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(54) A device for combining a loom with a knitting frame for attaining fabrics bearing figures composed of wefted loops bound bytextile interlacings.

(57) A device for combining a loom with a knitting frame for attaining fabrics bearig figures composed of wefted loops, bound by texile interlacings, wherein one or two front support plates are provided on the fore frame of the loom in an opposide and symmetric arrangement or in similar positions and needles, without tongues and pressers, each needle being arranged between two movable walls adhering to said needles, which needles are able to slide between the walls for opening and closing the needle hooks so as to charge the loop of the open hook onto the walls and discharge the loop falling down from the needle, as well as to displace the loops from one front support plate to another one, a movable comb being provided, which besides its normal beating movement is adapted to carry out the displacements to the right and to the left to guide the yarms between establiched needles provided for performing the interlacing, two parallel rods being arranged beyond the comb, between which rods there are pasing the yarns to be raised or lowered for hooking the needle yarns.

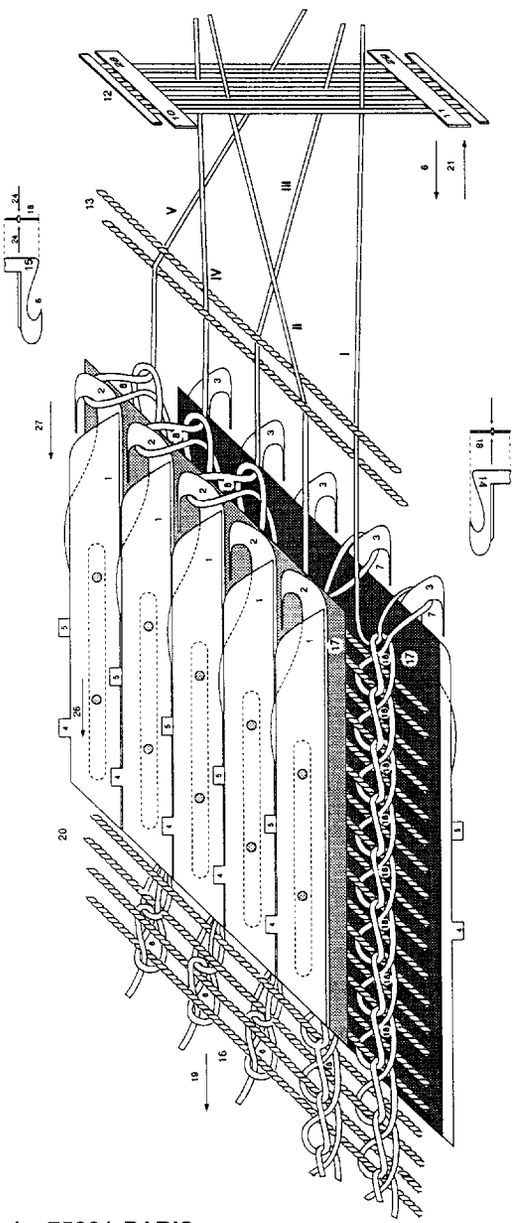

FIG. 1

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DISCLOSURE

The present invention relates to a particular arrangement of following four devices:

A first device consisting of two hosiery front plates arranged on the fore frame of the loom, opposite the movable comb. The needles and the front plates are aranged in a parallel, symmetric and opposite position. The yarns comming from the warp pass into the healds and comb and receive the inserted wefts and the needels form the loops, the tissue passes between the two front support plates and finally winds on the draw-cylinder.

A second device consisting of a new type needle without the tongue and with protection walls which hide the hook for performing the output of the loop from the needle. This device has two walls and a central needle having a hook without the tongue. The two walls are connected with one another by three pins so that they move always together and are controlled by the same heel.

The needle which slides between the walls is controlled by another heel, so that the walls and the needles form a single piece and their movements do not depend on one another.

A third device serves for hooking the warp yarns on the hooks and consists of a comb performing two movements:
a normal beating up movement and a horizontal side movement to the right or to the left for forming interlacings of the loops or for hooking the yarns on the needles.

Behind the comb there are mounted two horizontal and parallel rods for raising and lowering the warp yarns.

A fourth device for conveying the loops, and manufacturing figured fabrics, with two front support plates of needles. An upper front plate whiche carries out straight loops and a lower front support plate which carries out back loops. The conveying operation can be performend only by removing the loops from the upper front plate and conveying them into the needles of the lower front plate and vice-versa.

Each needle must always convey all the yarns included in one dent of the comb .

An object of the present invention is to combine in a single device the loom with the knitting frame, to produce new fabrics with the features of both the texture, weaves and hosiery that is double face fabrics with the straight of linen cloth or a fabric having a straight of linen cloth mixed with loop and a back of loop mixed with linen cloth or other textile figured combinations.

A further object of the invention is that to attain fabrics having a different compactness both as to the weft and warp, which fabrics are produced with the same loom, without changing the comb and front support plates of the needles.

A still another object of the invention is to attain the possibility of working by changing the arrangement of the needles on the front support plates. It is possible to utilize all the needles of a single front support plate using the upper or lower plate. It is also possible to use the needles of the upper front plate alternated with those of the lower front plate. Furthermore, it is likely possible to utilize all the needles of one front support plate with needle sector of the other one. A further purpose of the invention is tp provide a new type needle without the tongue, the walls of which open and close the hook by mechanical movements. The hook should be opened when it discharge the loop which is falling down.

