Nov. 14, 1950 R. B. TAYLOR, SR., ET AL 2,530,134

CLOTH CUTTER

Filed April 1, 1948 2 Sheets-Sheet 1

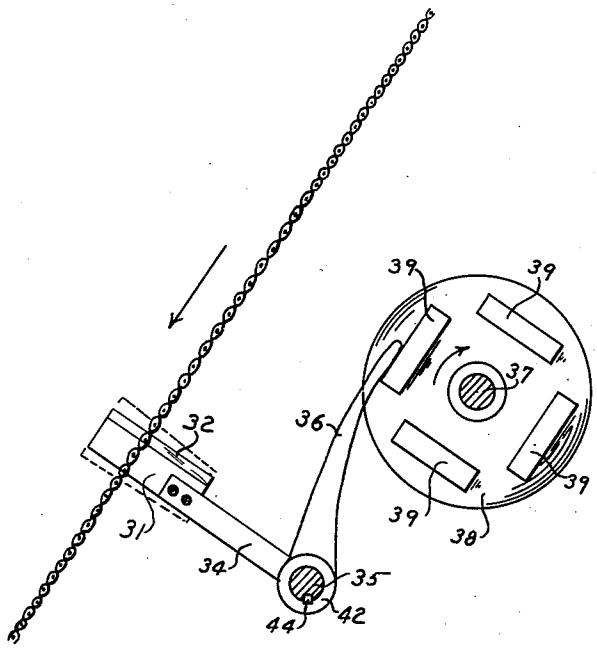


Fig. 2

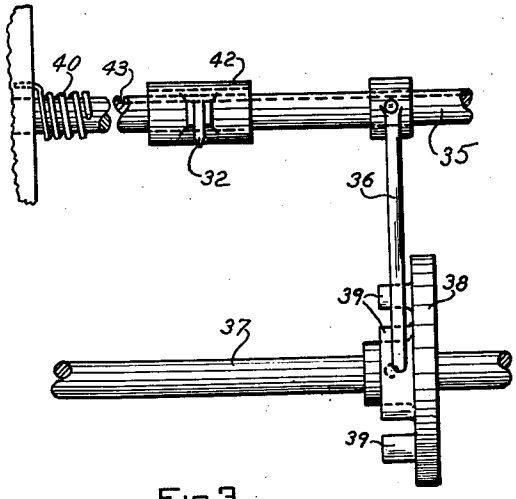


Fig. 3

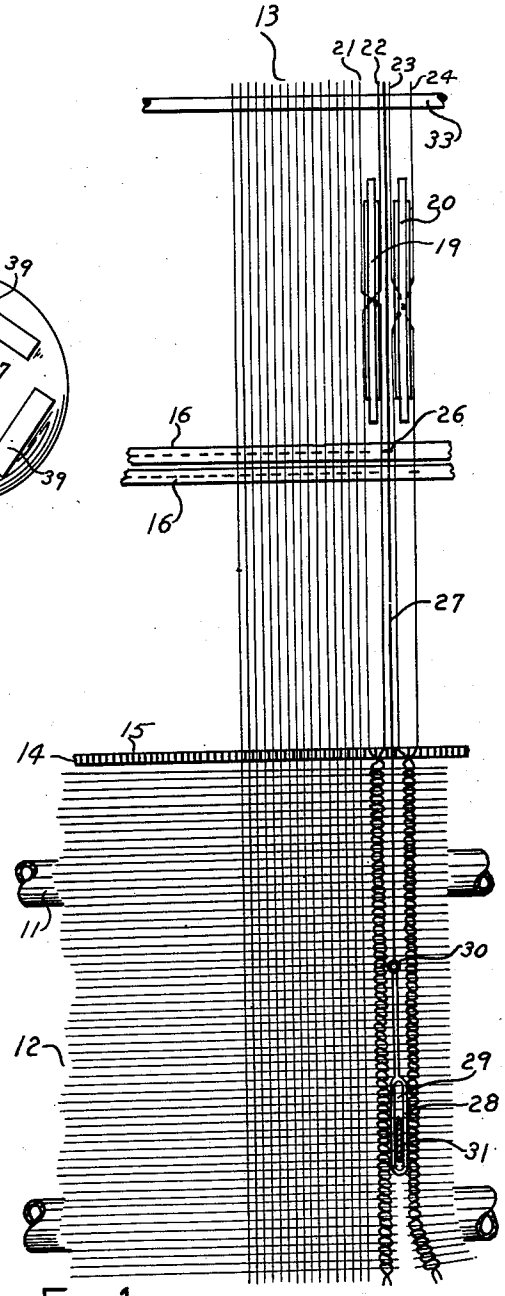


Fig. 1

INVENTORS
RALPH B. TAYLOR, SR.
BY ROBERT WHEWELL, JR.
Richey & Watts
ATTORNEYS

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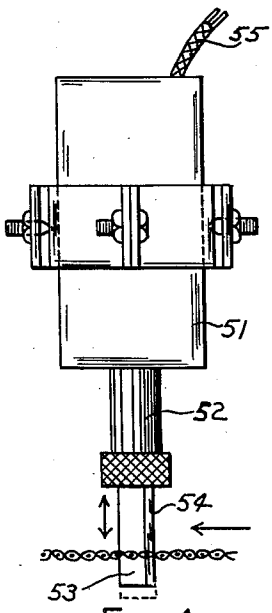


