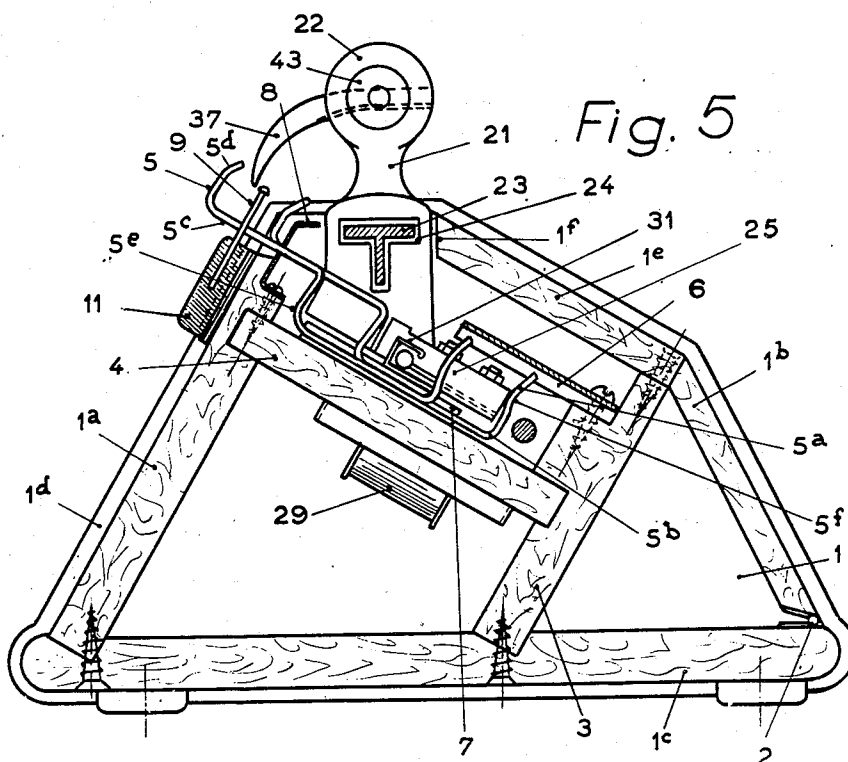
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M. BABEAU
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Filed Aug. 19, 1950

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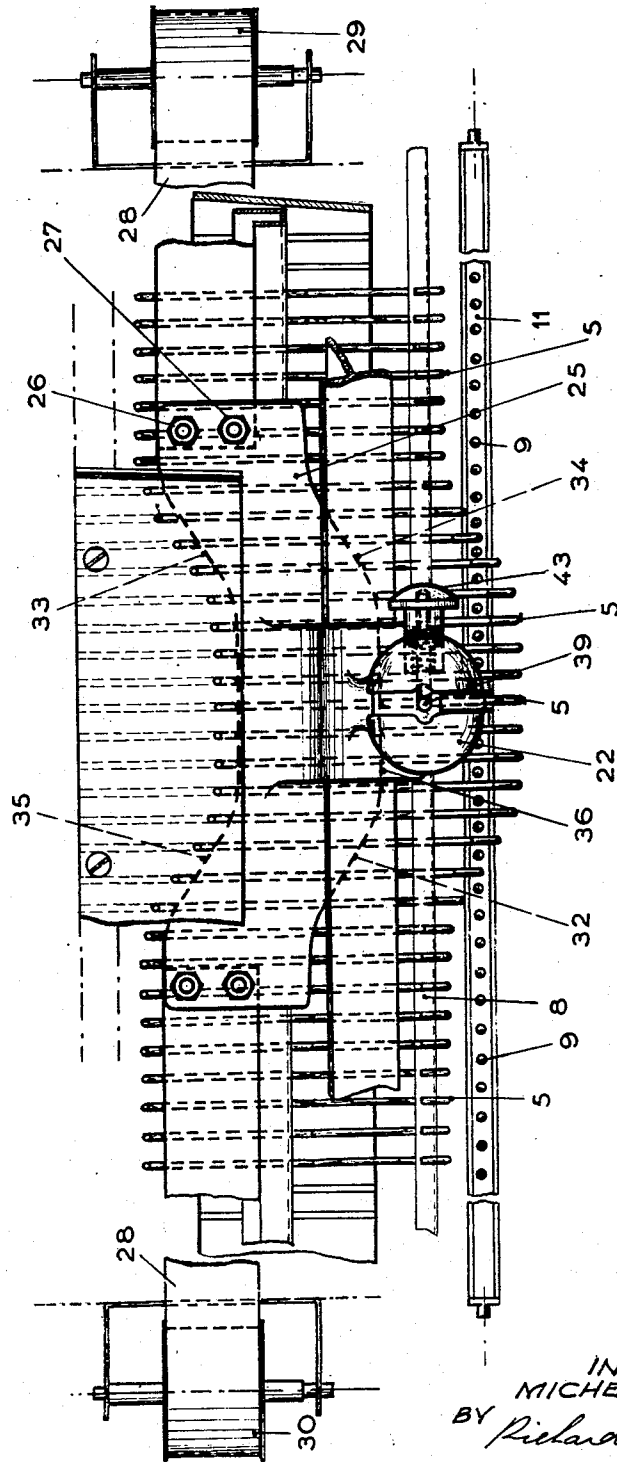
M. BABEAU
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8 Sheets-Sheet 6