Another object of the invention is to provide a device for conveying the loops from an empty needle to a full one, for distributing in the figure the straight loops and back loops.

These and other objects of the invention will result from the following disclosure with reference to the enclosed drawings, in which:

Fig. 1 shows a perspective view of the arrangement according to the invention.

Fig. 2 is a plate forming the left wall of the needle.

Fig. 3 shows the central needle with a hook and a slit for mounting the two walls, and two biangular projections on the base.

Fig.4 illustrates the right wall with two holes for fastening the needle.

Fig. 5 shows the top and side views of Figs. 2, 3 and 4.

Fig.6 illustrates a perspective view of the needle together with the yarn to be worked, the needle and the walls being advanced on the front support plate.

Fig. 7 shows the front wiew of Fig. 6 without the walls.

Fig. 8 illustrates the needle with the advanced walls and drawn back hook, the needle point being closed between the walls for gripping the yarn to be worked.

Fig.9 shows the front view of the needle and walls of Fig. 8.

Fig. 10 is a view of the needle, but entirely drawn back on the front support plate, a new loop being hooked on the hook and the precedent loop already discharged.

Fig. 11 shows a side view of the device for hooking the yarn into the needles, after the comb has conveyed from the initial position the second weft to a position near the closed needles, the yarns being aligned on the same plane, one of the two rods behind the comb being raised and the other lowered.

Fig. 12 illustrates the second step of operation of the hooking device, in which the comb begins its retun stroke to the healds followed by the needle which displaces without contacting the comb, the two rods being raised for raising the yarns above the hooks.

Fig. 13 shows a top view of the device of Fig. 12

in which the comb has aligned by its forward movement the yarns in front of the needles to be hooked.

Fig. 14 illustrates a top view of the device of Fig. 13, with the difference that the movable comb has been displaced to the right and has overlapped the yarn in the hooks.

Fig.15 shows a side view of the device of Fig.14, with the difference that the two rods are lowered and have hooked the yarns into the needle hooks.

Fig. 16 illustrates a view of the device for conveying the loops, wherein the upper needle is drawn back on the front support plate, but the walls are advanced, the loop being placed on the walls and the hooked punch is situated above the wall.

Fig. 17 shows a side view of the device for conveying the loops, the hooked punch being lowered between the walls of the upper needle.

Fig. 18 shows another view of the device for conveying the loops, in which the walls of the upper needle are drawn back into the front plate, the hooked punch being lowered to the level of the walls of the lower needle and the loop is hooked upside-down on the punch hook.

Fig. 19 is a side view of the device for conveying the loops, werein the punch with the upside-down loop is advanced to enter between the walls of the lower needle.

Fig. 20 shows a side view of the device for conveying the loops, the punch being entirely entered between the walls, which have removed the loop by unhooking it from the hook.

Fig. 21 is a side view of the device for conveying the loops, the punch being returned to its start position and the upside-down loop is situated on the wall of its needle, which is in an advanced position.

Fig. 22 shows a side view of the hooked punch, the loop being enlarged by two biangular projections which have the length of the punch and form two angles into which the points of the walls should enter for removing the loop from the punch.

Fig. 23 is a front view of the movable comb, which performs two movements, that is the normal beating movement and a regular movement to the right and to the left, behind the comb there being arranged two parallel rods, between which warp yarns pass; by raising the lower rods all the yarns displace downwardly; each dent of the comb having always at its disposal two needles, one from the upper front plate and the other one from the lower front pale, as shown by black and white circles, of which the black circles stand for the needles bearing the loop and the white circles stand for the void needles which remain closed, by conveying operation the loop are removed from the black circles and conveyed onto the needles of the white circles.

Fig. 24 shows a figured fabric manufactured by the device of the invention and having sectors wefted in line cloth, which bound the straight loops with the back loops.

Fig. 25 shows the interlacing of a tissue having very compact warp and stroungly beated up weft, manufactured without a necessity of performing any variation of the loom and needle front plates of the present invention.

Assembling of the needle with walls and without the tongue: the pins 15 and 16 of the left walls (Fig. 2) should be passed through the slot 6 (Fig. 3) and than inserted into the holes 17 and 18 as shown in Fig. 4. Afterwards, the pins 15 and 16 going out from the holes 17 and 18 of the right wall should be plumb line like fastened so that the needle, closed between the two walls fastened to one another, can let slide the yarn with a sufficient clearance therebetween.

The needle may perform two movements, that is a forward movement for hooking the yarn with the needle hook and a backward movement for returning into the front plate and discharging the loop falling down from the walls.

The operation of the device in orderof succession is as follows: for each inserted weft it is required a beating up of the comb 12 and thus for inserting two wefts 13 two beatings up are necessary. The position of the needles depends on the movements of the comb. When the wefts 13 are inserted, all the needles are situated in their back drawn position within the front plate 17.