Fig. 4

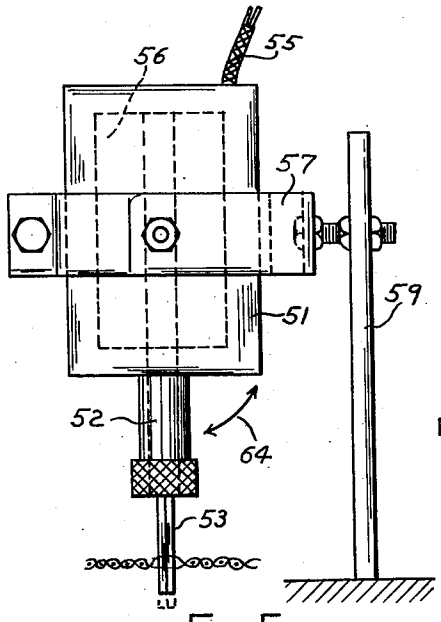


Fig. 5

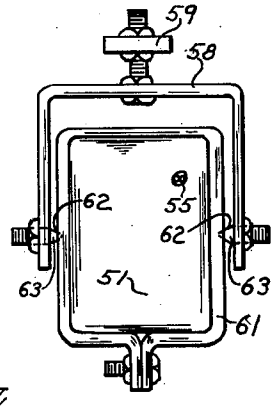


Fig. 6

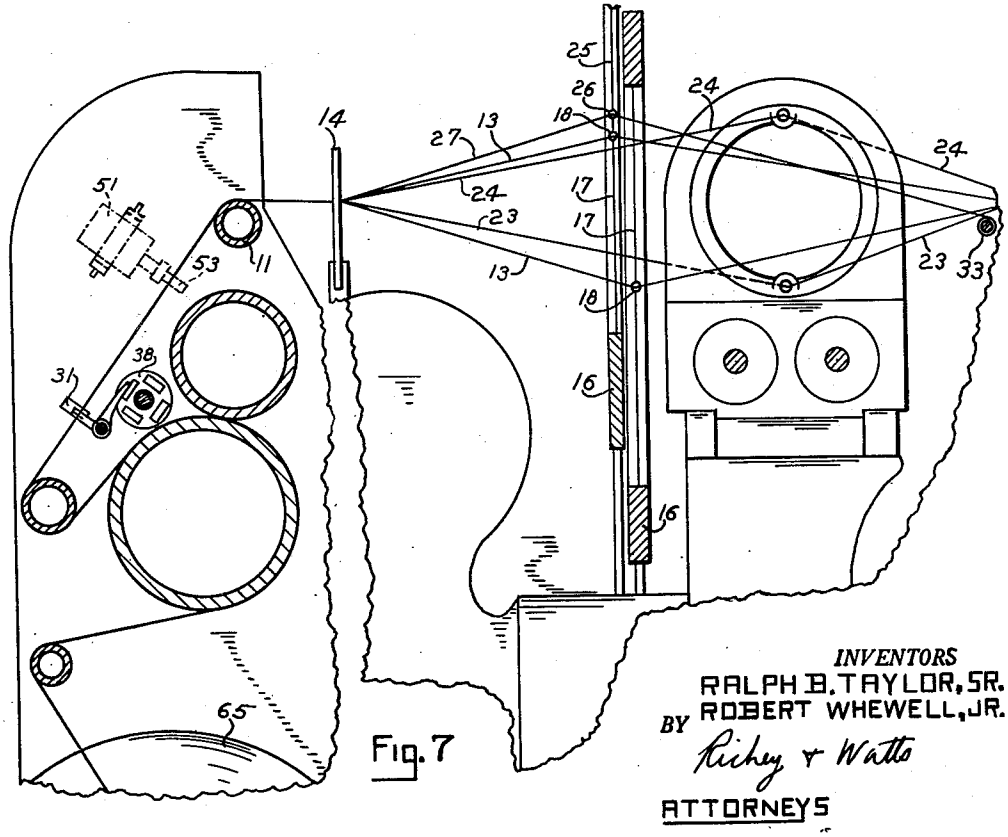


Fig. 7

INVENTORS
RALPH B. TAYLOR, SR.
BY ROBERT WHEWELL, JR.
Richey & Watts
ATTORNEYS

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CLOTH CUTTER

Ralph B. Taylor, Sr., East Cleveland, Ohio, and Robert Whewell, Jr., New Bedford, Mass., assignors to The Warner & Swasey Company, Cleveland, Ohio, a corporation of Ohio

Application April 1, 1948, Serial No. 18,468

15 Claims. (Cl. 139—54)

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This invention relates to weaving and concerns particularly improvements in cloth trimming and cutting.

It is an object of the invention to enable selvage to be trimmed and cloth to be slit longitudinally as the cloth is being woven and to carry out the operation accurately without improperly cutting, tearing, or otherwise damaging the cloth, regardless of unevenness in the edges of the cloth or in the warp threads.

An object is to cut a cloth edge with short weft thread portions projecting, and with said projecting weft thread portions of equal length.

A further object of the invention is to provide long life for a cloth-cutting blade without necessity for frequent resharpening.

Still another object of the invention is to enable the cloth-cutting blade to follow the irregularities in the edge or in the direction of warp threads of cloth as it is being wound on the cloth beam.

Other and further objects, features and advantages of the invention will become apparent as the description proceeds.

In carrying out the invention in accordance with a preferred form thereof, in connection with a loom forming twisted selvages or pairs of binding threads suitably spaced, a blade guide is woven into the cloth in the space between the binding threads. The blade guide is arranged in elongated form with a slot for receiving the cloth-cutting blade. The pairs of binding threads are sufficiently close together so that the knife guide fits snugly and is retained close to the binding threads which will form the selvage of the finished cloth. The blade guide is held substantially fixed in position longitudinally by means of a guiding cord secured thereto at one end also woven into the cloth and tied down at a point behind the heddle harness of the loom, so that the cloth as it moves slips over the guiding cord and the blade guide. It will be understood that the cloth beam is at the front of the loom and the warp beam at the rear.

