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3,073,197

GUIDING APPARATUS FOR A WORK HEAD

Filed Dec. 5, 1958

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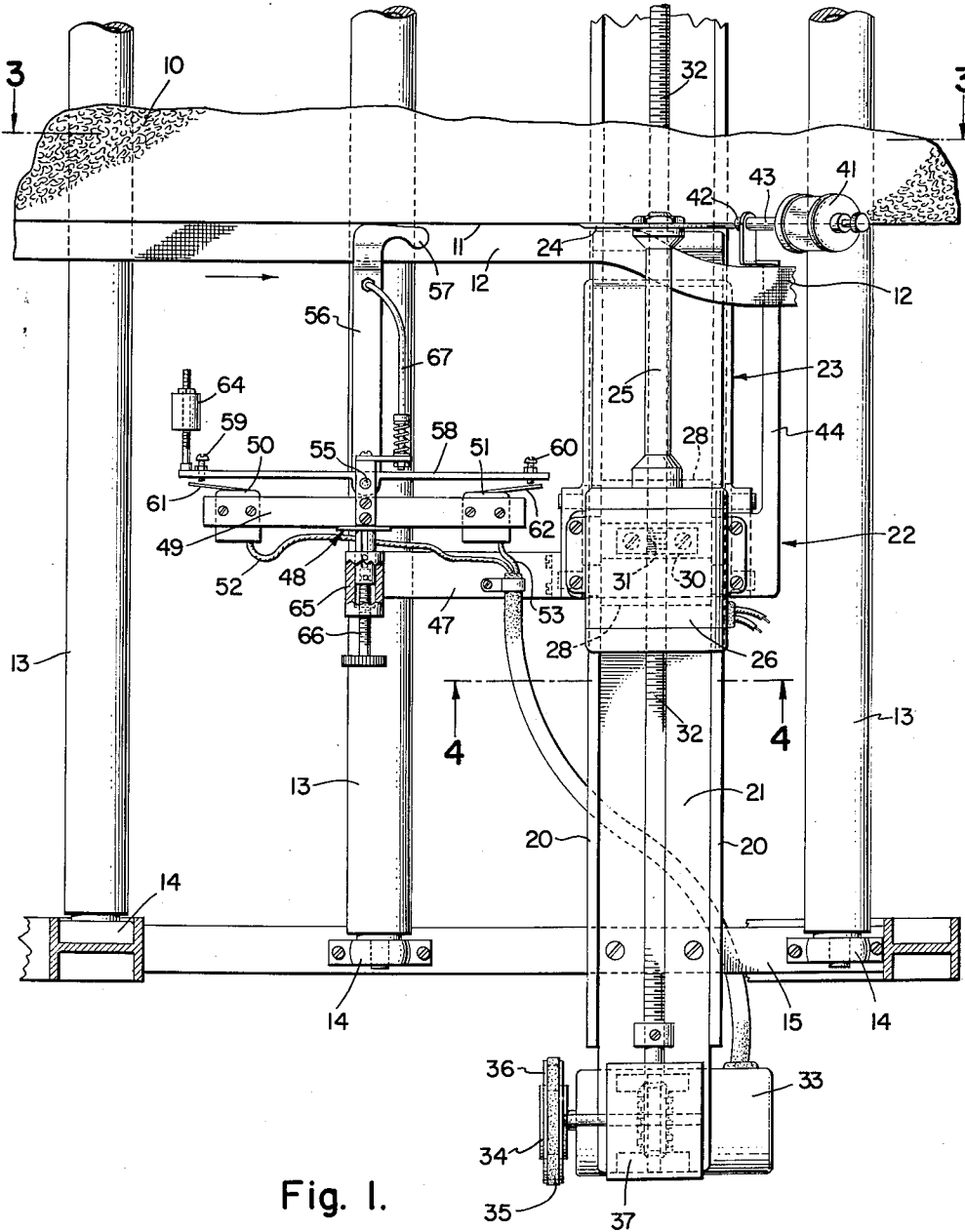


Fig. 1.