When only one front plate is operating, the needles operate only once after the insertion of the wefts. Whereas, when the two front plates are operating, the needles operate twice: the first time for carrying out the straight loops on the upper front plate and the second time for carrying out the back loops on the lower front plate. In the present case the two front plates are operating since the loops of the first and second yarns are situated on the needles 3 of the lower front plate and the loops of the third, fourth and fifth yarns are situated on the needles of the upper front plate. It is started from the upper front plate for forming the straight loops. At this step, as shown in Fig. 11, the comb is situated near the needles with the already inserted wefts and begins its return stroke torwards the healds (see arrow 21). In Fig. 12, while the comb moves on the first tract of its stroke (s.arrow 40), the needles of the third, fourth and fifth yarns follow it, but do not contact the comb, the rods 10 and 11 are raised up for raising all the yarns above the hooks of the needles which have followed the comb. At the end of its stroke (the point of the arrow 40) the comb immediately displaces to the right (Fig. 14, arrow 9) and the rods 10 and 11 lower down (Fig. 15) and thus all the yarns of the needles, which have followed the comb, remain hooked on the needles of the respective hooks, which displace backword to form the back loops. The movements of the needles are carried out by a heel 5 and the movements of the walls are controlled by a heel 4.

The loops of the first and second yarns, which were inoperative and have not been hooked by the needles of the upper front plate, should be now looped by the lower front plate to form the back loops. The comb repeats its stroke without inserting further wefts. This time, for carrying out back loops, the comb is followed on the track corresponding to the arrow 40 by the needles 3 only of the first and second yarns of the lower front plate. The rods 10 and 11 initially lower down and then the comb displaces for one dent (arrow 9) and the rods raise up for hooking the yarns into the hooks of the needles 3.

Since the two front plates are opposite and symmetric to one another, the above disclosed movement may be followed by turning upside down the drawings of the figures 12, 13, 14 and 15, so that the upper front plate seems to be the lower one and thus the first and second yarns are hooked onto the needles 3 to form the back loops. As the needles perform the return stroke on the front plate,it begins the movement for actuating the needles. The projection 24 which extends on the whole length of the needle base serves to the walls for withdrawing a new loop from the needle and forms with the needle two angles 1 and 2 (fig. 7). Moreover, the projection 24 always keep enlarged the loop, so that the two points 8 of the walls may enter the angles 1 and 2 (fig. 9) for conveying the loop situated both on the needle and wall.

In Fig. 6 the needle and the walls are situated in an advanced position and a loop 6 is already formed on the needle, the yarn 14 being hooked by the hook. In Fig. 8 the needle has been backwardly displaced so that the point of the hook is hidden between the walls for causing the loop 6 to disengage the hook.

In Fig. 10 the needle and its walls are wholly drawn back on the front plate 17 which stops the fabric causing the loop 6 to fall down, whereas the yarn 14, which will form a new loop 7, remans on the hook and is protected by the walls.

Afterward, the needle pushed in the direction of the arrow 30 advances and reach the position shown in Fig. 6, as follows: as soon as the comb, after having performed a beating up action, returns toward the healds, it is followed by the advancing needle, which in turn is followed by the walls which slide with the points 8 in the projection 24 of the needle,so that the walls withdraw the loop 7 from the hook, which is now free for hooking a next loop.

For conveying the loops each comb hat at its disposal two dents which can exchange the loops one with another as follows: for performing a figure on a tissue it is necessary to convey the loops from a needle of the upper front plate to the needle of the lower front plate and vice-versa, since the formation of the figure causes the exchange of the straight loops with the back loops.

In Fig. 23 the circles 1, 2, 3, 4 and 5 correspond in the order of succession to the circles 6, 7, 8, 9 and 13. The loop 6 is situated on the wall of the needle 3 and should be passed upside down onto the wall of the lower needle 8. The wall 1 in Fig. 16 has been advanced according to the arrow 4 and keeps the loop 6. The needle 2 is drawn back as shown by the arrow 7 and the hooked punch 15 is situated on the wall 1.

In Fig. 17 the punch 15 is lowered (s. arrow 20) and its hook is entered netween the walls and is ready for hooking the loop 6. In Fig. 18 the walls 1 of the upper front plate are drawn back (s.arrow 5), the punch has hooked the loop 6 and then is lowered to the same level of the lower front plate, turning upside down the loop 6. In Fig. 19 the punch 15 is stopped and keeps the loop, while it is taken between the two advanced walls 1 of the needle 3. The overturned loop on the punch is protected by the projection 24 and the two points of the wall can enter the loop. In Fig. 20 the wall continues its foreward movement to unhook the punch hook frm the loop, which remains freely situated on the walls. In Fig. 21 the punch 15 is drawn back, goes out from the walls and can return to its start position as shown in Fig. 16, while the needle 3 advances (s.arrow 9) and is ready to operate the back stitch with the loop conveyed on the needle 8 of Fig. 23.

The punch 14 of Fig. 21 performs the same operation of the punch 15, with the sole difference that the movements are overturned, but the proceeding is the same. In fact, it would be sufficient to turn upside down the figure 21 for seeing that the punch 14 stays ready to operate on the wall 1 of the needle 3.