Fig. 6



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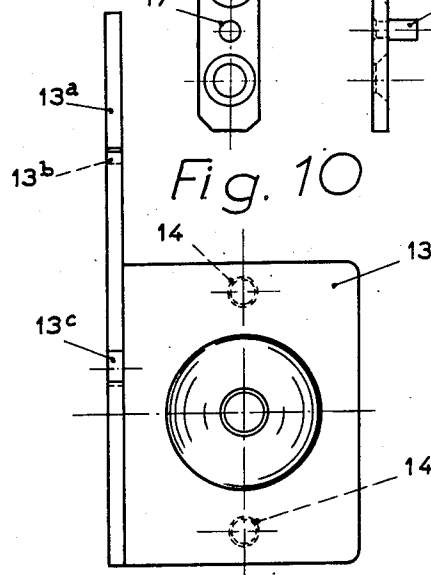
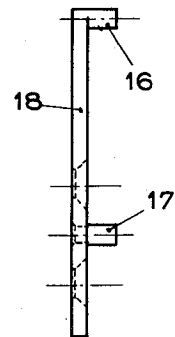
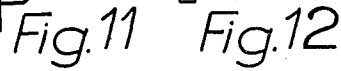
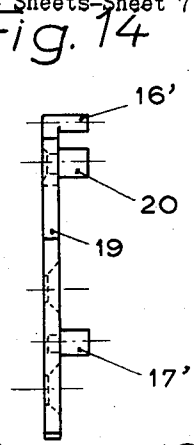
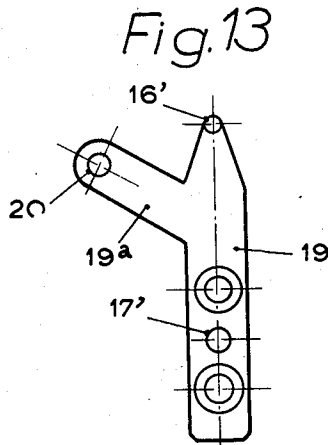
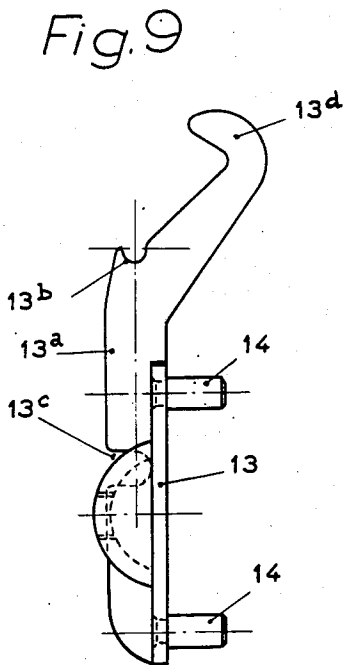
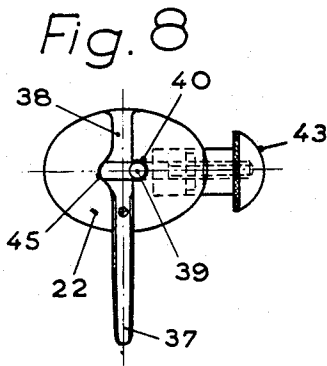
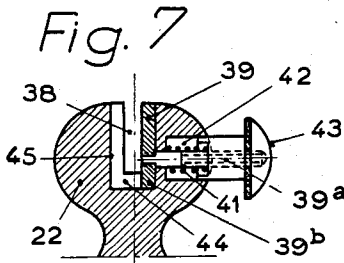
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M. BABEAU
HAND-KNITTING MACHINE

