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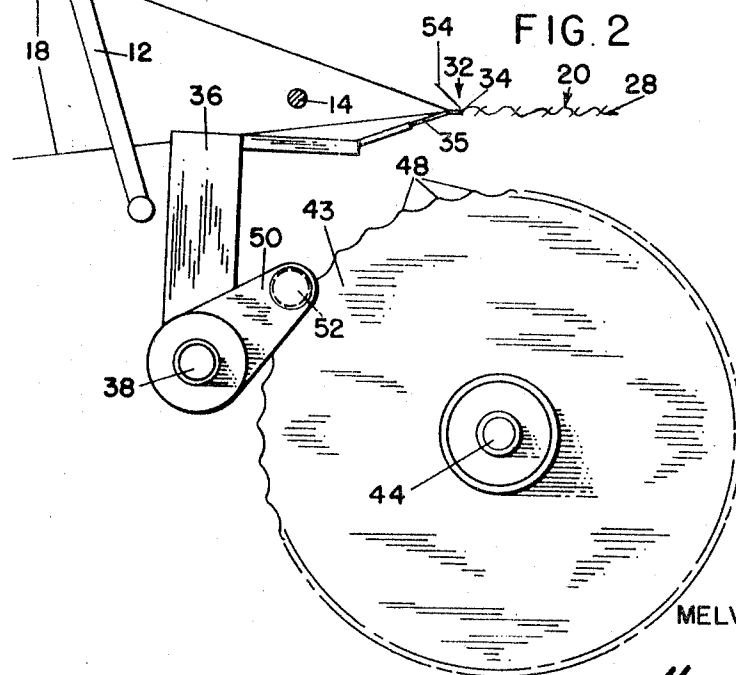
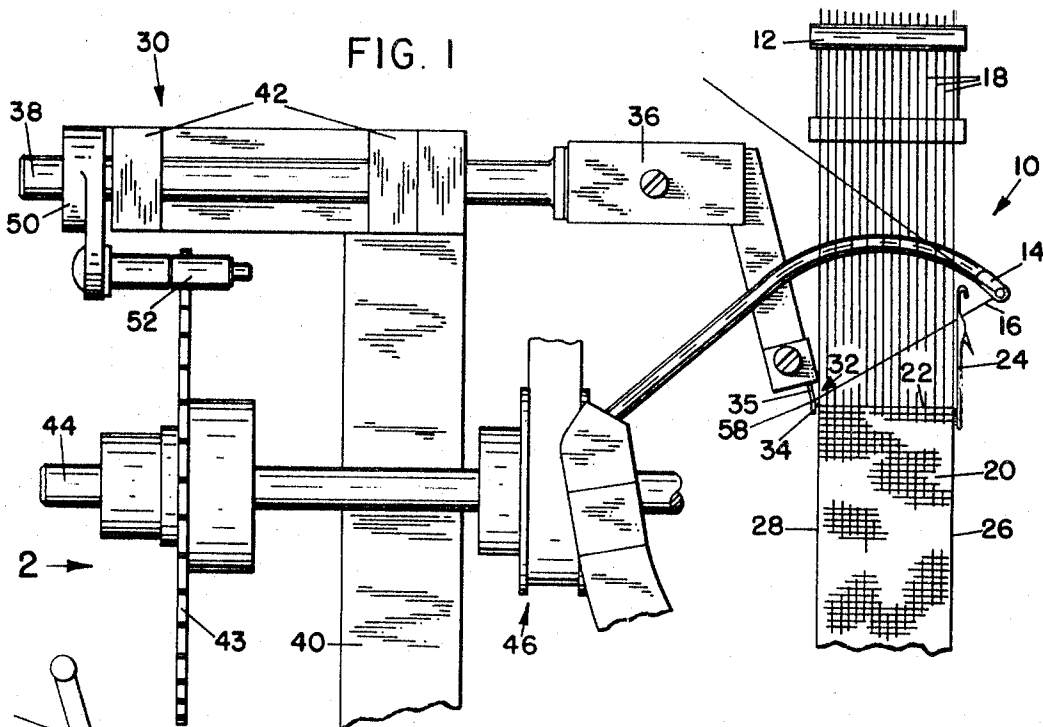
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3,460,583

