ABSTRACT: The present invention relates to a weft thread cutting device and the mode of and means for its operation in a weaving machine having weft thread supply cones located outside the shed and weft thread insertion members such as rapiers with weft engaging carriers, which also includes a cam shaft rotating synchronously with the weft thread insertion members and provided with a plurality of cams for actuation of a thread positioning member, a pulldown member, a weft thread clamping device and a cam for actuation of the cutting device.
WEFT CUTTER AND CONTROL FOR WEAVING MACHINE

BACKGROUND OF THE INVENTION

In a known embodiment of a weft thread control attached to a weaving machine, the weft thread cutting device operates only with every second insertion, which enables the insertion of two lengths of weft thread in the shape of a hairpin. See for example, U.S. Pat. No. 2,641,285. The fabric so obtained is on the one side provided with a closed edge or selvage and, on the other, with an open or fringed edge. With some threads which are employed mainly for fabric webs to be welded together, differences in tension may occur between the open and the closed edges which are inadmissible for the purpose envisaged, i.e. they produce a poor weld. Good results are obtained if both fabric edges are open, but that is not possible with the hairpin arrangement referred to. Nor is it possible without quite considerable complication and expenditure, to insert sequences of hairpin weft threads from several thread supply cones located outside the shed, e.g. of different colors, just as it is impossible to obtain every single pick from different supply cones, that is, to weave pick-and-pick.

On the other hand, another embodiment enables two open edges to be produced but involves the disadvantage that a cutting device is located underneath the fabric and in front of the path of the slay. This results in that the slay speed cannot be optimally utilized since account must be taken of this fabric splitting device. The latter must be swung out of the coverage area of the slay prior to the start of the slay movement.

It is an object of the present invention to provide a weft thread control which eliminates the said disadvantages, that is, which will primarily make it possible by so devising and actuating a cutting device that it can move to and from a pick catching and severing position adjacent the edge of a fabric being woven, but between it and a so-called false selvage which may later be discarded. This cutter is timed to sever the pick of weft just as a sufficient amount has been measured as will be explained.

A more broadly stated object is that of providing a cutter of a type so devised and operated that it permits the insertion of single picks in desired sequence from different weft supplies according to pattern but by the means normally utilized for a hairpin system only.

SUMMARY OF THE INVENTION

The weft thread control means according to this invention is characterized in that a pinion shaft located above the fabric is equipped with a pinion which is swivable by a rack driven by a cam with a roller rotatably arranged in a roller head, and that one of the cutting blades is firmly anchored to the said pinion shaft. The other blade is pivoted on a sleeve extending from the fixed blade and the two are normally maintained in open or non-cutting relationship. The blades are moved to and from cutting position in which a weft receiving notch is positioned to pick up the weft in advance of the last beat up pick. Further action then imparts a shearing motion to cut the weft.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of the weft thread control according to this invention, the insertion member being in a weft measuring and inserting position;

FIG. 2 is a section of the weft thread control housing and some other parts with the weft thread cutting device in operating position;

FIG. 3 is a similar section but with the said device in idle position;

FIG. 4 is a view showing the weft thread insertion member shortly after taking over the thread;

FIG. 5 is a side view of part of a thread pulldown member; and

FIG. 6 is a section of the weft thread cutting device.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 shows the control according to the present invention with an insertion member 4 being in an inserting position. A front girt 1 of a weaving machine not shown in greater detail than necessary to illustrate the invention carries a control housing 2 with a driving shaft 6 rotatably held in two bearings 3 driven by means not shown, running in synchronism with the movements of the insertion members 4 and provided with a plurality of cams 5.

The control motions of thecams 5 are transmitted via roller heads 8 equipped with rollers 7 to push rods 9, 10, 11 and 12 horizontally movable in guides in a bar 13. Push rod 9 is provided with rack teeth 14 meshing with a pinion 15 fixed on a shaft 18 running in bearings 16, 17 which carries the cutting device generally indicated at 20. An extended end 19 of the pinion shaft 18 enables the weft thread cutting device 20 to be selectively adjusted to a certain fabric width. The weft thread cutting device 20 is so arranged on the pinion shaft 18 that its cutter halves 21, 22 may penetrate between the warp threads 23 of the basic fabric and auxiliary warp threads 24 which serve as a false or temporary selvage and also to permit the weaving of single picks by the so-called hairpin system. The push rods 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23 and 24 provide with rollers 25 rotatably pivoted to bearings 27, a thread pull-down or depressor member 28 designed to move the weft thread 29 from a horizontal position into a vertical position suitable for engagement by a carrier 30 of the weft insertion member 4 to take it over. Tension springs (not shown) force the rollers 25 against the push rods 10 and 11. These parts and their function are shown and described as well in U.S. Pat. No. 2,604,123.