A better understanding of the invention will be afforded by the following detailed description considered in conjunction with the accompanying drawing, in which

Fig. 1 is a schematic diagram representing a plan view of a portion of a loom illustrating the manner of carrying out the method of the invention in conjunction with such a loom;

Fig. 2 is a side elevation of a mechanically driven cloth-cutter which may be employed in carrying out the invention according to one embodiment thereof, and showing a longitudinal section of the cloth from which selvage is being trimmed;

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Fig. 3 is a top view of the apparatus of Fig. 2;

Fig. 4 is a view corresponding to Fig. 2 illustrating an electromagnetically driven cloth-cutter;

Fig. 5 is a rear view of the apparatus of Fig. 4;

Fig. 6 is a top view of the apparatus of Fig. 4; and

Fig. 7 is a side elevation of a loom showing alternative locations for cloth cutters of the type shown in Figs. 2 and 4.

Like reference characters are utilized throughout the drawing to designate like parts.

Referring to Fig. 1, there is shown a conventional breast beam 11 over which there is being drawn a cloth consisting of weft threads 12, spacing between which is exaggerated for clarity in the drawing, and warp threads 13, only a few of which are shown, also being shown with exaggerated spacing, for simplicity in the drawing. There is a conventional reed 14 schematically represented, including dents 15 only some of which are indicated to simplify the drawing, and there is a conventional heddle harness, including a plurality of heddle frames 16 two of which are schematically indicated. It will be understood that warp threads 13 are drawn from a warp beam not shown.

The heddle frames 16 include conventional heddle wires or cords 17 each carrying a heddle eye 18 through which one of the warp threads 13 is passed.

In weaving looms of the gripper shuttle type having stationary bobbins, it is customary to cut off the weft thread after each beat-up stroke of the lay and to provide a false selvage by turning in the cut-off ends of the length of weft thread, or a twisted selvage consisting of one or more pairs of twisted warp or binding threads may be formed at the edges of the cloth to hold the ends of the weft threads.

Pairs of binding threads may be worked into the cloth by the use of conventional selvage twisting disks 19 and 20. The disk 19 is arranged to twist a pair of binding threads 21 and 22 and is located to be adjacent the sidemost of the ordinary warp threads 13. The disk 20 is arranged to twist a second pair of binding threads 23 and 24 spaced from the pair of binding threads 21 and 22. As shown, the binding threads pass through openings in the disks 19 and 20.

The twisting disks 19 and 20 may be arranged to rotate continuously for twisting the binding

threads, or to rotate a predetermined number of revolutions in one direction and a predetermined number of revolutions in the opposite direction, in accordance with conventional practice. One means of mounting such twisting disks is illustrated in Patent #2,389,809 to Moessinger.

Where a twisted selvage is provided, or binding threads parallel to the warp threads are used, the protruding ends of the weft threads are made unduly long for a finished cloth, in order that the weaving and selvage forming operations may be carried out reliably. In order to cut off the excess length of the weft thread after the cloth has been woven, the cloth may be woven with a pair of spaced parallel sets of binding threads or twisted selvages, one of which is at the edge of the closely woven cloth and the other of which is to be trimmed away. In types of cloth where raveling is not a consideration, the pair of binding threads nearer the closely woven cloth may be omitted. The trimming knife is then run between the two sets of binding threads close to the inner one, or between the outer binding threads and the rest of the cloth, so producing a cloth with a neat, close-cut edge. Likewise, when two or more narrow fabrics are to be woven simultaneously on a wide loom, pairs of spaced binding threads without intermediate ordinary warp threads may be provided between what are eventually intended to be separate widths of cloth and a slitting knife or blade may be run between the pairs of binding threads, in order to separate the woven material into independent widths of cloth.

The ordinary weaving processes may produce cloth with some lateral deviation of the warp threads or irregularities therein instead of perfectly straight warp threads. Likewise, the binding threads or twisted selvage threads do not always run evenly, and, especially at the edges of the cloth, there may be irregularities rendering it difficult for an operator to run a slitting knife close to the binding threads or between pairs of binding threads without inadvertently cutting into the binding threads or otherwise injuring some of the fibers and damaging the cloth. Furthermore, the protruding weft thread ends cannot be made of equal length by the conventional method of employing a slitting knife, nor by means of scissors if hand cutting is resorted to.