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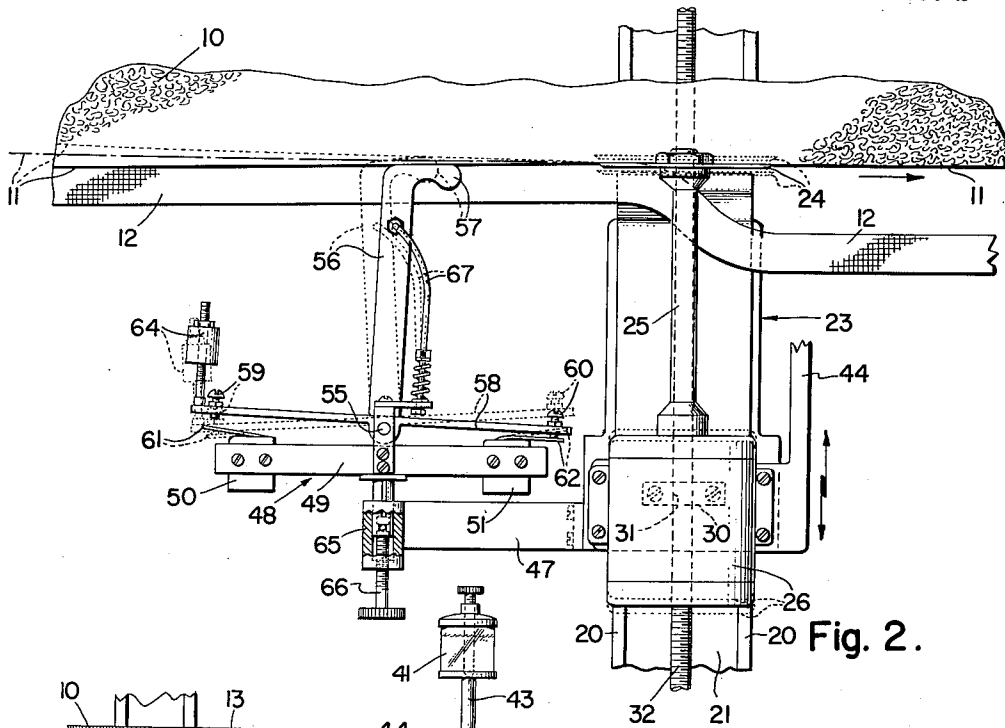
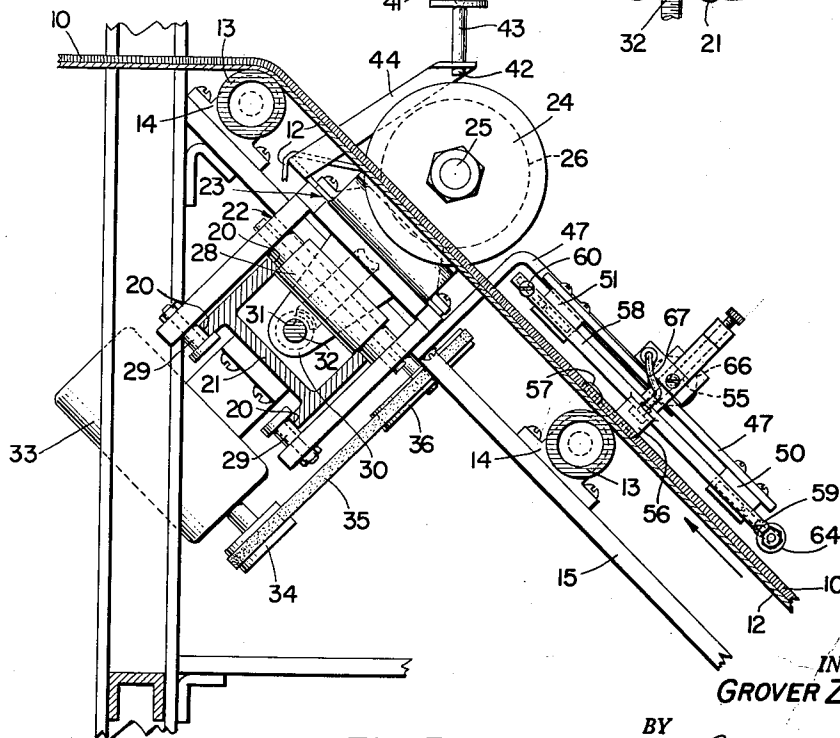
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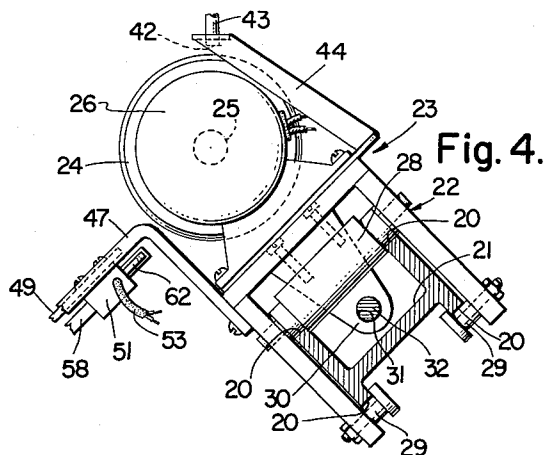