The further push rod 12 is in operative relationship with a bar 33 displaceable in guides 31 and provided with a pusher 32, the said bar being forced against the push rod 12 by a compression spring 34. The push rod 12 actuates a weft thread clamping device 35 comprising two leaf springs 37 attached in square bars 36, and a backing bolt or post 38.

The figure further depicts a slay support 39, a slay 40, with a reed 41 and a race plate 42 forming the support for the warp threads 23, 24 and the weft insertion member 4. That member 4 is also restrained to a proper path by guide member 43. The weft threads 45 forming a fabric 44 together with the warp threads 23 leave a loop 46 in the auxiliary warp threads 24. The weft thread 47 last beat up by the reed 41 has an elongated and as yet uncut loop 46 formed by the weft thread 29 and passing or extending back via an insertion carrier 30, a slider 48, the weft thread clamping device 35 and an eyelet 50 set in the shield 49, and thence to a weft thread supply cone 51 from which the weft is drawn.

FIG. 2 is a section of the weft thread control housing 2 with a view of the thread cutting device 20, the latter being in operative position. The unit is mounted on front girt 1 to which is bolted the control housing 2 which is closed by a lid 52.

The cam 5 attached to the driving shaft 6 actuates via roller 7, journalled in roller head 8, the push rod 9. Attached to the control housing 2 is a support or arm 53 which is provided with a fork type portion 54 in which an arm 56 swivelable about a pivot 55 is arranged. With a rotatable roller 57 the arm 56 operates under the action of a tension spring 60 attached to pins 58, 59 against the push rod 9, keeping it in contact with the cam 5. This also constitutes the return motion for the cutter to raise it to inactive position. The teeth 14 mesh with the pinion 15 fixed to the shaft 18 which carries the weft thread cutting device 20.

According to FIG. 6 the weft thread cutting device 20 comprises the fixed cutter half 21 with a hub 61 and a sleeve portion 62 with a threaded end on which the mobile cutter half 22 is attached on a needle or other bearing 63 indicated generally and held axially by thrust bearing 64. These parts are further held in place by a threaded ring or nut 65. The terms fixed and
movable here used refer to the relationship of the cutter parts to the shaft 18.

Firmly attached to the mobile cutter half 22 is a cap bolt 66 on which is arranged a torsion spring 67 of which one end 68 rests against the hub or annular portion 69 of the mobile cutter half 22 while the other end 70 exerts pressure on a bolt 71 connected with the fixed cutter half 21. The web thread cutting device 20 is attached by means of a set screw or screws 72 to the shaft 18 at a point corresponding to the width of the fabric and in properly adjusted angular relationship to shaft 18.

The torsion spring 67 causes the fixed cutter half 21 and mobile cutter half 22 to be held in a position shown in FIG. 2 in which limited by the bolt 71 and a slot 73, the U-shaped recess 74 with a cutting edge 75 of the mobile cutter half 22 is exposed to a cutting edge 76 of the cutter half 21. That is, spring 67 normally holds the cutter halves in a non-cutting relationship.

Still referring to FIG. 2, the web thread cutting device 20 is in web cutting position so that the U-shaped recess 74 is located in front of the web thread 47 last inserted in a shed formed by warp threads 23 forming an upper shed 77 and a lower shed 78. The web thread 29 inserted by the carrier 30 must thus come to be located between the cutting edge 75 of the movable blade and the cutter edge 76 of the blade 21 fixed to shaft 18.

When the carrier 30 transfers the web thread 29 to a pullout carrier 79 coming from the left in FIG. 1, the mobile cutter half 22 is locked since a lobe 80, FIGS. 2 and 6, rests against a stop 81 fixedly attached to or a part of the control housing 2, while the shaft and fixed cutter 21 are further rotated, the cutting edge 76 severing the web thread 29 in conjunction with the cutting edge 75. Of course, the setting of parts is such that enough web has been measured out by carrier 30 at transfer and before cutting. The severed end of the web thread 29 is then pulled out by the left hand carrier 79, the web thread clamping device 35 preventing further drawoff of the web thread 29 from the web thread supply cone 51 during this phase since the pusher 32 is forced against the leaf spring 37 and the backing bolt 38 when the proper length of pick has been measured.

Shown at 44 is the fabric which is drawn by a grooved roll 82 and a presser roll 83, to a cloth beam (not shown). Slay 40 with clamped-in reed is actuated in the usual way to beat up each pick.

