United States Patent

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[32] Priority **Jan. 23, 1969**
[33] **Switzerland**
[31] **967/69**

[54] **SELVAGE-FORMING MOTION OPERABLE IN CONJUNCTION WITH A FILLING-CUTTING MECHANISM OF A SHUTTLELESS LOOM**
9 Claims, 14 Drawing Figs.

[52] **U.S. Cl.** **139/122, 139/302**
[51] **Int. Cl.** **D03d 47/40**
[50] **Field of Search** 139/122–127, 194, 195, 302, 303

[56] **References Cited**

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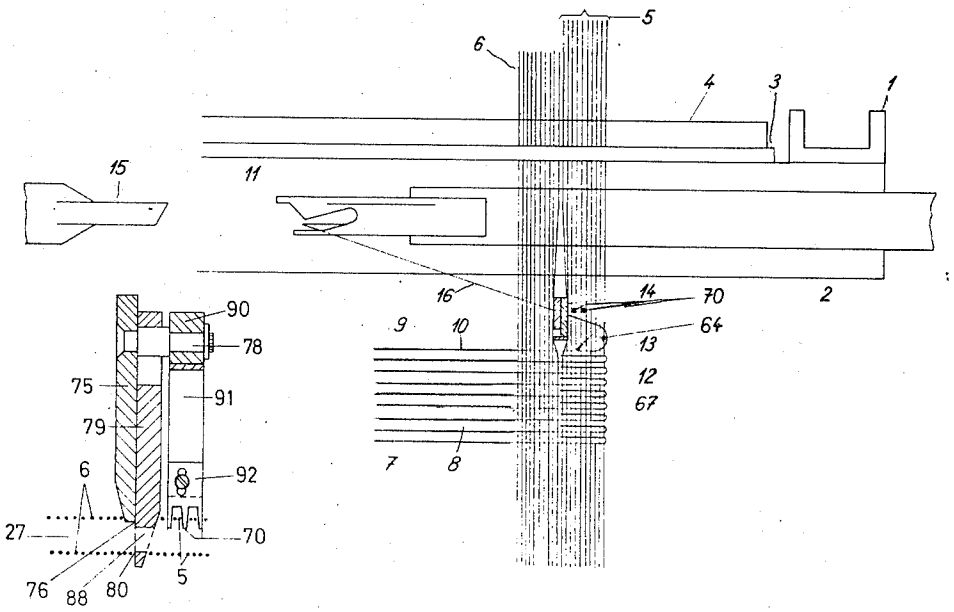
ABSTRACT: This invention relates to a selvage-forming motion operable in conjunction with a filling-cutting mechanism of a shuttleless loom in which filling yarn supply packages and filling insertion members are situated outside of the warp shed. The cutting mechanism and its control devices have a cam shaft with a plurality of cams rotating synchronously with the motion of the filling insertion members for the actuation of that filling cutting mechanism. The loom also has a filling depressor and a filling clamp as shown in U.S. Pat. No. 2,604,123. Such a cutter and its control devices are shown in copending U.S Pat. application Ser. No. 766,446, filed Oct. 10, 1968. In that application, it was one purpose of the invention to weave a fabric with nonfast selvages. According to the present invention, it is desired to weave a fabric with a fast edge or edges and the cutter has been modified to function within the fabric a short distance from the edge and to cut the filling a few millimeters from that edge thereby to leave the short cut end of filling in the shed as a tucked end. These ends do in many instances snap out of the shed before it can close on them, or at least, become displaced to leave a loop at the cloth edge. To obviate this, the cutter is provided with added functional parts which hold the tucked ends in place until they are locked by the shed.