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8 Sheets-Sheet 7



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HAND-KNITTING MACHINE

2,682,761

Filed Aug. 19, 1950

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Fig. 19

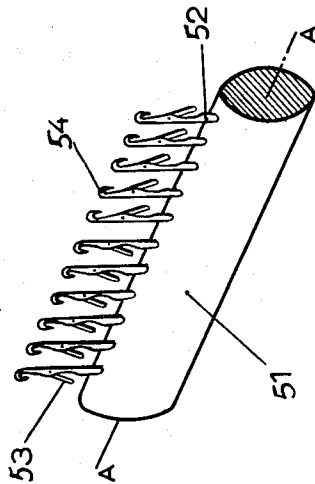


Fig. 17

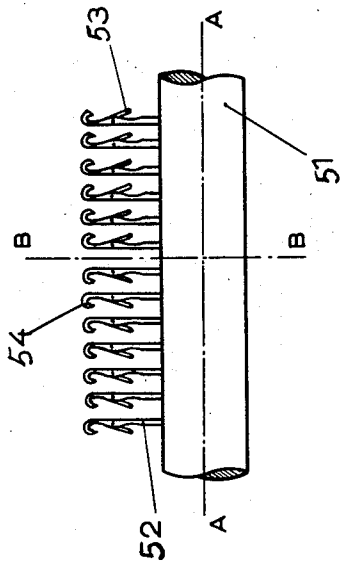
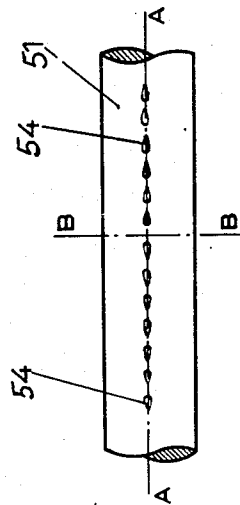


Fig. 18



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UNITED STATES PATENT OFFICE

2,682,761

HAND-KNITTING MACHINE

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Application August 19, 1950, Serial No. 180,448

Claims priority, application France
August 22, 1949

4 Claims. (Cl. 66—4)

1

This invention relates to knitting machines and more particularly to an apparatus for producing stitched or looped cloths notably for domestic or handicraft use, of a known kind comprising two sets of cooperating members of different types. One of these sets consists of metal rods, pegs, pins or similar members so assembled as to form a rectilinear removable comb while the other set is formed of sliding hook members arranged in front of the free intervals of the aforesaid comb and actuated from inside the apparatus by a driving member or carriage adapted to move the hook members to-and-fro in relation to the comb so as to initiate each row of stitches, after the first row has been formed, by placing the thread in zigzag between the comb and the hook members.

As a rule, the work is started by using the well-known metal-strip device which serves to hold fast the first row of stitches and subsequently to readily turn it over the comb.

In knitting machines of this type the stitches are formed by introducing the thread through the passage formed by the hook members advanced beyond the comb, and then restoring the hook members to their initial position in order to cause the thread to run zigzag. Thus, the thread pulled by the hook members is locked at the upper portions of the teeth and the row of stitches is completed by turning or "knocking" the preceding row of stitches over the heads of comb teeth or needles. The next row is prepared by turning the comb end to end longitudinally or by leaving or putting it back in the same position, according to the stitch pattern to be made with the comb.