EDGE FORMING DEVICE FOR LOOMS

Filed April 22, 1968

3 Sheets-Sheet 1



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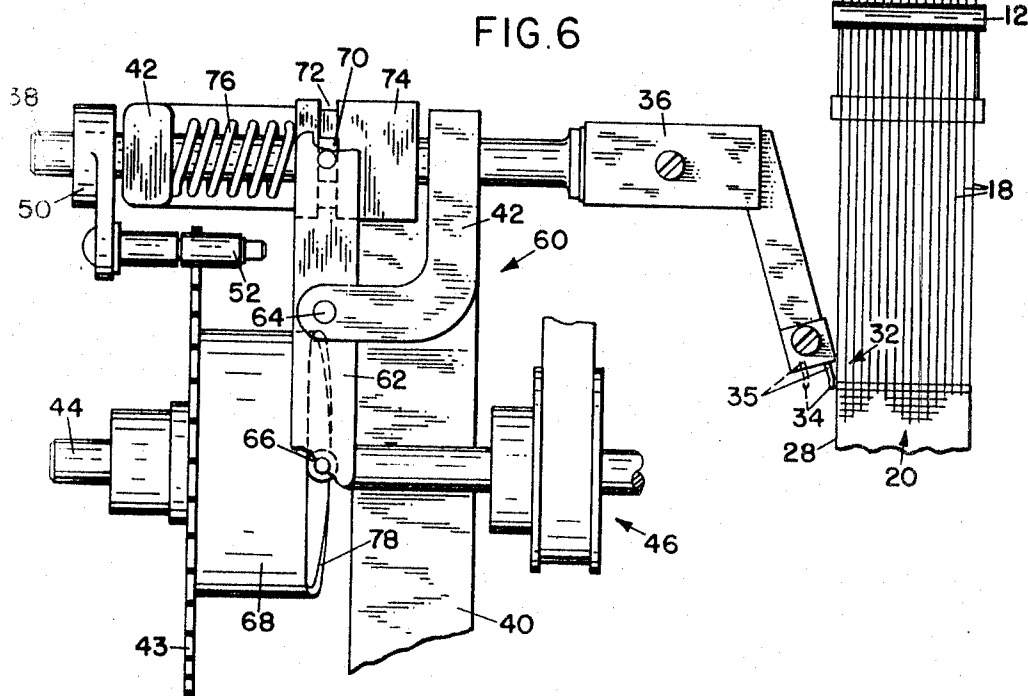
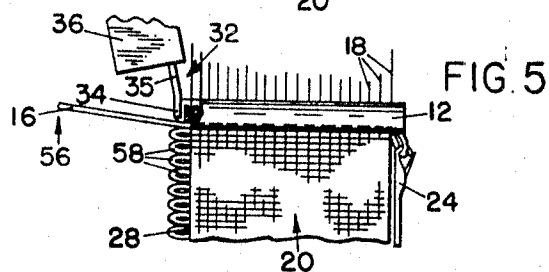
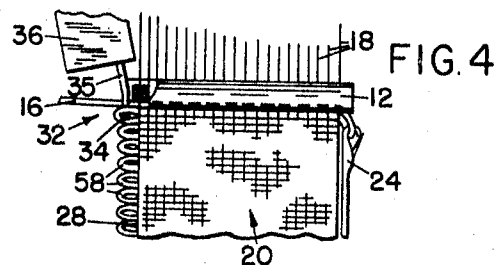
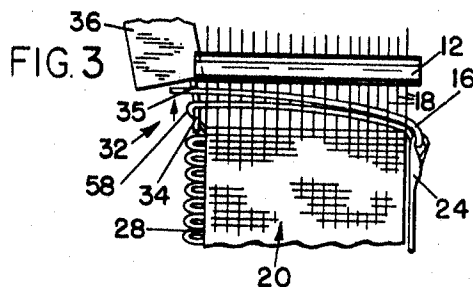
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EDGE FORMING DEVICE FOR LOOMS

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3 Sheets-Sheet 2



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EDGE FORMING DEVICE FOR LOOMS