In Fig. 24 there are shown the features of a figured tissue attained according with the present invention. The loops 8 are back loops. The dark loops are straight loops. The yarns 1 are the raisings of the linen cloth warp on the wefts 13 the linen cloth continues on the back of both the straight loops and back loops, so that all the loops are closely bound thereamong to attain compact and solid fabrics. The tissue is marked by three sectors 6, 7 and 8 having the following features:

- the sector 6 is a double face tissue which is obtained with the sole lower needle plate and has on its straight side the linen cloth and loops on it back side;
- the sector 7 is the same tissue of the sector 6 and is obtained with the sole upper needle plate, but has on its straight side the loops and the linen cloth on its back side;
- the sector 8 is a figured fancy tissue and must be performed with the both front needle plates to allow the formation of straight loops alternated with back loops and thus it is necessary to convey the loops for attaining a desired figure.

Example: as shown in Fig. 24 the yarns 9, 10, 11, 12, and 13 alternate so as to form a figure with straight loops and back loops, which distinguish by that the wefts 13 pass above the back loops, whereas in the

case of the straight loops the weft 13 passes therebelow.

Each yarn carries the loops from one front plate to the other one after the insertion of one or more wefts.

Fig. 25 shows a tissue having a greater thickness of the warp yarns and more beaten up in wefts.

The yarns 1, after being singolarly passed into the loops 2, pass into the comb 14 in a rate of four yarns for one dent. These four yarns 1, after having inserted four wefts 13, are looped by the needle 3 all into the same loop 6. Thus, each single loop is formed by four yarns and four wefts. This operation does not require the necessity of using apparatuses with different fineness degree (number of needles for one centimeter) since with the same loom it is possible to manufacture tissues with yarns of different thickness for attaining tissues with different reduction and consistence.

Claims

1) An industrial loom for manufacturing classic hosiery, wefted and bound with interlacings of textile weaves, characterized in that on the fore frame of the loom there are provided two knitting front plates, arranged in an opposite or symmetric position to one another or in similar position.

2) An industrial loom as claimed in claim 1, characterized in that needles are used which have no tongues and pressers and are porvided with two movable side walls adhering to the respective needle, said needle being able to slide between its side walls for opening and closing the needle hook to charge the loop of the opened hook onto the walls and discharge the loop falling down from the needle as well as to displace the loops from one front plate to the another one.

3) An industrial loom as claimed in claim 1, characterized in that a movable comb is provided, which besides its normal beating up movement is adapted to perform displacements both to the right and left for guiding the yarns between established needles provided for forming the interlacing, two parallel rods being arranged behind the comb to let passe therebetween the yarn which should be raised or lowered for hooking the needles.

4) An industrial loom as claimed in preceding claims, characterized by punches which remove the loops from the needles of one of the front plates and carries them to the needles of the other front plate for forming straight loops alternated with back loops.

5) An industrial loom as claimed in preceding claims, characterized by two bilateral projections which extend on the whole length of the needle base and enlarge the loops, said projections forming angles into which enter the points of the walls for removing the loops from the hooks and that similar projections, having the same function, are provided on the punch base.

6) An industrial loom as claimed in the preceding claims suitable for any yarns type, thick and fine yarns for attaining compact or loose tissues, characterized in that any needle hooks always all the yarns passed into a dent of the comb, whereas each warp yarn is controlled by the dobby independentely from one another.

7) An industrial loom as claimed in preceding claims, characterized in that it is suitable for manufacturing tissues in which each loop formed by the warp yarns is bound with the wefts of interlacings and textile weaves of the loom, whereby a sliding of the wefts is wholly avoided and a light and solid figured tissue is attained.

8) An industrial loom as claimed in preceding claims, characterized in that the movements of both the needle and its walls are controlled by the heel of the needle itself.

9) A tissue as manufactured by the industrial loom as claimed in any of preceding claims.