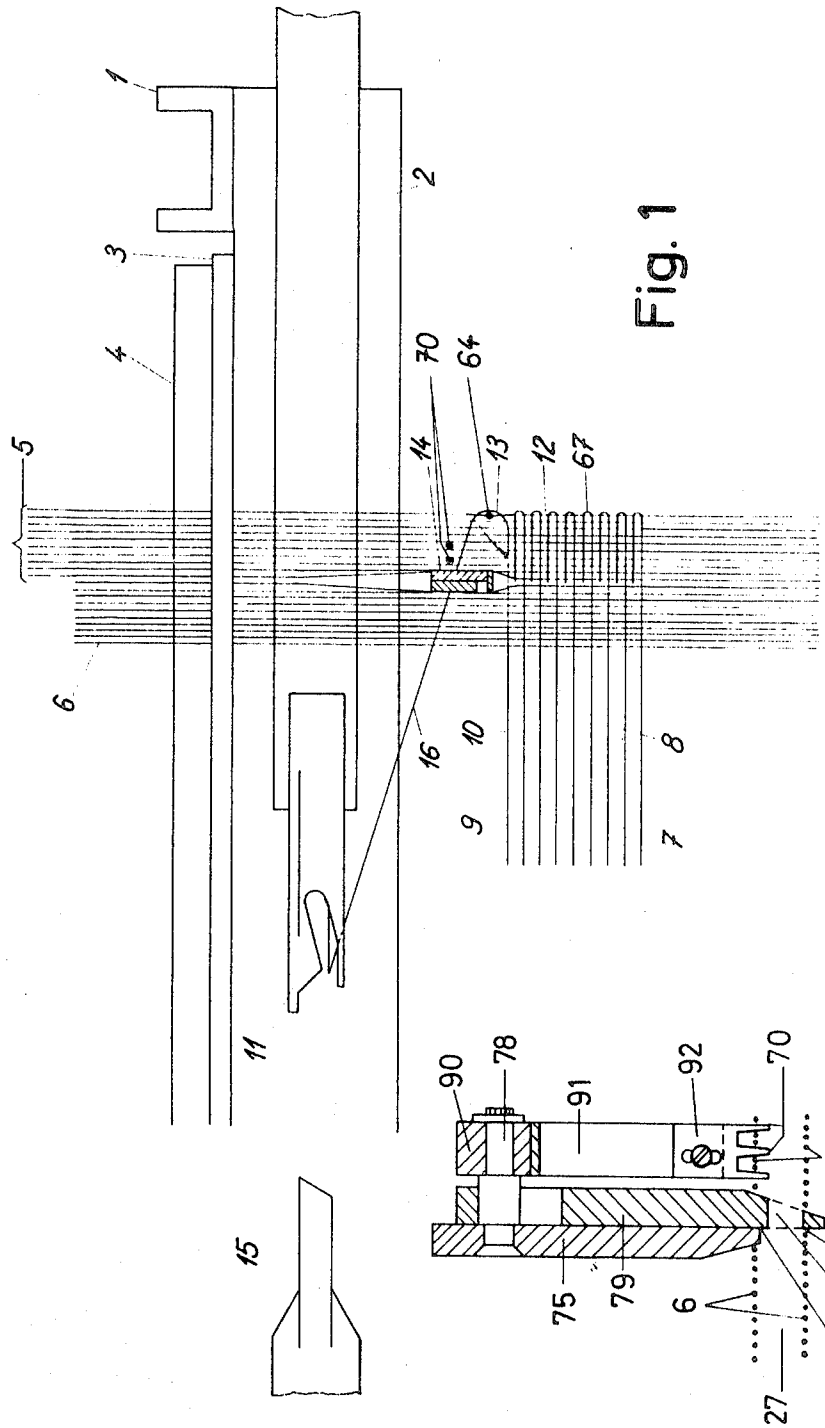


Fig. 1

Fig. 14

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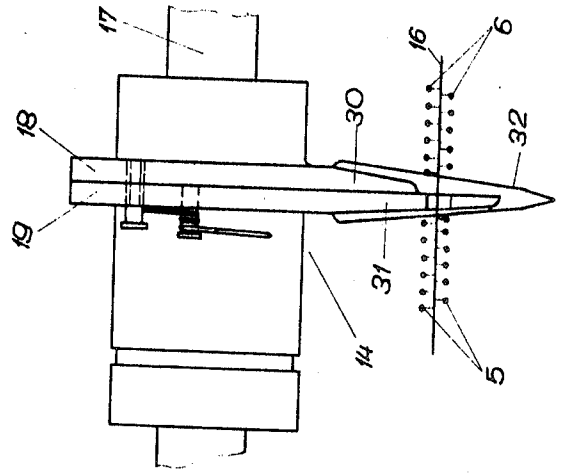