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3 Sheets-Sheet 3

FIG. 7

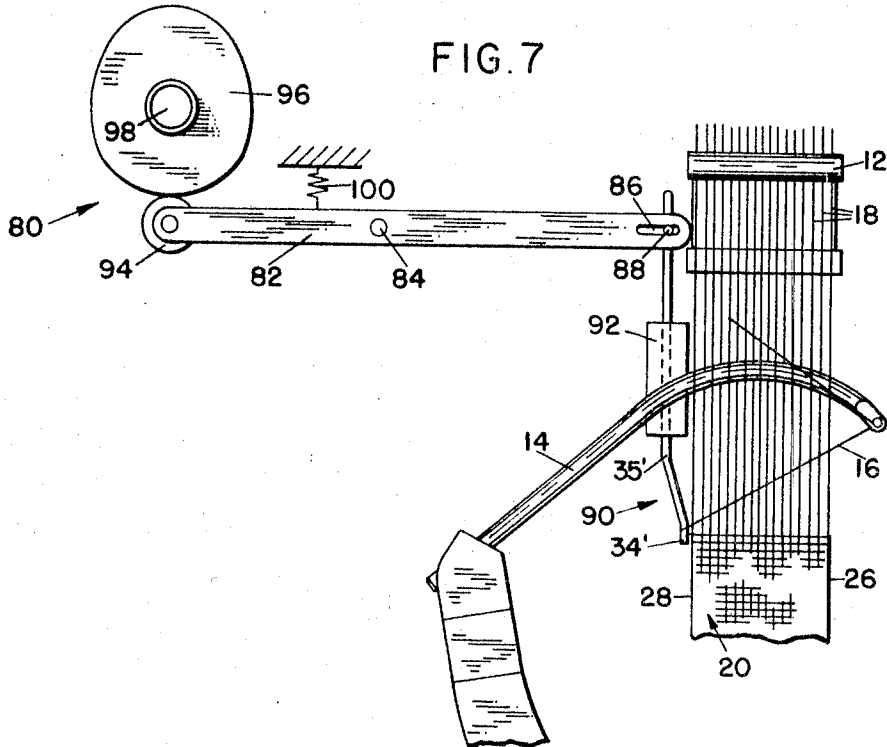
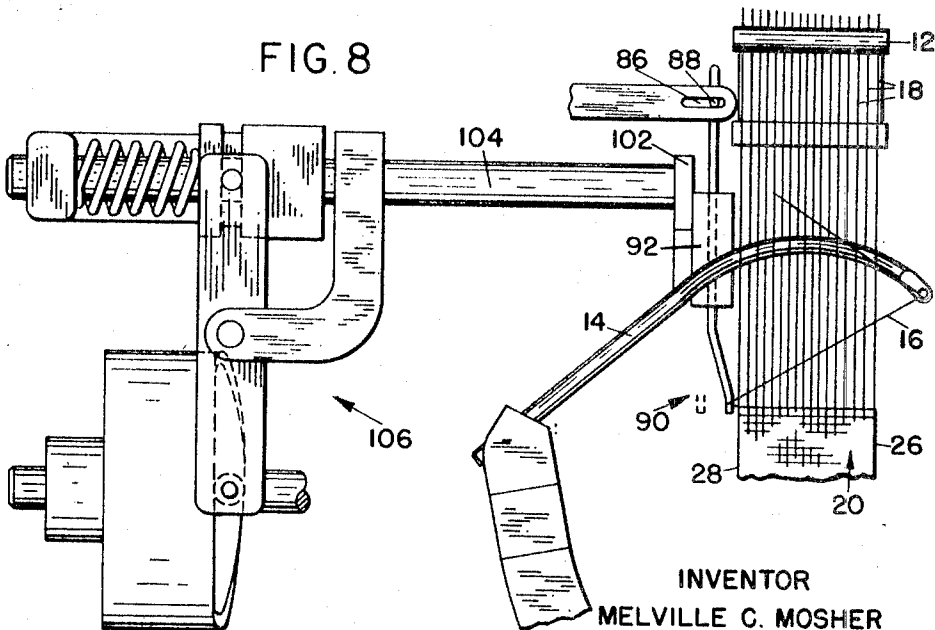


FIG. 8



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3,460,583

EDGE FORMING DEVICE FOR LOOMS

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Int. Cl. D03d 13/00, 45/50

U.S. Cl. 139—118

8 Claims

ABSTRACT OF THE DISCLOSURE

An edge forming device for needle looms, which includes an edge wire at the weft insertion side of the loom for retaining the weft loops during the insertion of weft. The edge wire is moved parallel to the edge of the fabric being woven and away from the fell of the fabric to release the loop after the lay reaches the fell of the fabric. Means are also provided to vary the size of the loops.