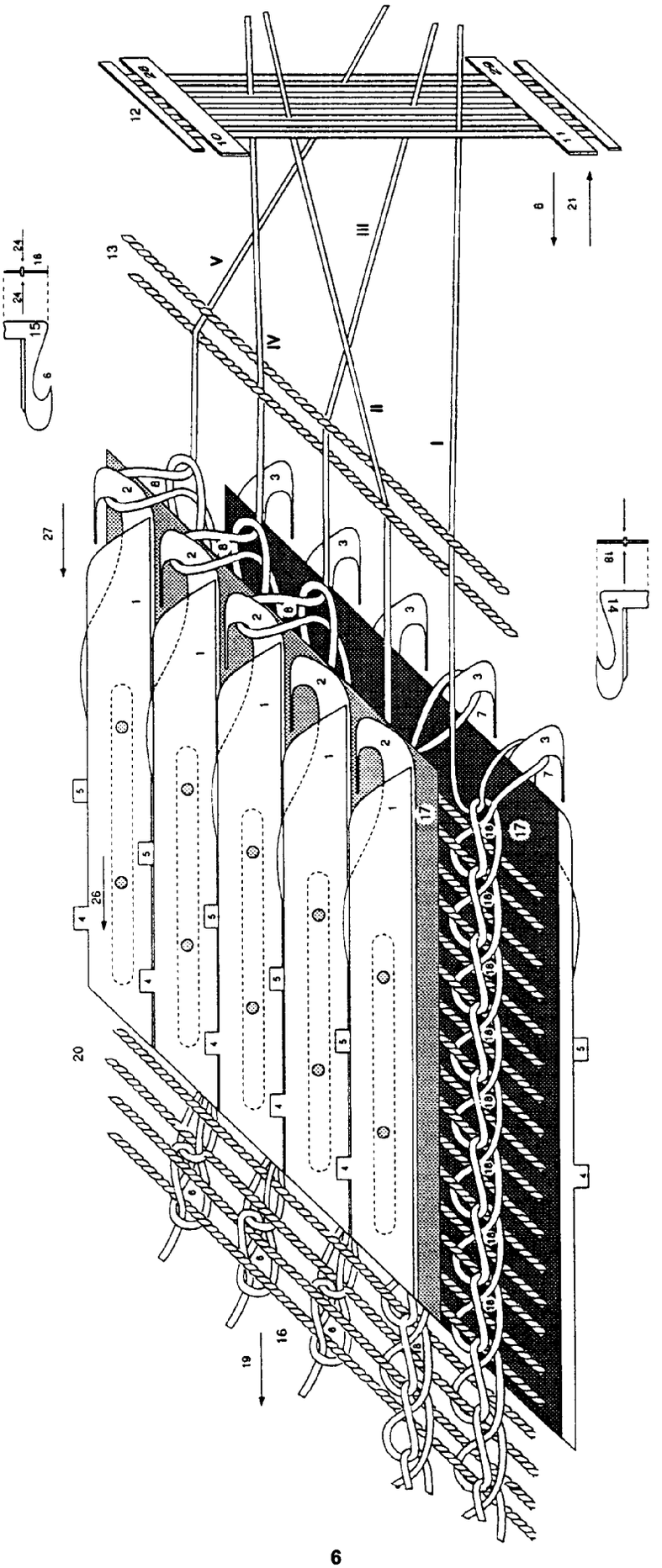


FIG. 1

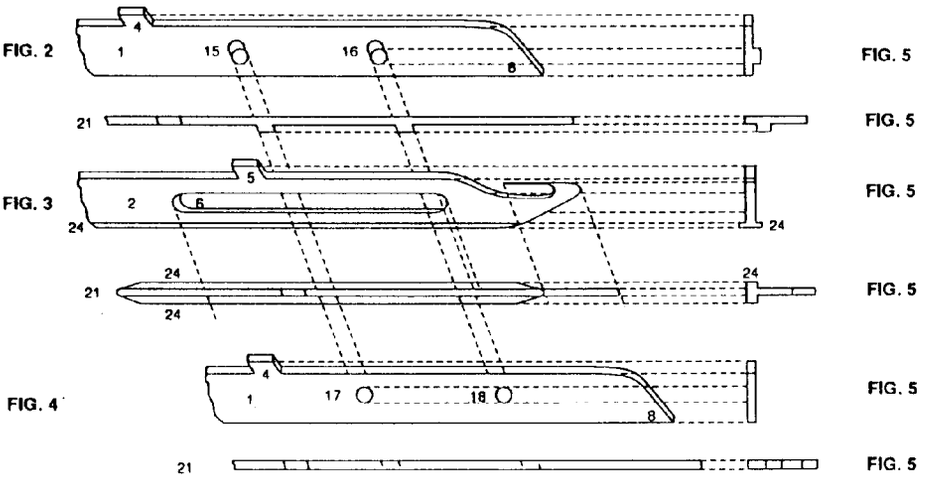


FIG. 2
FIG. 3
FIG. 4
FIG. 5
FIG. 5
FIG. 5
FIG. 5
FIG. 5
FIG. 5

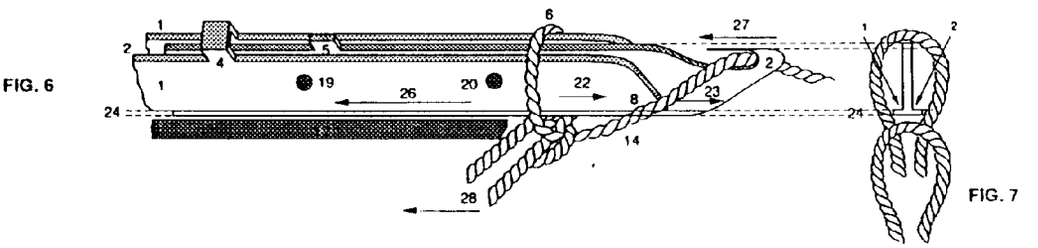


FIG. 6
FIG. 7

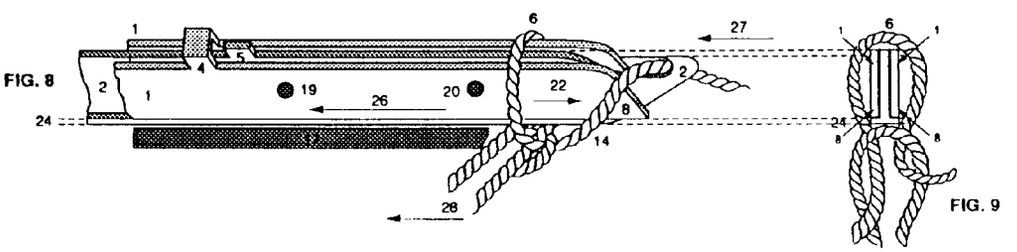


FIG. 8
