March 4, 1952 R. T. KOROLYSHUN ET AL 2,588,016

MACHINE FOR CUTTING TEXTILES

Filed Jan. 27, 1950 2 SHEETS—SHEET 1

Fig. 1.

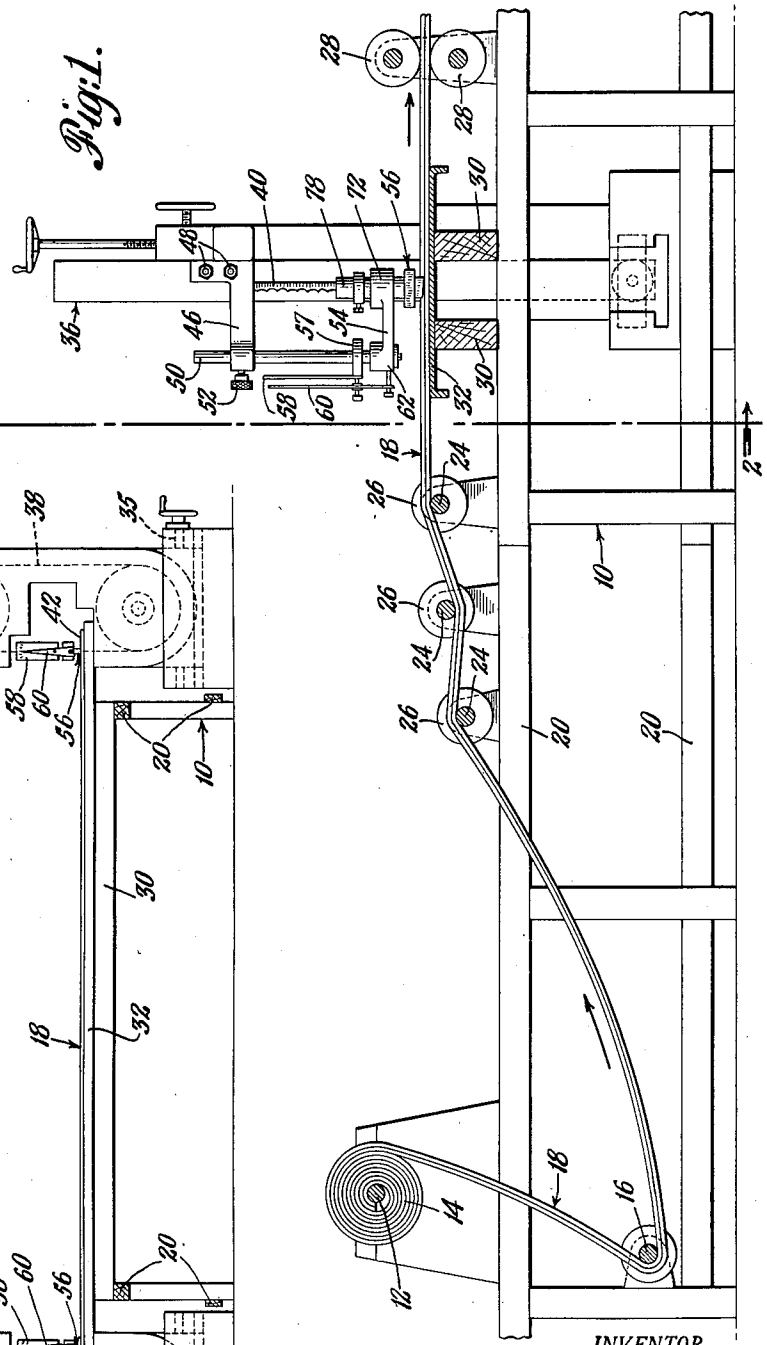


Fig. 2.

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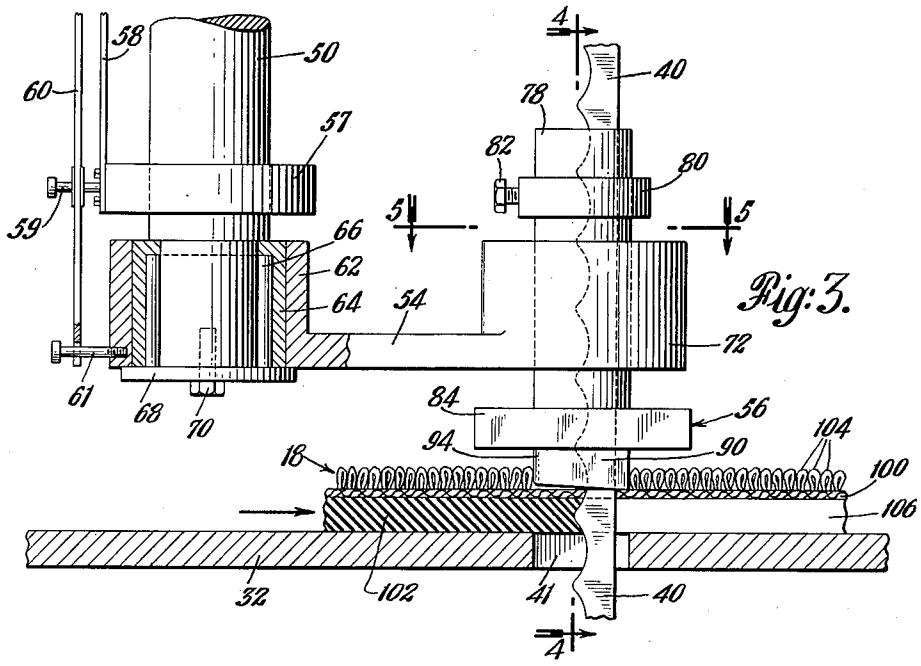


Fig:3.