FIG. 3 is a section of the web thread control housing 2 with a view of the web thread cutting device in retracted or idle position shown where the cut 5 is in a position in which it permits the push rod 9 to be drawn entirely to the right under the action of the tension spring 60 so that the pinion 15 with the shaft 18 and the fixed cutter half 21 are rotated in the clockwise direction. This enables the reed 41 moving towards the web thread 47 last inserted in the fabric 44 along with the slay 40 to beat up the web thread 47 without fouling the cutter halves 21, 22. Of course, the rotation of these parts by rack 14 first opens the blades from cutting position, then swings both together to the position of FIG. 3.

FIG. 4 is a view of the web thread insertion member shortly after pickup of the web thread 29 which runs as follows: From the pick of web thread 47 last inserted in the fabric 44, the thread 29 passes under the thread pulldown member 28, up on the side and back to a lower guiding groove 84 of the carrier 30, thence to an upper guiding groove 85, to the feeder 48 and then to the web thread clamping device 35 and the supply cone 51.

Located directly beside the thread pulldown member 28 is a stripper 86, FIG. 5 also, attached to the weaving frame portion 87 in front of which the web thread passes. FIG. 5 is a side view with the thread pulldown member and the web thread insertion member. The web thread 29 under the pulldown member 28 runs toward the fabric 44 and passes to the clamp and thread guide through the lower groove 84 and the upper groove 85 to reach the feeder 48. The return movement of the thread pulldown member 28 in the direction of the arrow when the carrier is in the position shown in FIG. 4, i.e. after the completion of a short loop 89, tends to take the web thread 29 in the direction of the movement and this is prevented by the stripper 86. This ensures, for each consecutive weft insertion, an exceptional accuracy in terms of time in the delivery of the loop 89, which is of particular importance because delayed delivery of the loop 89 is identical with a long loop. However a long loop cannot readily be pulled by the carrier 30 without causing slack, the web thread 29 to move out of the carrier notches 84, 85 and/or a missed transfer.

The weft control is suitable to feed weft threads from several supply cones located outside the shed if the one feeder is replaced by a plurality of controlled feeders and the weft thread clamping device by a plurality of leaf or other springs or other clamping means, that is, one for each of the wefts.

Pattern control of these weft threads will effect a change at a desired pick. Even though a hairpin system is utilized so that it is not necessary to grip a web end nor to transfer an end, single picks are inserted at will. The false selvage may be cut off and thus removed while the fabric is progressing through the loom or later.

This disclosure of a preferred embodiment of the invention is to be interpreted as illustrative of one form of the invention which 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.

I claim:

1. A web thread cutter and means for actuating thereof in a weaving machine of the type having a stationary source of web located outside the shed of a fabric being woven and reciprocating weft carriers functioning to draw web from said supply in the form of a loop by a first carrier and then to transfer said web to a second carrier by which said web is extended across the shed as a completed pick, characterized in that, the cutter includes a rotatable shaft two blades coaxially mounted on said shaft being which has a web cutting, notched end movable to and from a position between warp threads and in advance of the last pick of web beaten into the fabric, a cutting edge defining one portion of said notch, a second blade having a cutting edge cooperating with that of the first blade and means normally maintaining the blades in a noncutting relationship, the means for actuating said cutter being comprised as a cam actuated means movable in a timed relation in the weaving cycle of the said weaving machine for withdrawing the cutter from active position before beatup of a pick and then for moving it to active position at the start of insertion of the next pick, and then imparting further movement to one of the blades to cut said web after it has been measured for the pick and transferred from the first to a second carrier.

2. Mechanism as defined in claim 1, further characterized in that, the said second blade is fixed at the end of the rotatable shaft, and said cam actuated means includes a cam moved rack and a pinion fixed to said shaft.

3. Mechanism as defined in claim 2, further characterized in that, the notched blade is pivotable on said shaft and has a spring means for normally maintaining it in noncutting relationship.

4. Mechanism as defined in claim 3, wherein stop means is provided for arresting the motion of said notched blade in position to catch the web thereby to permit further motion of the fixed blade as the shaft is further rotated to cut the web.

5. Mechanism as defined in claim 1, further characterized in that, said second blade is fixed to the end of a rotatable shaft and the notched blade is rotatable on that shaft, means permitting limited angular motion of one blade relatively to the other and a spring for urging the blade to a noncutting relationship.

6. Mechanism as defined in claim 1, wherein the cam means for actuating the blades moves the cutters to an active pick catching and cutting position, and a spring is provided for withdrawing the unit to a position in which it will not interfere with the slay and reed at beatup as said cam permits.
7. Mechanism as defined in claim 1, wherein a weft pull-down member is provided to present the weft to the carrier for pickup and a stripper member adjacent the pulldown member to assure that the weft is released at a definite time point in each cycle.