FIG. 9

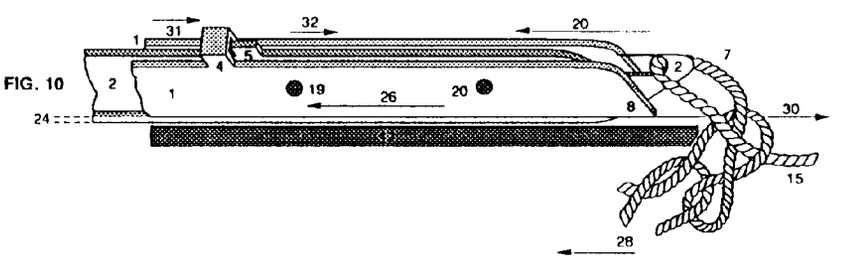


FIG. 10

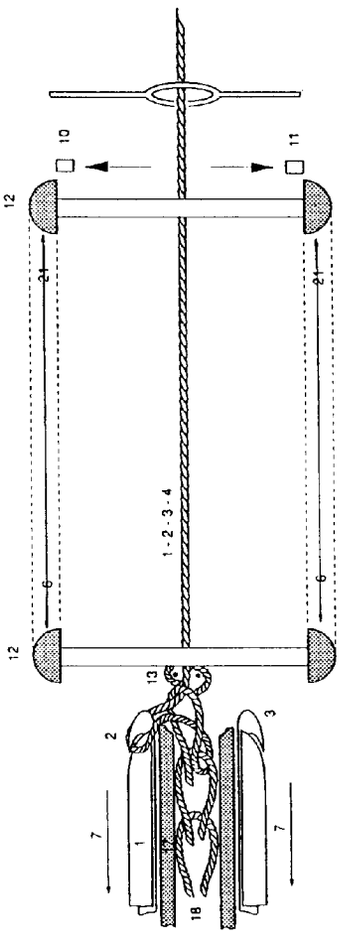


FIG. 11

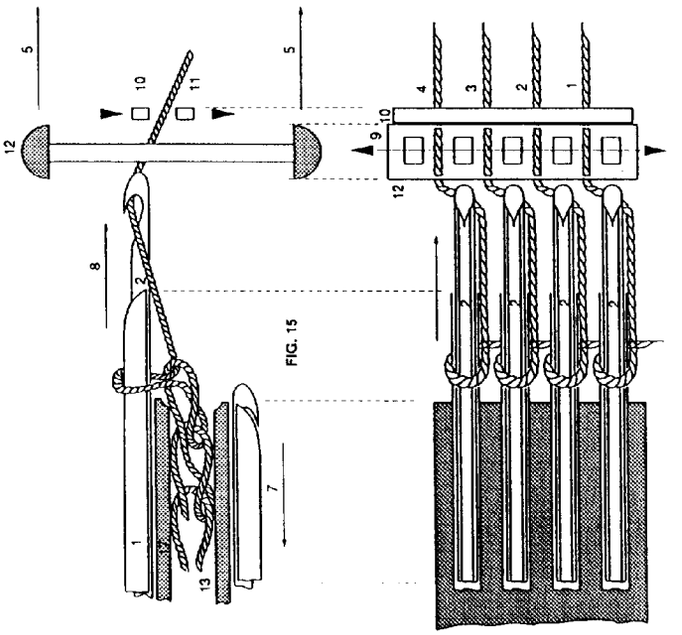


FIG. 15

FIG. 14

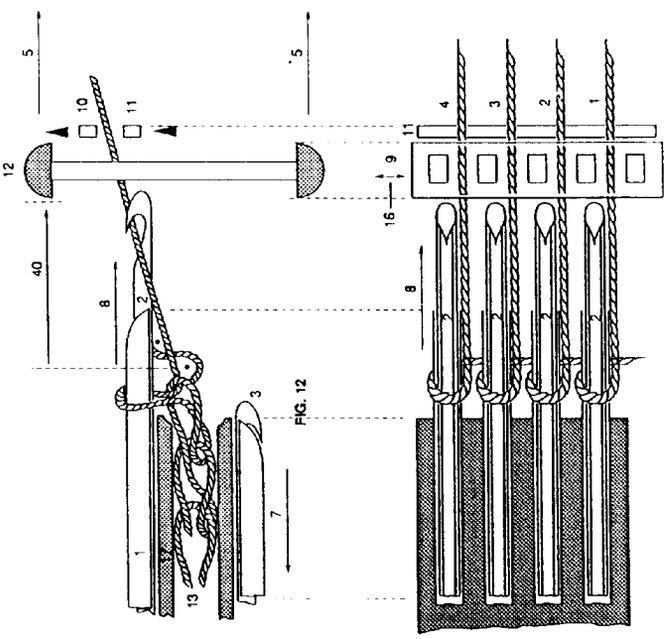


FIG. 12

FIG. 13

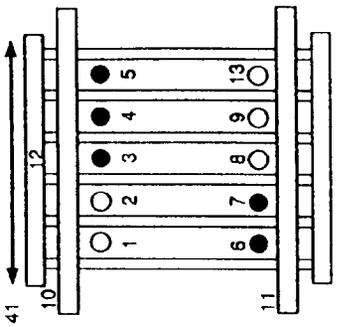