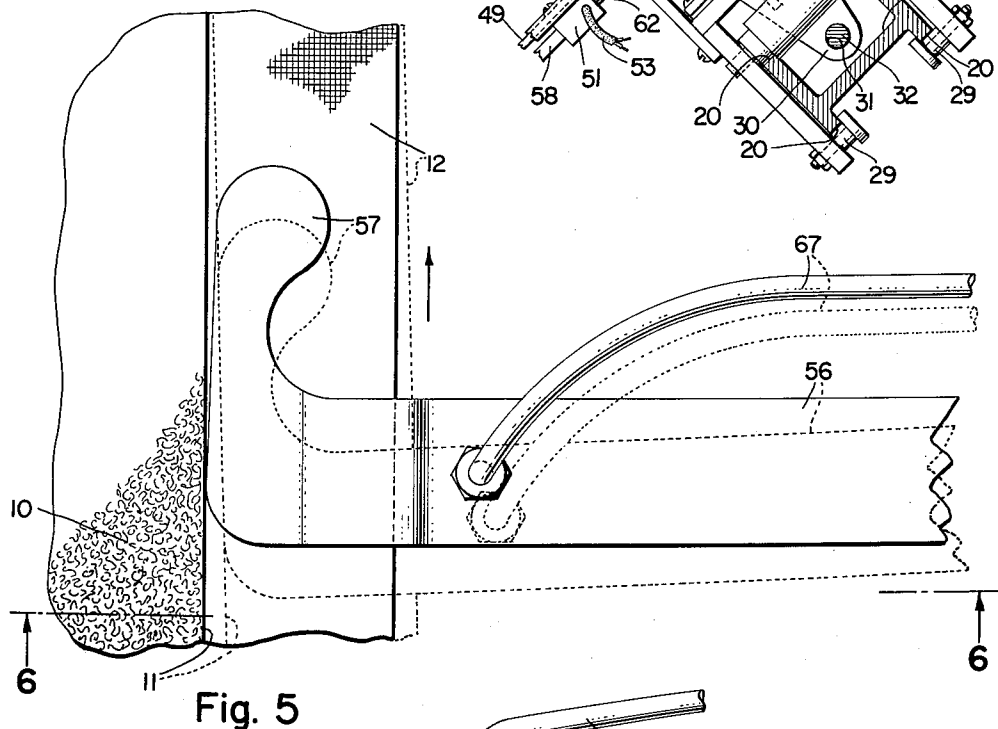
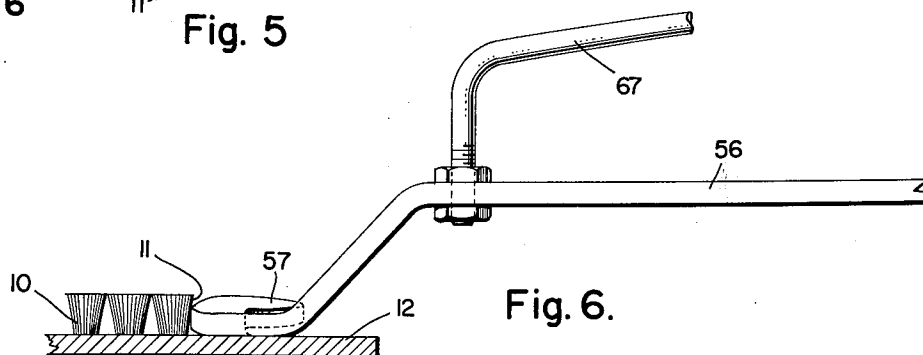
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GUIDING APPARATUS FOR A WORK HEAD