Fig. 3

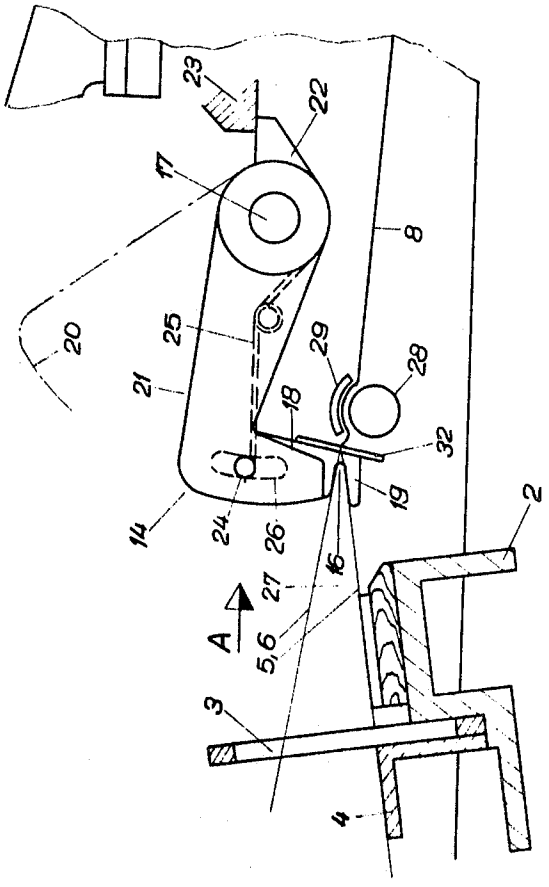

Fig. 2

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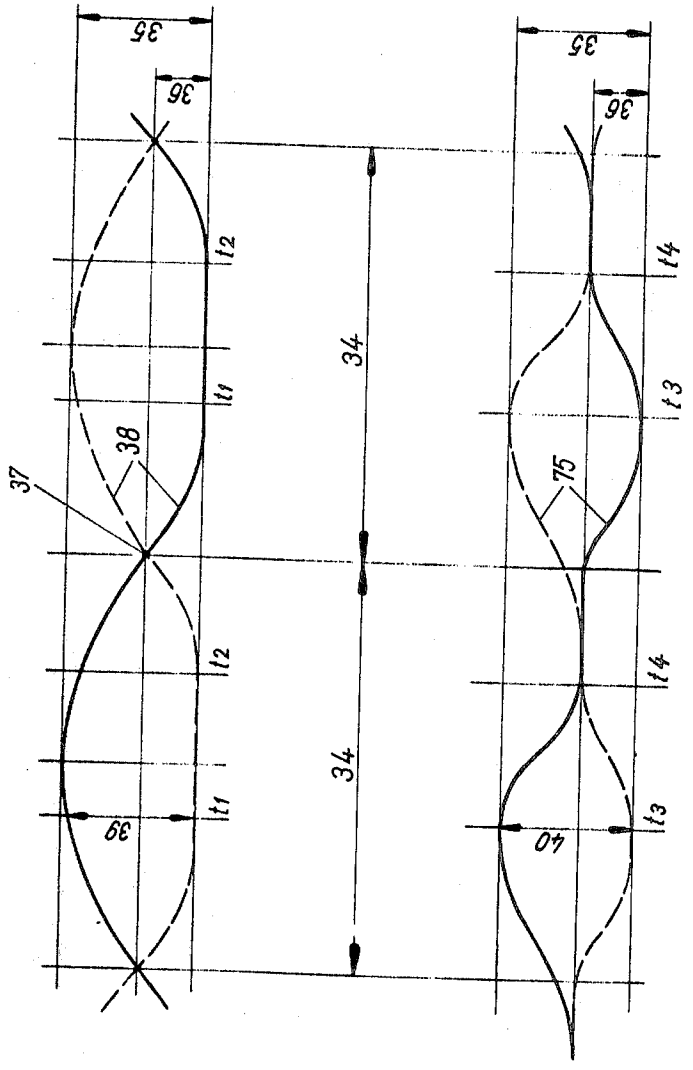

Fig. 4

Fig. 5

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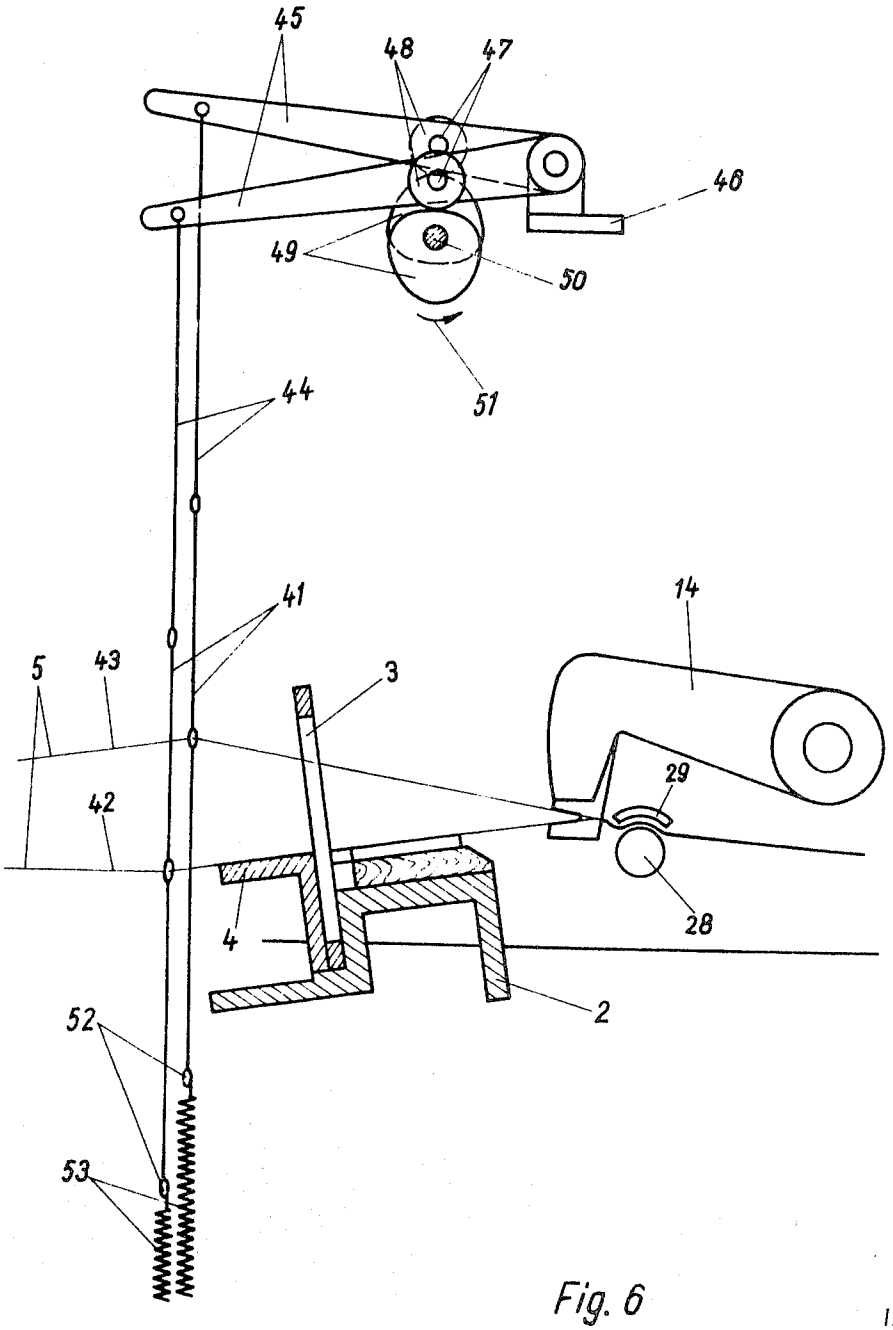