In accordance with the present invention the difficulty in causing the selvage-trimming or cloth-slitting knife to travel between the pairs of binding threads **21**, **22** and **23**, **24**, regardless of irregularities in the motion thereof, is overcome by weaving a blade guide into the cloth as it is being formed. One of the heddle frames **16** is provided with an auxiliary heddle wire or cord **25** having a heddle eye **26**, and a guiding cord **27** is passed through the heddle eye **26** in such a manner that the cord **27** is actually woven into the cloth **12** as if it were a warp thread. The guiding cord **27** is raised and lowered by the customary motion of the heddle frame **16**, so that weft threads pass under and over the guide cord **27** as they would under and over an ordinary warp thread. A blade guide **28** is provided, which is in elongated form, having an eye **30** to which the rear end (i. e., the end away from the cloth beam of the loom) is tied, so that the blade guide **28** in effect forms a continuation of the guide cord **27** and is also woven into the cloth with alternate weft threads or groups of weft threads passing above and below the blade guide **28**.

The front end of the blade guide **28** is provided with a slot **29** of sufficient width and length to receive a cloth-cutting blade **31** and to permit the cloth-cutting blade **31** to be reciprocated back and forth parallel to the direction of the warp threads **13** for severing the weft threads **12**, as each weft thread in succession is brought into contact with the cutting edge **32** of the blade **31**. If preferred, the eye **30** may be a continuation of the slot **29**, or the blade guide **28** may be in the form of a narrow forked member to which the cord **27** is tied, and between the forks of which the blade **31** passes.

Preferably, the selvage-twisting discs are close enough together to cause the pairs of binding threads **21**, **22** and **23**, **24** to be close enough together to avoid excessive clearance for the blade guide **28**. Accordingly, the blade guide fits snugly between the pairs of binding threads, or between a pair of binding threads and the closely woven part of the cloth so that the blade guide remains at the constant distance from the sidemost regular warp thread or the edge of the closely woven portion of the cloth.

It is to be understood that in normal loom operation the cloth beam is rotated a predetermined angle with each beat-up motion of the lay carrying the reed **14**, thus successive weft threads are carried toward the blade edge **32**. It will be understood that the heddle eye **26** is so mounted in the heddle frame **16** that it occupies the position between the pair of binding threads **21** and **22** and the pair of binding threads **23** and **24**. In order to prevent the blade guide **28** from being carried along with the cloth and wrapped into the cloth beam **11**, the guide cord **27** is secured at its rear end to a suitable stationary or fixed point on the loom apparatus. It may, for example, be tied to one of the bars **33** customarily provided in a loom for supporting the drop pins which form a part of a warp stop motion. The point of support is, as shown, behind the lay including the reed **14** and behind the heddle frame **16** carrying the heddle eye **26** which carries the guiding cord **27** and is preferably behind all of the heddle frames.

The guide cord **27** is composed of a suitable, relatively high tensile strength, durable and fine material, such as nylon e. g., and the blade guide **28** is composed of suitable material such as steel of the type used in piano wire for example, which is inherently resilient and adapted to be laterally compressed slightly in passing between closely spaced pairs of binding threads.

The cloth-cutting blade **31** may be reciprocated so as to provide some shearing action and not depend upon the motion of the cloth beam **11** in bringing successive warp threads against the edge **32**, although my invention is not limited to a reciprocating or a shearing blade. This reciprocating motion may be accomplished mechanically, as illustrated in Figs. 2 and 3, by providing an arm **34** to which the blade **31** is secured, supporting the arm **34** on a shaft **35** in such a manner that it may slide sidewise, and securing a second arm **36** to the arm **34** or to the shaft **35** in such a manner that the arm **36** extends across a continuously rotating shaft **37** which may be the main loom drive shaft or an auxiliary shaft rotating therewith. A cam disk **38** is mounted on the shaft **37** having cams or lugs **39** mounted thereon in such a position as to engage the lower end **41** of the arm **36**.