The object of this invention is to improve knitting machines of this type and more specifically to make it possible to obtain knitted material of different stitch patterns while making the operation of the knitting machine easier by simplifying and speeding-up the handling of the members to be moved and finally, to increase production.

These various objects are attained through the substantial improvements brought by my invention, which are characterized essentially in that—

1. The driving member or carriage provided for reciprocating the hook members to the in- and outside of the apparatus is so arranged that during each stroke it operates two distinct steps consisting the one in opening the hook members for receiving the thread therein and the other

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in closing the hook members to complete the first stage of stitch formation by placing the thread in zigzag between the comb and the hook members.

2. The carriage is combined with a thread-carrier which places the thread into the hook members when they are open as the carriage is moved longitudinally to the machine.

3. The thread tension adjustment for producing loosely or closely knitted material at will is carried out by means cooperating with the thread-carrier and adapted to exert a more or less pronounced braking action upon the thread passing through this thread-carrier.

4. The apparatus is provided with a pair of comb brackets on which combs of different types, i. e. ordinary toothed combs and latch-needle combs, may be mounted, these brackets being adapted to act as supporting members to the combs fitted thereon in both operating positions thereof, that is, in the case of an ordinary toothed comb, as well after as before it is turned end to end longitudinally and, in the case of a latch-needle comb, as well after as before it is pivoted upwards for bringing the needles in a position where they extend downward with a suitable inclination in relation to the plane of the hook members.

5. The comb brackets and the thread-carrier are so designed that the carrier is permitted to move beyond the working zone at either ends of its reciprocations.

6. The toothed comb is provided with end side-plates having each a protruding member adapted to engage a notch in the corresponding comb bracket.

7. The protruding members mentioned in paragraph 6 hereabove are substantially in alignment with the teeth ends.

8. The latch-needle comb is provided with end side plates having each, in addition to a protruding member adapted to engage a notch in the corresponding comb bracket so as to form a trunnion for the pivotal movement of the comb, a lateral projection adapted to bear on the bracket when the comb is in its knocking-over position and to provide the most suitable inclination of the comb in relation to the hook members.

Other features and advantages of the invention will become apparent in the following description of an embodiment thereof given by way of example and illustrated diagrammatically in the attached drawings, in which:

Fig. 1 is a perspective view of the apparatus;

Fig. 2 is a fragmentary perspective view showing at a larger scale the respective positions of the essential components of the apparatus;

Fig. 3 is a fragmentary elevational front view of the apparatus with parts thereof broken away;

Fig. 4 is an end view of the apparatus after the corresponding end plate has been removed, the comb used in this case and mounted on the apparatus being of the latch-needle type;

Fig. 5 is a similar view illustrating the driving device in an operative position, the fixed comb mounted on the apparatus in this case being of the ordinary toothed type;

Fig. 6 is a fragmentary plane view from above illustrating the operation of the carriage;

Fig. 7 is fragmentary sectional view of the handle provided for actuating the thread-carrier-supporting carriage;

Fig. 8 is a plane view from above Fig. 7;

Fig. 9 is an elevation side view of one of the comb supporting brackets,

Fig. 10 being an elevational front view thereof;

Figs. 11 and 12 are elevational views in perpendicular planes of one of the end side-plates of the ordinary-toothed comb;

Figs. 13 and 14 are views similar to Figs. 11 and 12, respectively, of one of the end side-plates of the latch-needle comb;

Fig. 15 is a perspective view illustrating the thread-throwing and loop-forming steps which occur by placing the thread in zigzag between the comb and hook members;

Fig. 16 is a perspective fragmentary view showing the latch-needle comb in its normal operating position and in knocking-over position, i. e. with the heads upside down, as shown in dotted lines;

Fig. 17 is a front view of a central longitudinal portion of a comb adapted for knitting garter and stocking stitches.

Fig. 18 is a plane view and

Fig. 19 a perspective corresponding view of the comb portion of Fig. 17.