Fig. 6

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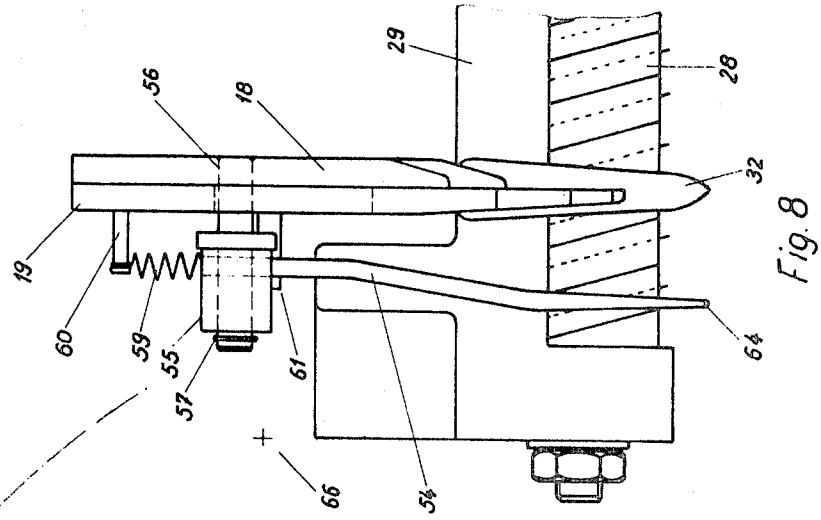

Fig. 8

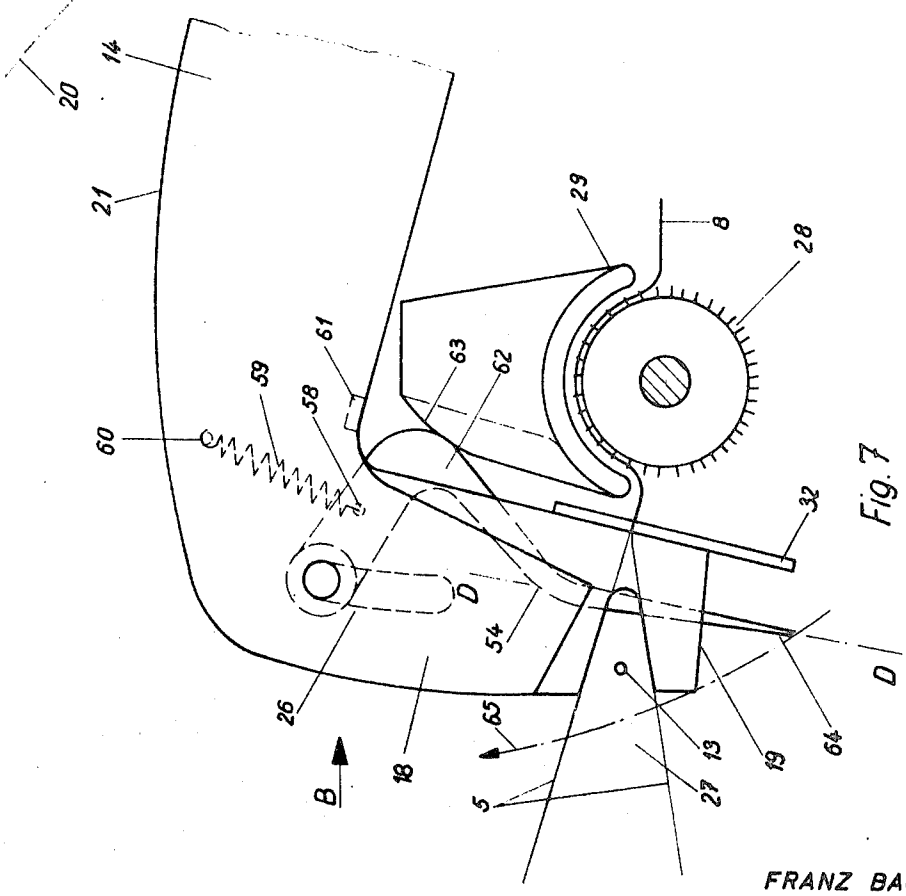

Fig. 7

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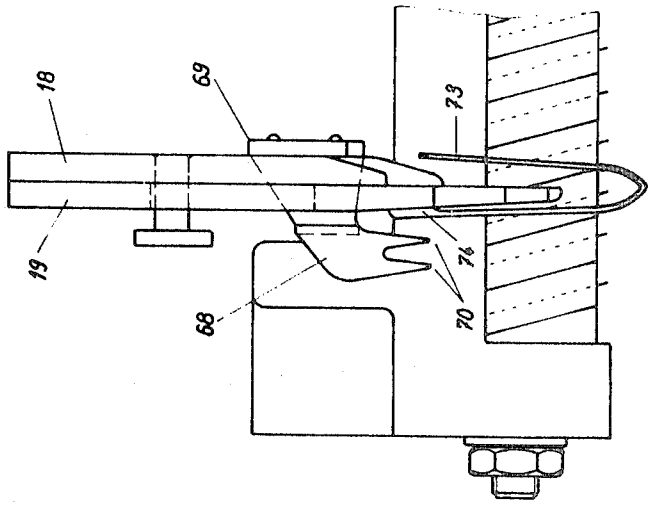