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4 Claims. (Cl. 83-368)

This invention relates to a selvage trimming apparatus for pile fabrics and particularly to a means for controlling the position of a selvage trimming element laterally of a pile fabric to maintain the same in trimming relation to the pile edge as the fabric is moved past the trimming element.

It is an object of this invention to provide a selvage trimming apparatus for a pile fabric which is sensitive and automatically responsive to the wandering of the pile edge as the fabric is moved past the trimming element for the purpose of guiding the trimming element along and closely adjacent to the pile edge. Further objects of this invention are to provide such an apparatus which is economical, efficient, reliable and durable.

In accordance with the above objects, the present invention comprises a selvage trimming apparatus having a sensing device adapted to engage a pile edge and, through the friction generated between the pile-engaging element and the moving pile, to bias an actuator pivotally in opposition to a further bias whereby, when the pile edge moves toward and away from the pile-engaging element, the friction bias is correspondingly increased or decreased to move the actuator in a manner to adjust the position of the trimming element to maintain the same in proper relation to the pile edge. By virtue of the opposed biases, the engagement of the pile-engaging element can be light, thereby permitting the same to operate directly against the pile edge.

Further objects and advantages of the invention will be apparent from the following description taken in conjunction with the drawings, wherein:

FIG. 1 is a top plan view, at an angle of 45° to the horizontal, of the invention operating to trim selvage from the edges of a pile fabric and with the guide finger in neutral position;

FIG. 2 is a view similar to FIG. 1, disclosing the guide finger in alternate extreme positions;

FIG. 3 is a view taken along the lines 3-3 of FIG. 1;

FIG. 4 is a view taken along the lines 4-4 of FIG. 1;

FIG. 5 is an enlarged top plan view of the guide finger in alternate extreme positions;

FIG. 6 is a view taken along the lines 6-6 of FIG. 5.

Referring to the drawings now in more detail, a pile fabric 10, such as a carpet, having pile 11 and a selvage 12 is fed in the direction of the arrow over rolls 13, the ends of which are supported in bearings 14 on the frame 15.

Also supported on the frame 15 and disposed transversely of the direction of fabric feed are a pair of upstanding parallel plate members forming tracks 20. These tracks 20 may be spaced apart by a longitudinal plate 21. Mounted to travel in either direction on the tracks 20 transversely or laterally of the fabric 10 is a carriage 22 for supporting a work head 23.