The apparatus comprises an elongated box member 1 consisting of a front wall member 1^a, a rear wall member 1^b hingedly mounted on a bottom member 1^c, a pair of removable side plates 1^d and a removable lid 1^e so designed as to form between its upper edge 1^f and the front wall member a longitudinal slot in which the driving device to be described presently is mounted for longitudinal motion.

The various members mounted inside box member 1 are supported by either a wall member 3 parallel with the front wall member 1^a or an intermediate bottom 4 positioned at right angles with members 1^a and 3.

Each sliding hook member 5 consists of a suitably bent metal rod or pin having its up-swept rear end 5^a in guiding engagement in a grooved plate 6 fixed on wall member 3, and its lower arm 5^b also in guiding engagement in another grooved plate 7 fixed on the intermediate bottom 4; furthermore, the other arm 5^c of the sliding hook member terminates in a hook portion proper 5^d and passes through the corresponding hole provided for this purpose in a front guide-plate 8.

The assembly of members with which the sliding hook member 5 cooperates for the formation of knitted stitches may consist, for example, of rectilinear nail-shaped metal rods or pins 9 (see Figs. 1 to 3, 5, 6 and 15) or latch needles 10 (Figs. 4 and 16) according to the type of stitches to be

knitted, i. e. garter or stocking stitches. The teeth 9 or the latch-needles 10 are assembled to form a removable rectilinear comb 11 or 12 which may consist either of a flat bar (as shown) or a cylindrical bar. Either of these combs 11 or 12, according to the kind of knitting to be made, is mounted between a pair of brackets comprising each a plate 13 provided with studs 14 engaging corresponding recesses formed either in the front wall member 1^a of the box member or in an inserted member, this plate 13 being held against motion by means of a knurled screw 15 engaging a corresponding threaded hole in wall member 1^a or in the aforesaid inserted member. The shank of screw 15 is of a length sufficient to permit the interposition between plate 13 and wall 1^a or said inserted member, of a varying number of adjusting strips of varying thickness whereby the length of the stitches formed may be modified by varying the distance between the comb 11 or 12 and the row of hook members 5.

Each supporting plate 13 comprises on its comb-receiving side a portion 13^a bent at right angles and provided with a notch 13^b and a recess 13^c adapted to be engaged respectively by an upper pin 16 (or 16') and by a pin 17 (or 17') of the corresponding end plate 18 (or 19) of comb 11 (or 12). Pins 16 are disposed along a line substantially in alignment with the tooth line. An upper hook-shaped projecting portion 13^d of the supporting plate 13 is adapted to cooperate in a manner which will be defined presently with another pin 20 of an arm 19^a of the corresponding end plate 19 of the latch-needle comb 12 when the latter is turned over through a pivotal movement upward so as to cause the needles 10 to extend downward, as shown in Figs. 4 and 16.

The ordinary teeth 9 or latch-needles 10 are so disposed that when the comb is in its operative position, hook members 5 are placed in front and centrally of the intervals formed between these teeth or needles. Hook members 5 are actuated for alternate to-and-fro motion in relation to the comb by a slide member or driving device or carriage 21 to which reciprocating motion may be imparted by seizing its handle-forming head 22. The carriage slides along a longitudinal slide-bar 23 on which it is engaged through its slit 24. The lower portion of carriage 21 is provided with a plate 25 having fixed thereto at 26 and 27 respectively the ends of a metal band 28 passing around loose guide pulleys 29, 30 mounted on the fixed structure of the machine. The plate 25 is guided by a leading bar 31.

Plate 25 is characterized essentially by the provision of two pairs of cam faces adapted to push the hook members 5 to their outer positions and subsequently to restore them toward the front wall member 1^a. In other words, plate 25 comprises a pushing cam face 32 and a pulling cam face 33 which become operative when the carriage is moved from right to left, and a pushing cam face 34 and a pulling cam face 35 which become operative when the carriage is moved in the opposite direction, i. e. from left to right. With this arrangement, during each stroke of the carriage the cam plate 25 passing by the hook members will first open the latter or cause them to move forward in relation to the needles of comb 11 or 12 (for instance, considering a right-to-left movement, through actuation of hook arms 5^c by cam face 32), then hold these hook members open during a time period sufficient for throwing the thread in the passage formed between the advanced hook mem-

bers and the needles of the fixed comb (as caused by the edge 36), and subsequently close these hook members (through action of cam face 33 on hook arms 5¹ during the right-to-left movement contemplated) in order to bring about the desired zigzag thread pattern between the comb and hook members.