Fig. 10

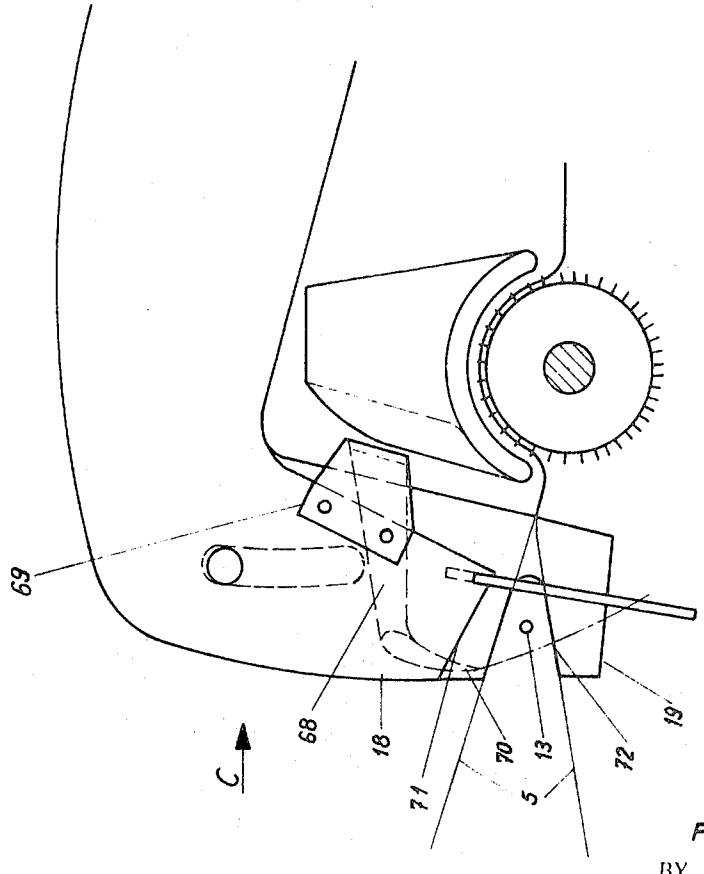

Fig. 9

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Fig. 11

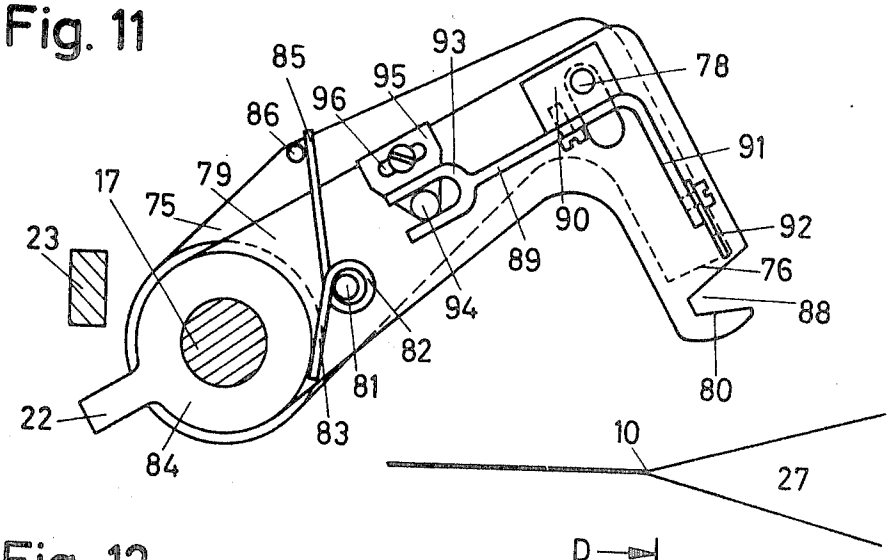


Fig. 12

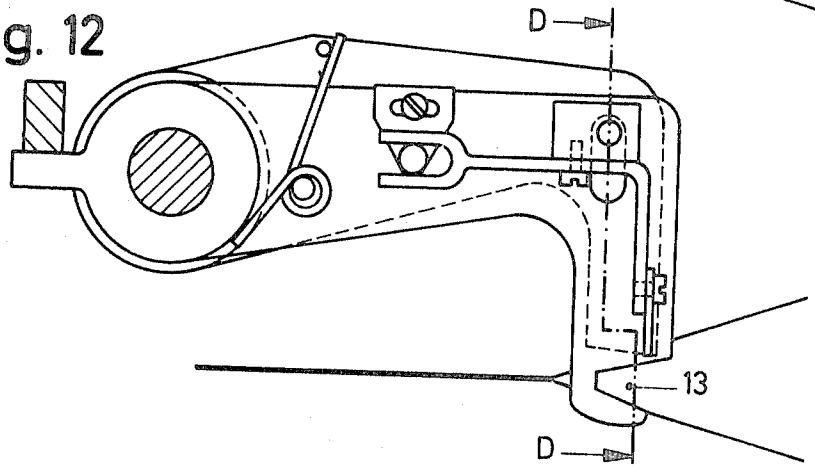
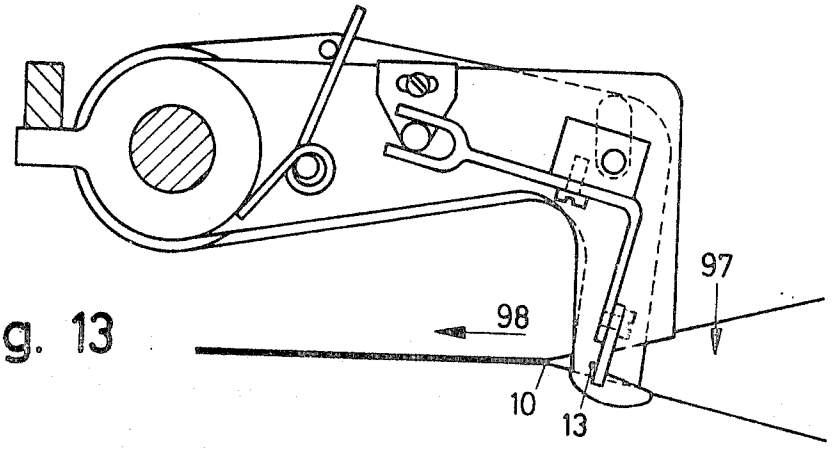