Background of the invention

This invention is an improved loop forming device in a needle loom in which a weft laying member inserts successive loops of continuous weft into successive warp sheds from an outside supply source. The loops are inter-knit with previous loops by a knitting needle at the side opposite from which the weft is inserted. The invention relates to a device for holding the weft loop at the side of the fabric from which weft is inserted and particularly when the loom is weaving elastic fabric to produce a straight uniform edge or a decorative fringe.

In the past, when it was desired to weave elastic fabric, the loops at the weft insertion side of the fabric were held by a semi-rigid edge wire to maintain a uniform edge. This wire was attached to a harness frame and was flexed up and down as the harnesses reciprocated to form new warp sheds. The wire was woven into the cloth as if it were the last warp yarn and would be pulled out by the forward advance of the cloth. Since the wire had to be flexible enough to move up and down with the harnesses, the tension from several weft loops would have a tendency to distort the wire in a widthwise direction toward the center of the fabric. This would result in a non-uniform edge, greatly affecting the appearance of the fabric. When it was desired to produce a decorative fringe or scalloped edge which consisted of varying lengths of weft loops, a plurality of edge wires were used. These wires would be raised and lowered in a patterned sequence to produce loops of varying lengths for a decorative effect. Whether the edge wires were used to produce a uniform edge or a decorative edge, the constant flexing of the edge wire resulted in frequent breakage of such wires and down time for the loom. In addition, the broken wire would be likely to damage part of the fabric advancing mechanism or cause a considerable quantity of cloth to be ruined before the break was detected.

In order to eliminate the disadvantage of the conventional edge wires, loop holding devices have been developed which are operated to engage and disengage one loop at a time. There are well-known devices in which wires or fingers are reciprocated vertically for engaging and disengaging single weft loops. U.S. Patent 3,126,920 to Libby shows an edge wire or finger which is not only reciprocated vertically to engage and disengage single weft loops but is moved toward and away from the fabric edge to produce a decorative or scalloped edge. One drawback in this approach to loop holding is that the finger is disengaged from the loop before the weft inserting member is retracted from the shed in order to be clear of the weft inserting member. At this point, there

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is insufficient tension on the weft to hold it in position since the weft has not been beaten in and the harnesses have not crossed the warp to form a new shed. When weaving elastic fabric, this problem is particularly acute.

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Summary of the invention

The present invention eliminates all of the problems of selvage loop retention mentioned above and produces a uniform high quality selvage which can be made decorative if desired.

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An object of the present invention is to provide a movable weft loop retaining device which retains a selvage loop during a major part of a weft laying cycle to insure the production of a uniform selvage edge.

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Another object of the invention is the provision of a movable edge loop retaining device which is capable of producing loops of varying lengths from the edge of the fabric.

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The present edge forming device includes a loop former which is in the form of a wire disposed parallel to the edge of the fabric from which the weft inserter enters the warp shed. The loop former is simple in construction and requires a very slight motion away from the fell to release a selvage loop at the end of each weft insertion. The selvage loop can be released any time before the next loop is picked up. The loop can therefore be dropped after the lay reaches the fell or crossing of the warp sheds to insure that the weft is firmly held in place. Since the loop former is disposed parallel to the edge of the fabric and moves substantially parallel thereto to release the weft loop, the loop is able to slide along the wire as the lay beats the weft toward the fell of the fabric. No undue tension is placed on the weft loop as it slides along the edge wire which aids in maintaining loop uniformity. The even loop tension, the slight motion of the edge wire, and relatively long contact with the loop all contribute to the production of a highly uniform selvage edge at extremely high speeds, particularly in weaving elastic fabrics.

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Brief description of the drawing

The invention will now be described in more detail in conjunction with the drawings, in which:

FIGURE 1 is a fragmentary plan view of the edge forming device as it is used to form a uniform selvage on a needle loom;

FIGURE 2 is a side elevation of the edge forming device looking in the direction of arrow 2 in FIGURE 1;

FIGURE 3 is a schematic plan view which is similar to FIGURE 1 but showing the position of the edge forming device as the lay approaches beatup;

FIGURE 4 is a schematic plan view similar to FIGURE 3, showing the position of the loop forming device at beatup;

FIGURE 5 is a schematic plan view similar to FIGURE 3, showing the position of the loop forming device upon release of the selvage loop;

FIGURE 6 is a fragmentary plan view of the loop edge forming device of FIGURE 1 adapted to form loops of varying length;

FIGURE 7 is a fragmentary plan view showing a modification for actuating the edge forming device; and

FIGURE 8 is a fragmentary plan view of the modified device in FIGURE 7 adapted to form loops of varying lengths.