In the drawings, the work head 23 comprises a rotary cutter blade 24 mounted on a shaft 25 which is driven by an electrical motor 26. The motor 26 is fixed to the top of an inverted U-shaped carriage housing 27 which fits down over and envelops the tracks 20 for longitudinal movement thereover. Supported transversely between the walls of the housing 27 for free rolling movement over the tracks 20 are a pair of upper rollers 28. Lower rollers 29 may be provided to assist in retaining the carriage

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housing 27 on the tracks 20, particularly when the carriage 22 is mounted at an angle, as disclosed in FIG. 3. Depending from the top wall of the carriage housing 27 between the upper rollers 28 is a block 30 provided with a threaded opening 31 for receiving a long screw shaft 32 extending parallel between the tracks 20 and adapted to be rotated in either direction in order to drive the carriage 22 laterally toward and away from the fabric 10. The screw shaft 32 is driven by means of a reversible motor 33 through lower pulley 34, belt 35, upper pulley 36 and reduction gear box 37.

When the cutter blade 24 is applied to a carpet having a foam rubber backing, water 40 is applied to the blade 24 from a reservoir 41 through a wick 42 located in the end of an outlet pipe 43, supported by an arm 44 from the carriage 22, in order to dispel heat generated by the rotation of the blade against the backing.

Attached to one wall of the carriage housing 27 is a bracket 47 for supporting the guide frame 48 as a unitary part of the carriage 22. The guide frame 48 comprises a switch bar 49 substantially parallel to the direction in which the fabric is fed for supporting at either end thereof an electrical switch 50 and 51. The switches 50 and 51 are connected through separate circuits 52 and 53 to a reversible motor 33. When the switch 50 is actuated, the motor 33 is adapted to rotate the screw shaft 32 in such a direction as to drive the carriage 22 toward the fabric 10. When switch 51 is actuated, the motor 33 will reverse the rotation of the screw 32 to drive the carriage 22 away from the fabric 10.

Mounted in the guide frame 48 to pivot about an axis substantially perpendicular to the plane of the fabric 10 is a post 55 carrying a guide arm 56 extending substantially at right angles to the post in the direction of the fabric. The free end of the guide arm 56 is bent downwards slightly at an angle between 10 to 20 degrees to form a guide finger 57 extending laterally from the guide arm 56 in the direction of fabric feed. The outer edge of the finger 57 is substantially straight over a short portion of its length and forms an angle slightly greater than 90° with the guide arm 56. The free end of the finger is arcuate and the heel portion of the finger which joins the guide arm 56 and normally abuts against the edge of the pile 11 is also arcuate to provide a substantially rolling contact surface which slidably and frictionally engages the pile 11 as the fabric 10 moves in the direction of the finger 57. A contact bar 58 is also fixed to the post 55 transversely of the finger 57 and substantially coextensive with the switch supporting bar 49. Contact studs 59 and 60 are mounted at opposite ends of the contact bar 58 for respective engagement with the contact finger 61 on switch 50 and the contact finger 62 on switch 51 when that particular end of the contact bar is pivoted toward its respective switch. When the contact bar 58 is substantially parallel to the switch bar 49 as disclosed in FIG. 1, no contact is effected between the respective studs and fingers, so that neither switch 50 nor 51 is actuated to energize the motor 33. Consequently, the screw shaft 32 is not rotated and the carriage 22 remains stationary.

However, when the guide arm 56 is pivoted in the direction opposite the direction of fabric feed as disclosed by the solid line positions of FIGS. 2 and 5, the contact stud 59 will engage and depress the contact finger 61 to actuate the switch 50 and energize the motor 33 to rotate the screw shaft 32 in a direction which will cause the carriage 22 to move toward the fabric 10. When the guide arm 56 is pivoted to its extreme dashed line position in FIGS. 2 and 5, the carriage 22 is moved in the opposite direction away from the fabric because the contact stud 59 is disengaged from its finger 61 to open the switch 50, and the contact stud 60 engages the contact finger 62 to close the switch 51.