Fig. 13



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SELVAGE-FORMING MOTION OPERABLE IN CONJUNCTION WITH A FILLING-CUTTING MECHANISM OF A SHUTTLELESS LOOM

BACKGROUND OF THE INVENTION

The motion as described in copending application Ser. No. 766,446, allows to produce a fabric, the right hand selvage of which is formed by a filling yarn or yarns and a number of ground selvage ends and a further small number of selvage ends at a distance of approximately 8–12 mm. from the ground selvage. By cutting through the 8–12 mm. wide gap the selvage is separated from the ground fabric. Thus the ground fabric has an open selvage. While in many cases, e.g., for weaving fabric to be coated, this is desired, however, in other cases an open selvage is not desired and is considered to be a disadvantage. One example of this is seen in fabric for sheeting where two fast edges are commercially necessary.

It is an object of the invention to improve the cutter and its mode of operation to make possible the production of a tucked selvage at the insertion side of the loom. Of course, a tucking mechanism of any suitable type can be used at the opposite side to form a duplicate selvage there.

SUMMARY OF THE INVENTION

The inventive selvage-forming motion is characterized by the fact that the cutting devices consisting of the fixed cutter half and of the movable cutter half are provided with a taper on the right-hand side and on the left-hand side and that the movable cutter half carries a wedge-shaped thread separating piece so they may enter the warp, and also incorporates, first, a finger movable to a position in advance of the last pick inserted and at the very edge of the warp threads, and secondly, a comblike member which, at the proper time, enters the selvage warp threads at spaced points to press or beat the tucked end into place so it will be positively controlled against pulling the edge warp threads inwardly and also held in properly tucked relationship until locked by the locked or crossed warp threads.

BRIEF DESCRIPTION OF THE DRAWINGS

The drawings show by way of example embodiments of the invention, wherein:

FIG. 1 is a plan view of the right-hand side of the fabric and part of a loom with the insertion member being in inserting position.

FIG. 2 is a section through part of the loom and a side view of the cutting device, the cutting device being in operating position.

FIG. 3 is a view in the direction of A of FIG. 2.

FIG. 4 is a diagram of the shedding motion of the ground warp ends.

FIG. 5 is a diagram of the shedding motion of the selvage warp ends.

FIG. 6 is a section showing the device to obtain the shedding motion for the selvage warp ends according to the diagram in FIG. 5.

FIG. 7 is a side view of the cutting mechanism with one embodiment of a tucked selvage end forming and holding means.

FIG. 8 is a view in the direction of B of FIG. 7.

FIG. 9 is a side view of the cutting mechanism with another embodiment of a tucked selvage end forming and holding means.

FIG. 10 is a view in the direction of C of FIG. 9.

FIG. 11 is a side view showing still another embodiment of the invention with the cutter in raised position.

FIG. 12 is a similar view with parts in position to receive the weft.

FIG. 13 is a further view with the parts in cutting position and the tucked end under control.

FIG. 14 is a partial section at D—D, FIG. 12.

DESCRIPTION OF PREFERRED EMBODIMENTS

FIG. 1 is a plan view of the right-hand side of the fabric and parts of a loom with the filling insertion member in process of insertion, and showing a sley sword 1 with a sley 2, a reed 3 and a reed-clamping member 4. Drawn into the reed 3 are the selvage warp ends 5 and the ground warp ends 6. The warp ends 5 and 6 together with the filling 7 form the fabric 8. These selvage and ground warp threads may or may not be of the same material and count.

The filling thread 9 beaten up last by the reed 3 forms the weaving line or fell 10. By the insertion member 11 the filling yarn 7 is bent at the selvage 12 to a hairpin shape and during the insertion process, each pick is presented to the cutting mechanism 14. After the transfer of the filling 7 by the insertion carrier 11 to the filling extension member or carrier 15, the filling portion 16 is cut by the cutting mechanism 14.

In the section, FIG. 2, one sees a side view of the cutting mechanism in operating position showing a shaft 17 on to which a fixed cutter half 18 is firmly and positively secured. Fixed for rotation on shaft 17 is a movable cutter half 19. Actuated by means not shown, the shaft can bring the cutting mechanism 14 from a rest position 20 to an operating position 21. The operating position 21 is reached when a nose 22 of the movable cutter half 19 rests against the stop 23.

By further turning the shaft 17 out of operating position 21, the fixed cutter half 18 with its stud 24 can be depressed against the tensioned spring 25 until the stud 24 rests against the end of the slot 26 in the movable cutter half 19, which represents the position attained in the actual cutting process. Furthermore, the position of these cutter parts relative to the sley 2, the reed 3, the fixing clamping member 4 and the warp ends 5 and 6 forming the shed 27 are shown. By way of illustration there are also shown a temple roller 28 and a temple cover 29.