Description of the preferred embodiments

Referring to the drawings, the present invention can be applied as an attachment to existing needle looms of the type shown, for example, in U.S. Patent No. 3,102,557, issued Sept. 3, 1963 to R. W. Gustavson et al. and designated generally at 10.

Referring particularly to FIGURES 1 and 2, the loom 10 is partially shown with a lay 12 and a weft inserting member 14 which inserts successive loops of filling 16 into successive warp sheds formed by warp yarns 18. The filling is beaten in by the lay 12 to form a fabric 20 having a fell 22. A knitting needle 24 engages the weft loop for each weft insertion to form a knitted selvage at the far edge 26 of the fabric.

At the near edge 28 of the fabric, the edge loops are formed by an edge forming device generally indicated by the reference character 30. This device includes a loop former in the form of a wire generally indicated at 32 which is held in a supporting member 36 fixed to a stub shaft 38. Edge wire 32 has an outer forward portion 34 which is parallel to the edge 28 of the fabric and a rear portion 35 disposed at an angle away and downward from edge 28. A bracket 40 supports a shaft 38 through projections 42 which act as bearings for the shaft 38. A toothed wheel 43 is mounted on a second stub shaft 44 which is slowly rotated by a pulley and belt arrangement generally indicated at 46. The belt is driven in timed relation with the loom by speed reducing means, not shown. It is driven at such a reduced rate that the wheel 43 moves only the distance of one of its peripheral teeth 48 for each weft insertion. A lever 50 is fixed to shaft 38 and has a follower 52 attached to its outer end. Follower 52 engages the wheel 43 and is reciprocated once each time that wheel 43 is advanced the distance of one tooth. This reciprocation causes shaft 38 to rock and swing support 36 and loop former 32 in an arc. Because the shaft 38 is located below the fabric, loop former 32 is moved through an arc, indicated at 54 in FIGURE 2, having a substantial horizontal component. This enables the wire loop former 32 to reciprocate in a substantially parallel direction with respect to edge 28.

Referring to FIGURES 1, 3, 4, and 5, the timing of the edge forming device 30 is such that the loop former is in a forward position while the weft 16 is being inserted into the warp shed as shown in FIGURE 1. The forward portion 34 is disposed slightly above the fabric and as the weft inserter begins to enter the shed, the portion of the filling extending from the previous shed swings rearwardly in the direction of arrow 56 in FIGURE 5 under the portion 34 of the edge wire which at this time is beginning to move forwardly. As the weft inserter continues to penetrate the warp shed, the filling is swung farther rearwardly until it strikes the rearward portion 35 of the loop former whereupon a loop is formed. This loop is cammed forwardly along portion 35 until it reaches the forward portion 34 as shown in FIGURE 1, the loop being indicated at 58 in that figure. As the lay approaches the fell of the fabric, the loop former begins to move rearwardly as shown in FIGURE 3. As the lay pushes the filling 16 toward the fell, the loop 58 is also pushed forwardly and slides along portion 34 during its forward motion. As the lay reaches the fell, loop 58 is still maintained on portion 34 as shown in FIGURE 4. Shortly after the lay has reached the fell and the harnesses have crossed to form a new shed, the wire has moved rearwardly a sufficient amount to allow the loop 58 to be released as shown in FIGURE 5. At this point, the filling is held in place so that the loop 58 will be precisely formed. Since all of the loops 58 are formed in this precise manner, the edge 28 takes on an even uniform appearance. The forward portion 34 of the loop former need not extend forwardly beyond the fell as shown in FIGURE 1 as long as it at least reaches the fell at the end of its forward motion. The rearward motion of the former may take place any time after the lay reaches the fell and before the next loop is picked up as long as the loop is not dropped before the lay reaches the fell.