FIG. 23

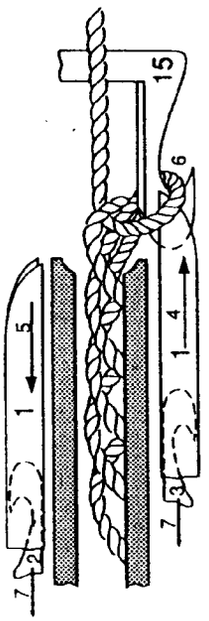


FIG. 19

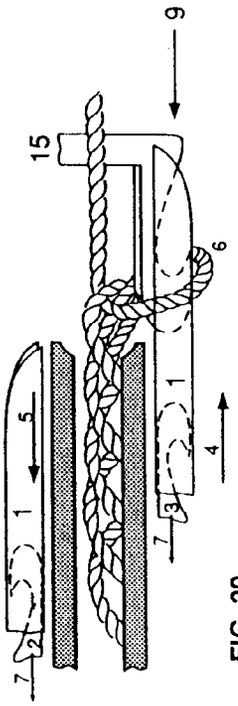


FIG. 20

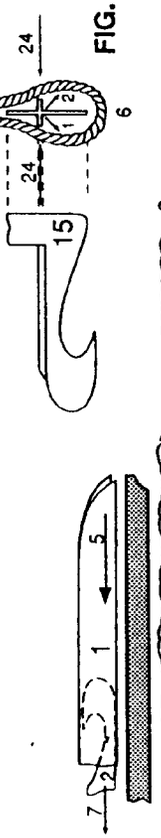


FIG. 22

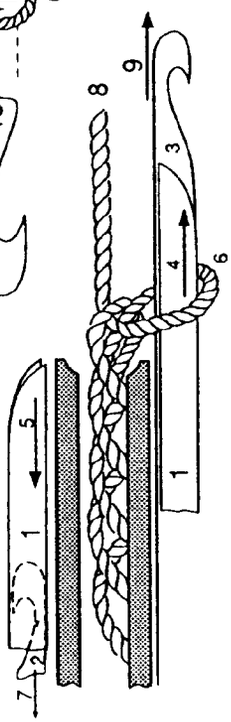
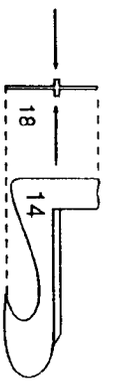