Suitable means may be provided such as a return spring **40**, shown as a torsion spring, for

holding the cam-follower arm against the lugs **39**. To prevent binding and assure easy axial slidability of the arm **34** on the shaft **35**, the arm **34** is provided with a collar **42** of ample axial length and adequately loose fit on the shaft **35**. Likewise, a keyway **43** formed in the shaft to engage a key **44** in the collar **42** is so cut as to provide ample clearance for permitting easy axial slidability. The spring **40** is secured at one end to the shaft **35** and at the other to a suitable stationary portion of the apparatus. The arrangement is such that the spring **40** rocks the blade arm **34** in one direction and the lugs **39**, acting upon the arm **36**, rocks it in the opposite direction. In the arrangement illustrated, the spring **40** produces the cutting stroke but my invention is not limited to this arrangement, as the parts may also be reversed so that the cam produces the cutting stroke. The blade arm **34** may be supported above or below the cloth, but the supporting shaft **35** is represented as underneath the cloth in the arrangement of Figs. 1 to 3 and 7. It will be understood also that the cutter blade may be supported in any position along the cloth between the lay and the take-up roll **65**.

As the cloth is woven, the cloth beam **11** rotates in response to rotation of the loom driving shaft **37**. The arm **36** will be actuated intermittently by the lugs **39** and the spring **40** causing the blade **31** to travel back and forth with a slight shearing action and a component of motion parallel to the warp threads **13**. Owing to the shearing action the wear on the blade edge **32** will be distributed along the length thereof and the blade **31** will operate satisfactorily for long periods of time without resharpening.

The blade guide **28** is confined to the space between the binding threads **21**, **22** and **23**, **24** so that even though there may be irregularities in the cloth or the binding threads move back and forth laterally, the blade guide **28** will be moved to one side or the other to correspond to such lateral movements of the binding threads. The blade, in turn, will be caused to slide from side to side on the shaft **34**, remaining always between the pairs of binding threads **21**, **22** and **23**, **24**.

The arrangement illustrated in Figs. 2 and 3 has the merit of requiring no additional driving mechanism for reciprocating the cutter blade **31**, since the loom drive shaft **37** is already a portion of the standard loom. However, the invention is not limited to such an arrangement as illustrated and includes other arrangements, such as electromagnetically driven cutting knives, for example.

For instance, as illustrated in Figs. 4, 5 and 6, an electromagnetic cutter or Vibro tool of a conventional construction may be utilized having a body **51** with a reciprocating member **52** carrying a blade **53** having a cutting edge **54** corresponding to the cutting edge **32** of Figs. 1, 2 and 3. Figs. 4, 5 and 6 illustrate also the alternative of supporting the cutter above the cloth instead of underneath. The electromagnetic cutter in itself does not constitute a part of my present invention and the internal construction thereof need not, therefore, be illustrated. A suitable form of such tool is sold under the name Burgess Vibro Tool and it will be understood that such device includes a solenoid winding or coil adapted to be connected to a source of alternating current through a

pair of leads **55** acting upon a plunger or armature **56** to which the blade **53** is secured.

In order to provide the requisite lateral freedom of motion of the blade **53** within the knife guide slot **29** in response to a possible lateral motion of the selvages and the blade guide **28**, a pivotal cradle **57** is provided for the Vibro tool body **51**. This cradle comprises a stationary yoke **58** secured in any suitable manner to a post **59** or the like, forming a stationary part of the loom and a strap **61** composed of sheet metal or the like, clamped around the body **51** of the Vibro tool having sockets **62** formed therein adapted to receive pivot points **63** secured in the ends of the yoke **58**. In this manner the body **51** is free to rack around the axis of the pivot points **63**, as represented by the arrow **64** in Fig. 5, thus providing the blade **53** with lateral freedom of motion to follow a lateral motion of the blade guiding slot **29**. In the arrangement of Figs. 4, 5 and 6, as in the arrangement of Figs. 2 and 3, the shearing action of the blade **53** distributes the wear along the edge **54** so that clear, sharp cuts are obtained for a long period of time without necessitating resharpening or replacement of the blade **53**. As in the arrangement of Figs. 2 and 3, the blade **53** follows irregularities in the cloth and a clean, uniform, undamaged trim is provided for the cloth.