The guide arm 56 is normally biased to pivot in the direction opposite the direction of fabric feed when the guide finger 57 is disengaged or lightly engages the edge of the pile 11, preferably by means of a weight 64 extending from the lower end of the contact bar 58. The weight 64 is mounted to create a counterclockwise moment about the axis of the post 55 when the contact bar 58 is at an angle of at least 35° to the horizontal. The guide arm 56 is also located and the fabric 10 is fed in planes forming the same angle with the horizontal. FIG. 3 discloses these elements mounted at an angle of substantially 45° to the horizontal.

The lateral position of the guide frame 48 with respect to the carriage 22 may be adjusted by means of the collar 65 which is fixed to the bracket 47 and is threaded to receive an adjustable screw 66 manually operated to laterally move the guide frame 48 in either direction in small increments.

A tension member 67 may be provided for adjusting the elevation of the guide arm 56 and guide finger 57 normal to the plane of the fabric 10.

The operation of the invention will now be described as it is applied to the accurate trimming of selvage from the edges of a pile fabric 10, even though the edges of the pile may be irregular or the fabric is inadvertently laterally shifted from time to time.

As best disclosed in the drawings, the frame 15, the fabric rolls 13, and the tracks 20 are so disposed that fabric 10 is fed upward in the direction of the arrow at an angle of approximately 45° from the horizontal. The carriage 22 is mounted and moved along the tracks 20 until the cutter blade 24 will cut the selvage 12 along the edge of the pile 11. The screw 66 is then turned in the collar 65 to move the guide frame 48 until the guide finger 57 will abut against the side of the pile 11 with sufficient pressure that the movement of the pile fabric 10 at a constant velocity will develop sufficient friction with the edge of the guide finger 57 to overcome the effect of the weight 64 and maintain the contact bar 58 in a neutral position substantially parallel to the switch bar 49. Thus, neither of the switches 50 or 51 will be actuated so long as the fabric 10 is moving in a longitudinal direction normal to the axis of the cutter shaft 25 and there are substantially no irregularities on the edge of the pile 11.

If the edge of the pile 11 moves laterally away from the guide finger 57 to reduce or eliminate the frictional contact between the finger 57 and the edge of the pile 11, the weight 64 will cause the guide arm 56 to pivot downward and the contact bar 58 to pivot against and actuate the switch 50 to move the carriage 22 toward the fabric 10 so that the cutter blade 24 and the guide finger 57 will again abut against the edge of the pile 11 for a normal operation. If the fabric 10 shifts laterally toward the guide finger or the edge of the pile 11 bows outwardly, the increased friction between the upwardly moving pile and the guide finger 57 will overcome the effect of the weight 64 to move the guide finger 57 upward, pivoting the contact bar 58 to actuate the upper switch 51 to move the carriage 22 away from the fabric 10 so that the cutter blade 24 will not cut into the pile 11. The movement of the carriage 22 away from the fabric will also reduce the friction between the guide finger 57 and the edge of the pile 11 so that the guide arm 56 will resume its normal balanced position.

The sensitivity and responsiveness of the apparatus which will determine the accuracy and tolerance of the selvage trimming operation will be controlled by the spacing of the guide arm 56 relative to the cutter shaft 25, the spacing of the contact studs 59 and 60 relative to their respective contact fingers 61 and 62, the sensitivity of the switches 50 and 51 and the speed of rotation of the screw shaft 32.

In order to trim the selvage from both lateral edges of a pile fabric such as carpeting, the mirror-image of the above described apparatus is located on the other side of

the fabric. Also, if it is more convenient for the manufacturer to finish carpets by feeding the fabric downward, the apparatus may be adapted to operate equally effectively by locating the guide frame 48 on the opposite side of the carriage 22 so that the guide finger 56 will be located above and precede the cutter blade 24. The cutter blade may be laterally adjusted so that it may cut along the selvage to leave a border or cut off a certain amount of pile in order to reduce the overall width of the carpet.

It can be readily understood that this type of guiding apparatus may be adapted for use with any type of work head other than a cutter blade, such as a marking head for stamping the name of the manufacturer at uniform intervals along the bottom edge of the carpet.