FIG. 21



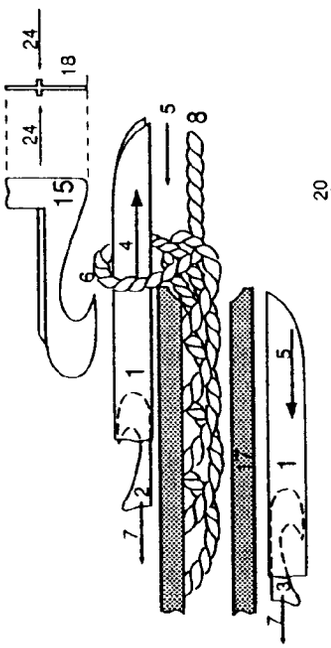


FIG. 16

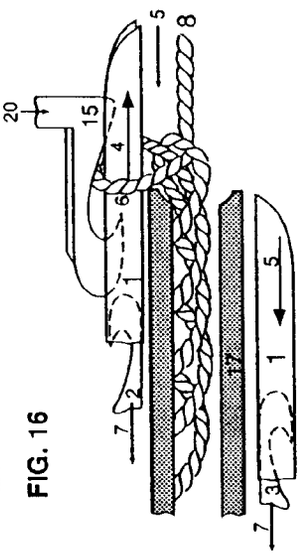


FIG. 17

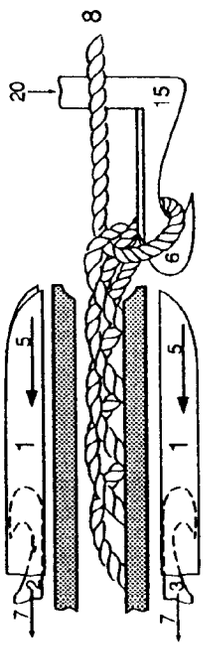


FIG. 18

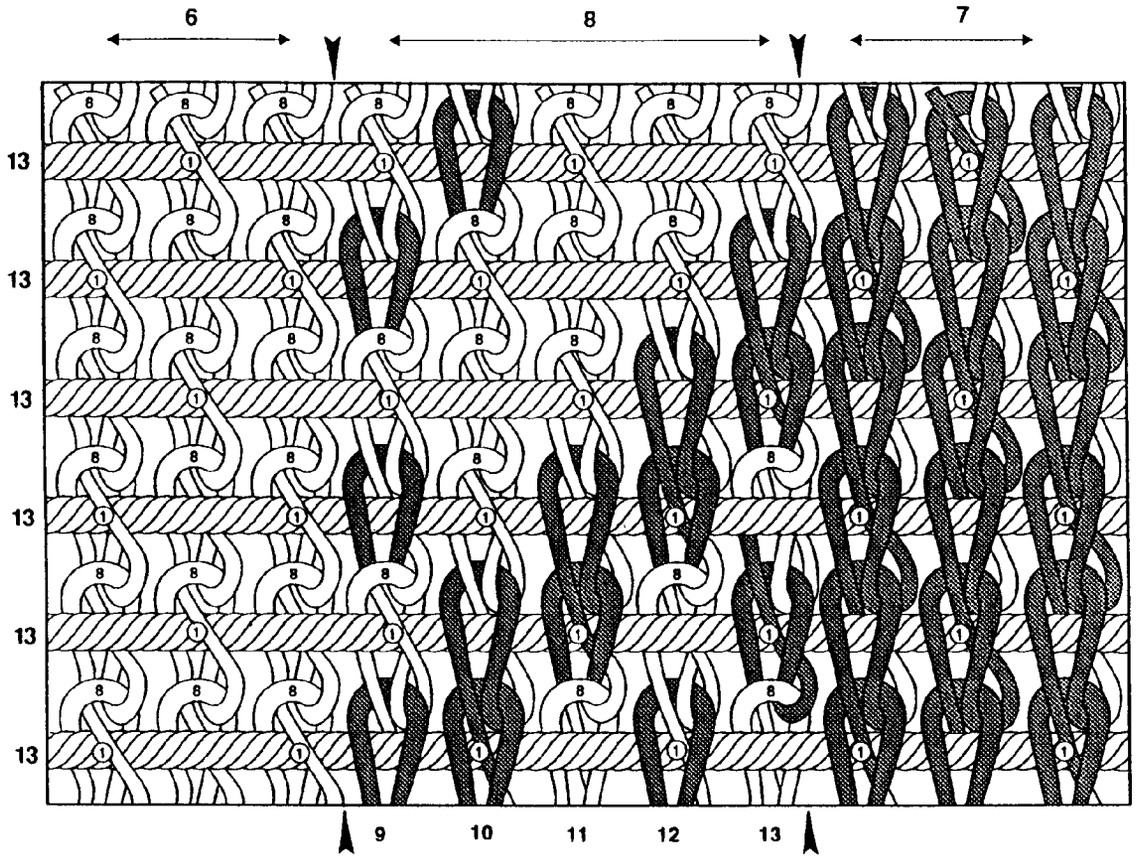


FIGURA 24

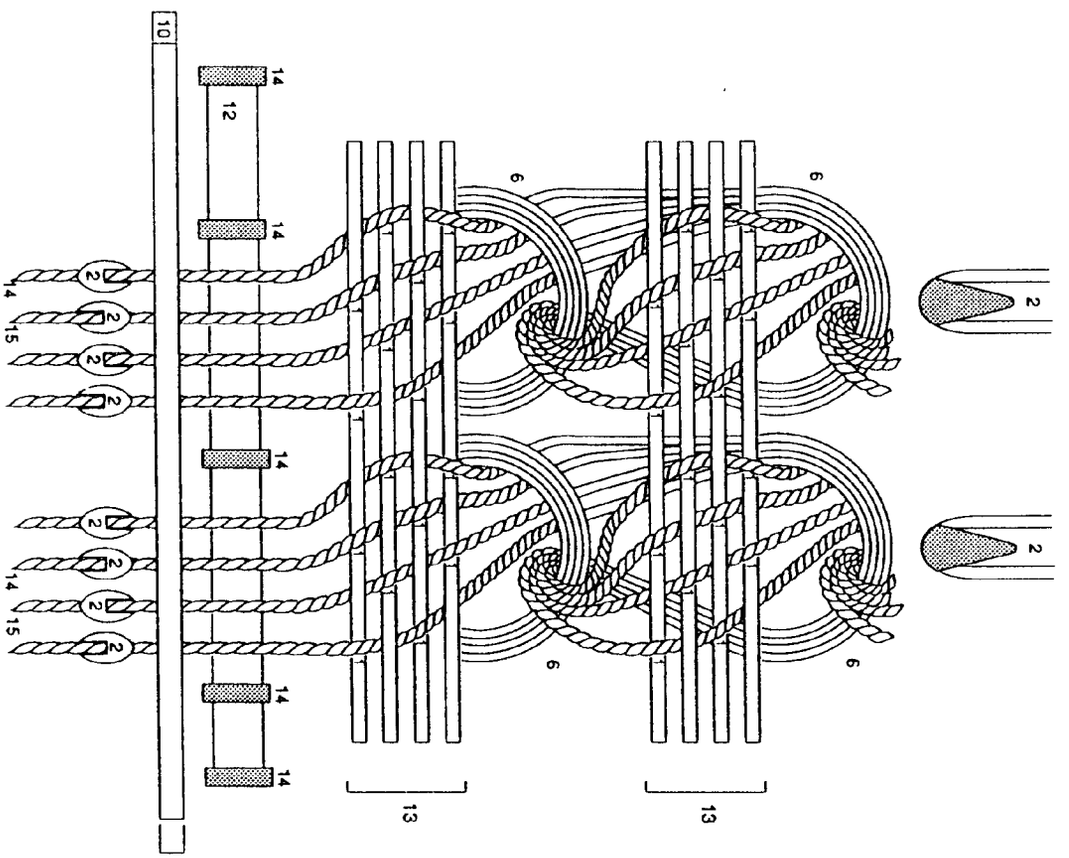


FIGURA 25