Certain embodiments of the invention and certain methods of operation embraced therein have been shown and particularly described for the purpose of explaining the principle of operation of the invention and showing its application, but it will be obvious to those skilled in the art that many modifications and variations are possible, and it is intended, therefore, to cover all such modifications and variations as fall within the scope of the invention which is defined in the appended claims.

What is claimed is:

1. In a weaving loom of the type having a cloth beam and a heddle harness with heddle eyes for ordinary warp threads and in which spaced binding threads are wound on the weft threads, a cloth-cutter comprising in combination with a heddle eye located in a position between the position of the spaced binding threads, a weft-cutting blade having mechanism for reciprocating it, a blade guide in the form of an elongated member having an eye at one end and a slot at the other end receiving said blade, and a guiding cord secured at one end to the eye in the blade guide and at the other end to a point in back of the heddle harness, and threaded through said heddle eye whereby the cord and the blade guide are woven into the cloth but remain stationary as the cloth advances and is wound on the cloth beam, and the reciprocating blade is guided between the binding threads to sever the cloth therebetween unaffected by unevenness in the weaving or in the cloth edges.

2. In a weaving loom of the type having a cloth beam and a heddle harness with heddle eyes for ordinary warp threads and in which spaced binding threads are wound on the weft threads, a cloth-cutter comprising in combination with a heddle eye located in a position between the position of the spaced binding threads, a weft-cutting blade, a blade guide in the form of an elongated member receiving said blade, and a guiding cord secured at one end to the blade guide and at the other end to a point in back of the heddle harness, and threaded through said heddle eye whereby the cord and the blade guide are woven into the

cloth but remain stationary as the cloth advances and is wound on the cloth beam, and the reciprocating blade is guided between the binding threads to sever the cloth therebetween unaffected by unevenness in the weaving or in the cloth edges.

3. In a weaving loom of the type having a cloth beam and a heddle harness with heddle eyes for ordinary warp threads and in which spaced binding threads are wound on the weft threads parallel to the ordinary warp threads, a cloth-cutter comprising in combination a weft-cutting blade adapted to be reciprocated, a blade guide in the form of an elongated member having a slot receiving said blade, and a guiding cord secured at one end to the blade guide and at the other end to a point in back of the heddle harness with means for weaving the guiding cord through the weft threads, whereby the cord and the blade guide remain stationary as the cloth advances and is wound on the cloth beam and the blade is guided between the binding threads to sever the cloth therebetween unaffected by unevenness in the weaving or in the cloth edges.

4. In a weaving loom of the type having a cloth beam and a heddle harness with heddle eyes for ordinary warp threads and in which spaced binding threads are wound on the weft threads parallel to the ordinary warp threads, a cloth-cutter comprising in combination with a heddle eye located in a position between the positions of the spaced binding threads, a weft-cutting blade mounted movable laterally transverse to the warp threads, a blade guide having a slot receiving said blade, and a guiding cord secured at one end to the blade guide and at the other end to a point in back of the heddle harness, and threaded through said heddle eye whereby the cord and the blade guide are woven into the cloth but remain stationary as the cloth advances and is wound on the cloth beam and the blade is guided between the binding threads to sever the weft threads therebetween.

5. In a weaving loom of the type having a cloth beam and a heddle harness with heddle eyes for ordinary warp threads in which spaced binding threads are wound on the weft threads parallel to the ordinary warp threads, the method of severing the weft threads between the binding threads which comprises weaving a slotted elongated blade guide into the cloth between the said binding threads, holding the guide relatively stationary with respect to longitudinal movement as the cloth is wound on the cloth beam, and passing a reciprocated blade through said knife guide to sever successive warp threads as they reach the blade guide prior to winding of the advancing cloth onto the cloth beam.