FIG. 3 is a view in direction of A of FIG. 2 showing the cutting mechanism 14, consisting of a fixed cutter half 18 and a movable cutter half 19, which are mounted on the shaft 17. The fixed cutter half has a taper at the left-hand side 30 and the movable cutter half has a taper at the right-hand side 31. Soldered or otherwise fixed to the movable cutter half is a wedge-shaped thread separating sheet 32 which separated the selvage warp ends 5 and/or the ground warp ends 6 and protects them against damage by the cutter halves 18, 19.

FIG. 4 is a diagram showing the shedding motion of the ground warp ends. The distance 34 represents each a cycle of a filling insertion. The height 35 represents a measurement of the maximum warp shed opening whereas the distance 36 represents the crossing point of the shedding line 38. At the moment T_1 the filling insertion member 11 enters the warp shed with the momentary height or warp opening 39 and at the moment t_2 the filling portion 16 is cut by the cutting mechanism 14 whereby the hairpin 13 is freed.

If the selvage warp ends 5 have the same shedding movement as the ground warp ends 6 it is possible that when using comparatively stiff filling yarn, the hairpin 13 extends itself so that the cut end comes to lie outside the selvage 12, FIG. 1. If not completely outside, such tucked ends may escape sufficiently to spoil the appearance of the edge. To help eliminate this risk, suitable means are provided to control the shedding motion of the selvage warp ends 5 according to the diagram as per FIG. 5.

In FIG. 5 the distance 34 represents again a cycle of the filling insertion. At the moment t_3 when the filling insertion member 11 enters the shed, the shed height 40 is the maximum height, whereas at the moment t_4, when the cutting mechanism cuts the filling portion 16, the selvage warp ends do no longer form a shed but lie in a sheet near each other and prevent the hairpin 13 from extending.

FIG. 6 is a sectional view of the device to obtain the shedding motion for the selvage warp ends according to the diagram in FIG. 5, showing a sley 2, a reed 3, a clamping member 4, a cutting mechanism 14, a temple roller 28 and a

temple cover 29. Guided by controlled heddles the selvage warp ends 5 form the bottom shed 42 and the top shed 43. The heddles 41 are connected with connecting parts 44 to levers 45 which are borne for rotation in a bearing in a bracket 46. The bracket 46 is attached to a loom part, not shown.

The levers 45 are provided with firmly attached studs 47 with rollers 48 rotatable on those studs. The rollers are in contact with cams 49 arranged for alternate action on a shaft 50 which drives the cams synchronously with the filling insertion member 11 so that they rotate in the direction of 51.

The lower ends 52 of the heddles are provided with connections to traction springs 53 which are hooked into an anchoring point on the loom frame, not shown, and which by their tractive force pull the heddles 41 down, whereas the cams 49 via rollers 48 and levers 45 pull the heddles up.

FIG. 7 is a side view of the cutting mechanism with a loop former comprised as an operational part thereof, whereas FIG. 8 shows the same in end view in the direction of B, FIG. 7. The loop former 54 has a hub 55 which is borne for rotation on a stud 56 and secured by a snap ring 57. The stud 56 extends through the movable cutter half 19 in slot 26 and is firmly attached to the fixed cutter half 18. This is preferably the stud 24 extended. Loop former 54 has an eye 58 into which a traction spring 59 is hooked with its one end, whereas its other end is hooked onto a stud 60, whereby the loop former is pulled by the tractive force of the spring against the stop 61. The loop former 54 also has a sliding part 62 which is in contact with the cam section 63 of the temple cover 29 and keeps the point 64 on the axis D—D while the cutting mechanism 14 swings from the operative position into rest position or vice versa.

From FIG. 1 it can be seen that the tip 64 of the loop former 54 which plunges down beside the selvage 12 and in front of pick end 10 so that when the loop of hairpin 13 is formed it will free the selvage warp ends 5 from the effect of the high filling tension which is required for certain filling yarns and thus prevents the selvage from tearing or pulling in the warp ends at the edge.

If the loop former 54 was firmly attached, its tip 64 would move along the circle line 65 which runs around the fulcrum 66 of the cutting mechanism 14, and in doing so it would push the hairpin forward. Thereby the hairpin 13 would extend itself and a properly tucked filling end could not be achieved.

FIG. 9 is a side view of the cutting mechanism with the embodiment of a holding comb and FIG. 10 is an end view in the direction of C, FIG. 9, showing a holding comb 68 which, with its foot or base 69, is screwed into the fixed cutter half 18 and extends around the movable cutter half 19 with its tips 70 projecting beyond the cutting edge 71.

During the cutting process, when the cutting edge 71 moves against the counterblade 72, the tips 70 of the holding comb 68 lock the hairpin 13 in the warp ends 5 and prevent the escape or extension of the tucked-in filling ends 67.

Furthermore, this example shows an alternative to the warp separating sheet 32, FIG. 8, consisting of a wire bent into wedge shape as at 73 which with its one end 74 is attached to the movable cutter half.

In some situations it may be desirable to attach the loop former 54 to a separate pivot on the blade 19 instead of on the fixed blade, as shown. At cutting, the point may only penetrate the loop a little deeper.

Now referring to FIGS. 11–14, a still further modification will be described. This is mainly different in that a more precise control for the tucked end holding comb is provided. While most of the basic cutter parts are the same here, certain novel features will presently be explained.