This apparatus has been successfully employed in automatically trimming selvage from pile carpeting formed by either weaving or tufting, and has consistently produced a tolerance of one-sixteenth of an inch over any given length.

It will be apparent to those skilled in the art that various changes may be made in the invention, without departing from the spirit and scope thereof, and therefore the invention is not limited by that which is shown in the drawings and described in the specification, but only as indicated in the appended claims.

What is claimed is:

1. A selvage trimming apparatus for a pile fabric comprising means for feeding the pile fabric in a longitudinal direction, a carriage, means for mounting said carriage for rectilinear movement along a line normal to a longitudinal edge of the pile fabric and carriage actuating means for moving said carriage in both directions along said line, a cutter blade mounted on said carriage and adapted to trim the selvage along a line longitudinally of the pile fabric, means on said carriage for actuating said cutter blade, and means for controlling the operation of said carriage actuating means to maintain said cutter blade closely adjacent to the pile edge comprising a guide arm, means for pivotally mounting said guide arm on said carriage for movement about a pivot axis in a plane normal to a plane defined by the pile fabric, first and second electrical switches mounted on said carriage, means on said guide arm for selectively closing said switches upon pivotal movement of said guide arm in opposite directions from a neutral position in which both of said switches are open, means electrically connecting said switches with said carriage actuating means for actuating the same to drive said carriage toward the pile fabric upon closing said first switch and to drive said carriage away from the pile fabric upon closing said second switch, a guide finger on said guide arm for overlying the selvage in front of said cutter blade and for frictionally engaging said pile edge as the pile is moved past said guide finger, said frictional engagement between said pile edge and said guide finger producing a force component in the direction defined by the fabric feed and acting upon the guide finger to bias said guide arm pivotally in the direction to close said second switch, and means for pivotally biasing said guide arm in the direction to close said first switch, whereby said biases are opposed and, when balanced, said guide arm is disposed in the neutral position and, when unbalanced, said guide is pivotally moved to close the respective one of said switches.

2. A selvage trimming apparatus in accordance with claim 1 in which said means for pivotally biasing said guide arm in the direction to close said first switch comprises a weight.

3. A selvage trimming apparatus in accordance with claim 2 in which said means for feeding the pile fabric in a longitudinal direction acts to feed said pile fabric at an acute angle to the horizontal.

4. A selvage trimming apparatus for a pile fabric comprising means for feeding the pile fabric in a longitudinal direction, a carriage, means for mounting said carriage for rectilinear movement along a line normal to a longitudinal edge of the pile fabric and means including a reversible

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electric motor for moving said carriage in both directions along said line, a cutter blade mounted on said carriage and adapted to trim the selvage along a line longitudinally of the pile fabric, means on said carriage for actuating said cutter blade, and means for controlling the actuation of said motor to maintain said cutter blade closely adjacent to the pile edge comprising a guide arm, means for pivotally mounting said guide arm on said carriage for movement about a pivot axis in a plane normal to a plane defined by the pile fabric, first and second electrical switches mounted on said carriage, means on said guide arm for selectively closing said switches upon pivotal movement of said guide arm in opposite directions from a neutral position in which both of said switches are open, means electrically connecting said switches with said motor for energizing the same to drive said carriage toward the pile fabric upon closing said first switch and to drive said carriage away from the pile fabric upon closing said second switch, a guide finger on said guide arm for overlying the selvage in front of said cutter blade and for frictionally engaging said pile edge as the pile is moved past said guide finger, said frictional engagement between said pile

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edge and said guide finger producing a force component in the direction defined by the fabric feed and acting upon the guide finger to bias said guide arm pivotally in the direction to close said second switch, and means for pivotally biasing said guide arm in the direction to close said first switch, whereby said biases are opposed and, when balanced, said guide arm is disposed in the neutral position and, when unbalanced, said guide is pivotally moved to close the respective one of said switches.

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