According to another feature of the invention the thread is laid down by means of a thread-carrier 37 fast with carriage 21. In the example illustrated in the drawing, the control handle 22 of the carriage is formed with a slit 38 having fixed in its bottom the thread-carrier proper 37 consisting of a simple suitably bent plate. The thread fed from the bobbin or ball and passed through slit 38 may be tensioned more or less according as it is desired to obtain a more or less close-knitted material, by means of a tension adjuster consisting of a friction or braking device comprising a vertical rod 39 engaging in its position of rest a recess 40 formed in one of the side walls of the slit 38 and urged by a return spring 41 placed between the bottom of a cavity 42 provided in the carriage handle 22 and a tapped button 43 screwed on a horizontal arm 39^a of the friction device. It will be readily understood that when the thread has been engaged in the thread-carrier the button 43 is pressed to push the vertical rod 39—the lower end of which is guided in a slot 44 formed at the bottom of the slit—whereby the thread is more or less pressed in a recess 45 provided in the opposite wall of slit 38. At the end of the thread-carrier stroke the button 43 is released and the return spring 41 will restore the friction rod 39 to its position of rest.

Fig. 15 illustrates how the thread 46 is thrown into the space formed between the advanced hook members 5 and teeth 9 of comb 11. The same figure shows how the thread is arranged in zigzag between the hook members and teeth when the former are moved back toward the box member 1 by the pulling cam face of the carriage which in this figure is assumed to move from right to left.

The already knitted material is designated in 47. After the right-to-left stroke of the carriage is completed, the thread just passed will form the loops of the new row of stitches. To complete this novel row the last row of stitches is knocked over the heads of teeth 9 of comb 11, then the latter is subsequently removed from its brackets 13 to remove the thread from hook members 5. Then the comb 11 is turned over longitudinally from end to end, i. e. by placing the right end to the left and vice-versa.

In the meantime the carriage 21 has been brought back to the right end of the box member and then work will be resumed to form a new row of garter stitch knitted material.

If a comb 12 fitted with latch-needles 10 is used the thread loops are formed around the needle shanks in the same manner as about the teeth 9 of comb 10. After completing the row of loops the comb 12 is lifted by pivoting it about the upper pins 16¹ and brought in its inverted position shown in dotted lines in Figs. 4 and 16. It is then possible to lower the last row of stitches thus closing the latch 10^a of the latch-needles 10, so retaining the thread which has just been passed. Subsequently, the stitches are turned down over the terminal hook portions of the needles and another row of stitches is so completed. Finally, the comb is lifted slightly to release this row from the hook members. Then

the comb is swung down to restore it in the position illustrated in thick lines in Fig. 16 and the thread is again laid down and given a zigzag pattern by displacing the carriage with its thread-carrier from left to right to form the next row of stitches, the knitted material thus formed having a stocking stitch pattern.

It will be understood that the invention is by no means restricted to the specific embodiment described and illustrated by way of example as equivalent modifications, improvements in details and provision of means may be devised without departing from the spirit and scope of the invention.

Thus, it will be advantageous to provide, in addition to the usual "starting comb" employed in apparatus of this type for assisting in holding the first rows of stitches for the knocking over operation, one or several half-combs adapted to make the operation of the machine easier for small works and to help the user carrying out the knitting when it is desired to materially increase the number of stitches per row.

In order to simplify the material required and make the work easier, another object of the invention is to provide a comb illustrated in Figs. 17 to 19 and applicable to the production both of garter and stocking stitch patterns. For this purpose the novel comb illustrated is characterized essentially in that it is fitted only with latch-needles but so mounted that the central plane thereof is not positioned at right angles with the comb axis as in known combs but in a plane parallel or substantially parallel with or passing through this axis.