6. In a weaving loom of the type in which spaced binding threads are wound on the weft threads parallel to the ordinary warp threads, a cloth cutter comprising a weft-cutting blade, a blade guide in the form of an elongated member having a slot receiving said blade, said member being of such width as to fill the space between said binding threads, and means for weaving the blade guide through the weft threads while substantially preventing longitudinal movement thereof, whereby the blade is guided between the binding threads to sever the cloth therebetween with uniform lengths of protruding weft threads.

7. In a weaving loom of the type in which binding threads are wound on the weft threads parallel to the ordinary warp threads and spaced from the ordinary warp threads, a cloth cutter

comprising in combination a weft-cutting blade, a blade guide having a slot receiving said blade, and means for weaving the blade guide through the weft threads while substantially preventing longitudinal movement thereof, whereby the blade is guided between the binding threads and the edge warp thread to sever the cloth therebetween.

8. In a weaving loom a cloth cutter comprising in combination a weft-cutting blade, a blade guide having a slot receiving said blade, and means for weaving the blade guide through the weft threads in close proximity to an adjacent warp thread while substantially preventing longitudinal movement of the blade guide, whereby the blade is guided a uniform distance from said warp thread to sever the cloth with uniform lengths of protruding weft threads.

9. In a weaving loom of the type in which binding threads are wound on the weft threads parallel to the ordinary warp threads and spaced from the edge warp thread, a cloth cutter comprising in combination a weft-cutting blade having a mounting providing freedom of movement thereof transverse to the warp threads, a blade guide having a slot receiving said blade, and mechanism for passing the blade guide through the weft threads in the manner of a warp thread, whereby the blade is guided between the edge warp thread and the binding threads to sever the cloth therebetween.

10. In a weaving loom a cloth cutter comprising in combination a weft-cutting blade, a blade guide having a slot receiving said blade, and a mechanism for causing said blade guide to pass through the weft threads between warp threads in the manner of a warp thread, whereby the blade is guided between warp threads to sever the cloth therebetween.

11. The method of evenly trimming woven cloth which comprises the steps of twisting selvage threads around weft threads along a line spaced from the warp threads at the edge of the cloth, weaving a guide into the weft threads between the edge warp thread and the twisted selvage as the shed is opened and closed to insert the weft threads, maintaining the guide in close proximity to the said edge warp thread, preventing the guide from moving with the advancing cloth as the cloth is wound on the cloth beam, and passing a blade through said guide with the blade edge away from the direction of motion of the cloth as it is wound on the cloth beam, whereby the weft threads are cut a fixed distance from the said warp thread and the said twisted selvage is severed from the cloth.

12. The method of evenly trimming woven cloth which comprises the steps of weaving a guide into the weft threads along a warp thread as the shed is opened and closed to insert the weft threads, preventing the guide from moving with the advancing cloth as the cloth is wound on the cloth beam, and passing a blade through said guide whereby the weft threads are cut a fixed distance from the said warp thread.

13. The method of longitudinally slitting woven cloth which comprises the steps of interweaving weft threads and warp threads with spacing between a pair of warp threads, and simultaneously weaving a guide into the weft threads between the said warp threads, preventing the guide from moving with the advancing cloth as the cloth is wound on the cloth beam, and passing a blade through said guide to cut the weft threads.

14. The method of evenly trimming woven cloth

which comprises the steps of twisting selvage threads around weft threads along a line spaced from the warp threads at the edge of the cloth, passing a slotted guide between said warp threads and said twisted selvage threads, passing a blade through said guide and advancing the cloth for cutting the weft threads.

15. In a weaving loom supplying narrowly spaced longitudinal threads between which the cloth is to be severed and weaving weft threads transverse to the longitudinal threads, a cloth cutter comprising in combination a weft-cutting blade, a resilient blade guide compressible in width, receiving said blade, and means for weaving the blade guide through the weft threads between the longitudinal threads, whereby the guide is slightly compressed and retains close contact with said longitudinal threads to sever

the cloth with uniform length of protruding weft threads.

RALPH B. TAYLOR, SR.
ROBERT WHEWELL, JR.

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