The thread cutter consists of the cutter part 75 with the cutting edge 76, which is firmly attached to the shaft 17, FIGS. 11–13, being borne in the loom frame and driven by a cam, not shown, to pivot back and forth synchronously with the filling insertion cycle, of the stud 78 fixed to cutter part 75 and of the freely rotatable cutter part 79 with the cutting edge 80, with the stud 81 bearing the pretensioned torsion spring 82 which with its one end 83 rests against the hub 84 and with its other end 85 against the stop 86. Owing to the tensioning effect of the torsion spring 82 the cutter part 79 is pressed against the stud 78 which acts as a stop and is thereby taken along by the cutter part 75 during its movement.

During the period of the beat up of the lay the thread cutter is in lifted position, FIG. 11, outside of the warp shed 27. Before the commencement of the filling insertion, the thread cutter with its cutter part 79 at the distance equal to the selvage width from the outer edge of the selvage is pivoted into the warp shed until the stop nose 22 rests against the stop 23 which is fixed to the loom frame, FIG. 12. During the filling insertion the filling end connected to the selvage is placed in the notch 88 of the cutter part 79 and is cut at the right moment by the cutter part 75, FIG. 13. The filling end connected with the carrier is pulled across the warp shed and the short filling end connected with the selvage is beaten up as a tucked-in end at the fell of the cloth.

To obtain a tucked-in selvage which will meet the requirements of the cloth consumers, additional devices are required which will make sure that the tucked-in filling end is beaten up regularly in the same position. It is particularly important to prevent the filling end from snapping out of the warp shed in the period between cut and beat-up by means of a holding device, and it is of advantage to have the filling end moved over a certain distance toward the fell of the cloth immediately after the cut, where the shed is smaller and due to its closing movement, which starts shortly after the cut, more quickly and securely locks the tucked-in filling end. The present modification is directed toward a more perfect solution of the above-noted problems.

A thread-shifting part 89 made of spring steel is rotatably borne with its hub part 90 on the stud 78 which is fastened to the cutter part 75. To its vertical arm 91 is fixed the fork 92 which is adjustable in height, FIG. 14. The horizontal arm is shaped as a fork 93 and engages with the stud 94. The stud 94 forms one piece together with the plate 95 having a slot 96 and is screwed to the cutter part 79.

During the cutting process, i.e., when the cutter part 75 moves in direction of the arrow 97, FIG. 13, the thread-shifting part 89, 92 which is taken along, is additionally moved in the direction of the arrow 98 due to its forked articulation on the stud 94 and thereby pushes the tucked-in filling end in the direction of the fell of the cloth. The stroke of the shifting movement can be altered by moving the plate 95 in the slot 96 and thus be adjusted to the most suitable conditions depending on the type of fabric and filling yarn.

If due to a weaving fault a knot is formed at the place of the tucked-in filling end, tearing of the selvage warp ends is avoided by the spring characteristics of the thread-shifting part 89.

This disclosure of preferred embodiments of the invention is to be interpreted as illustrative of forms the invention may take and modifications will readily occur to those skilled in the art. The invention is not to be restricted except by the scope of the appended claims wherein the novel features desired to be protected by Letters Patent are set forth.

1. A selvage-forming motion to obtain a cloth selvage with tucked-in filling ends, for a shuttleless loom of the type having a stationary source of filling located outside the shed of a fabric being woven and reciprocating filling carriers functioning to draw filling from said supply in the form of a loop by a first carrier and then to transfer said filling to a second carrier by which an end thereof is extended across the shed as a completed pick, and a cutter movable to and from the warp shed with blades one of which is fixed for movement with an oscillatable shaft and another of which is free to rotate upon said shaft, and designated as a movable blade, characterized in that, said cutter blades are positioned inwardly from the edge of the complete warp to plunge down between selvage warp ends and body warp ends at a definite distance from the edge of the complete warp, and a selvage loop former comprised as an elongated finger is pivoted on a support projecting from

one of the cutter blades and movable with that blade to a position ahead of the last-inserted filling pick as the inserting filling carrier acts to draw filling from the supply and to insert a loop thereof into the warp shed and at the edge of the fabric just beyond the terminal warp end so that the filling, as inserted, will wrap around said selvage loop former and be cut at a definite distance from the edge of the warp at each pick.

2. A selvage-forming motion as defined in claim 1, wherein, said loop-forming finger is pivoted on a stud fixed in the fixed blade and extends through a slot in said movable blade.

3. A selvage-forming motion as defined in claim 1, wherein, a resilient means is provided to bias the finger toward the fell of the fabric.

4. Mechanism as defined in claim 3, wherein, the position of the finger is maintained by a camming means acting in opposition to the said resilient means.

5. A selvage-forming motion as defined in claim 1, wherein, a further means in the form of a comb points of which pass between warp threads and in front of the end of filling being cut, to press that end into a tucked position as the shed closes upon it.

6. Mechanism as defined in claim 5, wherein, said comblike means is carried by the fixed cutter blade.

7. Mechanism as defined in claim 1, wherein, the warp threads adjacent the edge of the fabric and into which the cut ends of filling are tucked are controlled by a shedding means, cam-controlled separately from the main body of the warp threads and in a cycle such that they are closed on the tucked ends before the crossing of the main body of warp.

8. Mechanism as defined in claim 5, wherein, said comb is fixed to the end of a spring member pivoted for swinging motion about a pivot on one cutter half and has motion imparted to it by a means connected for actuating the spring member from the relative motion of the other cutter half.

9. Mechanism as defined in claim 8, wherein the spring member is of angular configuration, has loop engaging points adjustably fixed at one end and a fork at the opposite end engaged about a stud attached to the said other cutter half.

* * * * *