In Figs. 17 to 19, 51 illustrates the bar on which the needles are mounted. 52 is the shank, 53 the pivoting latch and 54 the hook portion of the needle.

As will be apparent from the figures the latch-needles are so mounted on the supporting bar 51 that the central plane of the needles passes through the axis AA of the support.

With this novel arrangement of the latch-needles the comb of the latch-needle type may be used for knitting both garter and stocking stitch patterns while hitherto known combs of this type could only be used for the production of stocking stitch knitted material. As the hook portions of the latch-needles are disposed in parallel with the axis AA of the supporting member the thread pulled by the sliding hooks placed in front of the free spaces between the comb needles will form around the shank of each needle a loop which cannot be released from the needle without being caught by the hook portion thereof both in those operating steps wherein the stitches are formed with the comb turned on one of the faces and in those wherein the comb is turned on the other face, i. e. as well before as after the end-to-end over-turning which, as is well known, is required after each row of stitches when knitting garter stitches.

As a result, the user on the one hand needs only one comb for knitting these two different stitch patterns and on the other hand can readily alternate one or several rows of garter stitches with one or several rows of stocking stitches during operation of the apparatus.

Preferably and as shown in the drawings the hook portions 54 of the needles are arranged symmetrically in relation to the plane BB at right angles with the comb axis and centrally of the length thereof, the left-side hook portions having their apertures directed to the left end

and the right-side hook portions having their apertures directed to the right end of the comb. As knitted material always tends to shrink, there occurs on each stitch, with the needles arranged in the manner described and shown, a slight tension toward the middle of the comb which will make the knocking over operation easier and somehow urge the stitches formed to move downward along the needle shanks instead of passing over the hook portions.

I claim:

1. A hand-knitting machine comprising a box member, said member having at least a front wall and the wall having recesses formed therein adjacent each end, two sets of coacting members for the box member, one of the sets comprising a comb, the comb having spaced teeth along one edge, a plate for each end of the comb, a bracket coacting with the plates and the recesses adjustably disposed on the front wall, the second set comprising a plurality of hook members slidably inserted through the front wall, the outer end of the hook members being intermediate the teeth of the comb; the machine further comprising a reciprocable driving device for the hook members reciprocably disposed in the box member in a plane substantially perpendicular to the hook members, two pairs of cams disposed on the driving device, one pair of cams actuating the hook members to the open and zigzag positions of the thread when moved in one direction, the second pair of cams actuating the hook members to the open and zigzag positions of the thread when the device is moved in the opposite direction, and a handle member for the driving device, the handle member having formed therein a thread carrying slit substantially parallel to the hook members.

2. A hand-knitting machine according to claim 1 in which the thread carrying slit of the handle member has two opposed vertical recesses formed therein and a cavity connecting the recesses at the bottom, a rod coacting with the recesses and cavity adjustably disposed in the slit, and means for maintaining the rod under adjustable tension relative to one of the recesses.

3. A hand-knitting machine according to claim

1 in which the plate for each end of the comb has vertically spaced and outwardly directed protuberances formed thereon, one of the protuberances being at the top extremity, and in which the bracket for each plate has formed on one surface thereof two outwardly directed and spaced studs coacting with the recesses of the front wall, adjustable means intermediate the bracket and wall for maintaining the bracket stationary, the bracket further having formed on the side opposite the studs a comb receiving portion substantially parallel to the center lines of the studs, said portion having a notch formed therein at the top coacting with the top protuberance of the plate and substantially aligned with the teeth of the comb when inserted, the portion further having a second notch formed therein coacting with the second protuberance on the plate.

4. A hand-knitting machine according to claim 3 in which the plate for each end of the comb has an integrally formed arm upwardly and outwardly directed, a pin disposed in the arm and directed toward the bracket, and in which the bracket for each plate has an integrally formed upper hook-shaped projecting portion coacting with the pin when the comb is in the knocked-over position and determining the inclination of the comb relative to the hook members.

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