Referring to FIGURE 6 there is shown an attachment which can be placed on the edge forming device 30 for varying the lengths of loops 58 to form a decorative or scalloped edge. This attachment is generally indicated at

60 and includes a lever 62 pivoted at 64. One end of lever 62 has fixed thereto, a follower 66 which engages a cam 68 fixed to and rotating with stub shaft 44. The other end of lever 62 has a key 70 pivoted to the under side thereof. Key 70 fits into a slot 72 of a collar 74 fixed to shaft 38. A spring 76 urges collar 74 toward the right in FIGURE 6 and maintains follower 66 in engagement with cam 68. The operating surface 78 of cam 68 can be made with any configuration which will produce a desired fabric edge through the formation of loops 58. As follower 66 is moved toward the left in FIGURE 6, loop former 32 will be moved toward the edge 28 of the fabric as shown in full lines. As follower 66 is moved toward the right in FIGURE 6, the loop former will be moved away from the edge 28 as shown in dotted lines. Depending on the configuration of surface 78 of cam 68, a wide variation of decorative edge patterns can be achieved including scalloped or picot edges.

Referring to FIGURE 7, there is shown a modified mechanism for operating the loop former. The operating mechanism is generally indicated by the reference character 80 and includes a lever 82 which is pivoted at 84. One end of lever 82 is slotted at 86 to receive a pin 88 which projects from loop former 90. This former is similar to loop former 32, having portions 34' and 45' which are comparable to portions 34 and 35 respectively. Loop former 90 is not rigidly supported as former 32 but is slidably supported in a guide member 92. The other end of lever 82 is attached to a follower 94 which engages a cam 96 fixed to a shaft 98. This shaft is driven in timed relation with the loom by mechanism not shown. A spring 100 urges the follower into engagement with cam 96. The particular arrangement shown in FIGURE 7 moves loop former in a rectilinear direction only. Cam 96 will be designed and timed so that edge wire loop former 90 will move rearwardly and forwardly as loop former 32.

Referring to FIGURE 8, there is shown an arrangement for varying the length of loops 58 for use with the loop former operating mechanism 80. In this figure, the guide 92 is mounted on a vertical lever 102 which is fixed to a shaft 104. This shaft can be reciprocated by a mechanism generally indicated by the reference character 106 which can be exactly like mechanism 60 as shown in FIGURE 6. Shaft 104 will move guide 92 and loop former 90 toward and away from edge 28 in the same manner as shaft 38 moves support 36 and loop former 32. Since mechanism 106 has the same elements as mechanism 60, no further description thereof should be necessary.

Having thus described the invention, it is apparent that other mechanical arrangements could be designed to operate a loop former as described. Various other changes and modifications could be made by those skilled in the art without departing from the intended scope of the invention as set forth in the appended claims, in which I claim:

1. In a loom including means for forming a warp shed, a weft inserting needle for inserting successive loops of a continuous weft yarn into successive warp shed from one side thereof, means for interknitting successive weft loops on the other side of said warp shed to form a knitted selvage, a reciprocating lay movable toward and away from the fell of the fabric for beating in said loops, an edge forming device comprising:

(a) a loop former mounted on a support adjacent said one side, having a forward portion for retaining weft loops; said forward portion being substantially parallel with the edge of said fabric and terminating in a freely suspended end adjacent the fabric; and

(b) means to move said loop former toward said fell into a position to intercept said weft before insertion thereof into said warp shed whereby a loop of said weft is retained by said former during weft insertion and to move said former away from said fell to release said loop of weft, after the lay reaches said fell.

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2. In a loom as set forth in claim 1 wherein said support is pivoted at a point below said warp shed, thereby permitting said edge wire to move in an arcuate path.

3. In a loom as set forth in claim 1 wherein said loop former has a rearward portion for guiding the weft loop at said one side toward said forward portion; said rearward portion extending downwardly and outwardly from said fabric edge at an angle.

4. In a loom as set forth in claim 1 wherein said moving means comprises:

(a) a follower operatively connected to said loop former; and

(b) a cam for actuating said follower, said cam being operated in timed relation with said loom.

5. In a loom as set forth in claim 1 wherein said edge forming device further comprises a second moving means for moving said loop former toward and away from said one side for varying the length of the weft loops.

6. In a loom as set forth in claim 5 wherein said second moving means comprises:

(a) a follower operatively connected to said loop former; and

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(b) a cam for actuating said follower, said cam being operated in timed relation with said loom.

7. In a loom as set forth in claim 1 wherein said loop former is guided for movement in a rectilinear plane.

8. In a loom as set forth in claim 7 wherein said edge forming device further comprises means for moving said loop former toward and away from said one side for varying the length of the weft loops.

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HENRY S. JAUDON, Primary Examiner

U.S. Cl. X.R.

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