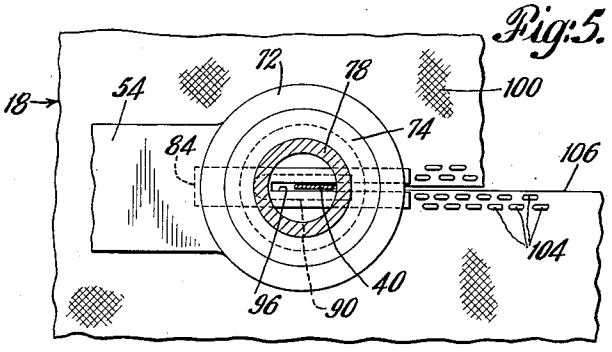
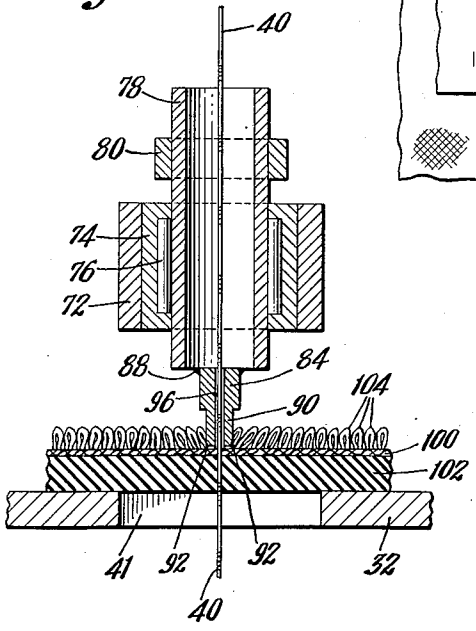


Fig:5.

Fig:4.



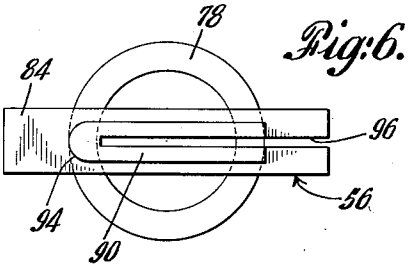


Fig:6.

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Patented Mar. 4, 1952

2,588,016

UNITED STATES PATENT OFFICE

2,588,016

MACHINE FOR CUTTING TEXTILES

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Application January 27, 1950, Serial No. 140,802

10 Claims. (Cl. 164—35)

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The present invention relates to a device for cutting fabric and more particularly to such a device for forming a longitudinal cut in a length of fabric along a line parallel with and closely adjacent to a row of pile loops or tufts or the edge of a pattern formed in such fabric as by printing, embossing, weaving or carving.

The embodiment of the invention chosen for illustration herein is particularly useful in connection with trimming the selvage edges from a pile fabric such as carpet of the type commonly referred to as broadloom carpet, although it will be recognized that this particular embodiment of the device has great utility with other forms of carpet as well as with other forms of fabrics where it might be desired to trim the selvage or otherwise form a longitudinal cut along a line which is parallel with a row of pile loops or with the edge of a pattern formed in relief thereon.

It is well known that no matter how carefully a pile fabric is woven the rows of pile loops will not form perfectly straight lines. Variations from true linearity will usually take the form of irregularly spaced waves. The usual method of trimming the selvage involves the use of a slitter roll and rotary blades cooperating therewith. Such equipment inherently produces a cut along a perfectly straight line which frequently cuts diagonally across a row of loops. While this may not matter particularly when stitched seams are to be formed in the ordinary manner, it has been found impossible to conceal a cut across a row of loops when it is attempted to form an invisible seam.

Carpeting is now being produced which has permanently secured to the back thereof a backing or cushion formed of sponge rubber which may vary in thickness from about ⅛" to ¼" or more. It has been observed that with carpeting of this type it is possible to form invisible or substantially invisible seams between adjacent strips if the edges of such adjacent strips have been cut along a line which precisely follows the row of pile loops or tufts adjacent the line of cut. Two strips of rubber backed carpet cut in this fashion may be laid side by said and a strip of tape may be cemented to the surfaces of the rubber backing adjacent the seam to join the pieces of carpet. Since the rubber backing insures against creeping of the carpet after it is laid, such a seam will remain invisible or substantially invisible throughout the life of the carpet.

To secure the result just described, it is apparent that apparatus must be provided which will insure the cutting of the carpet along a line which is parallel with and uniformly spaced from the row of pile loops which lies along the cut edge. Usually two or three rows of loops will be cut off along with the selvage and the cut may be made midway between two adjacent rows. If so desired the cut may be formed slightly closer to the row which remains on the piece to be used to compensate for failure to bring the cut edges into precise abutting relation when the seam is formed.

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The embodiment of the invention chosen for illustration herein comprises a bed of width suitable for the width of carpet which is to be cut or trimmed and a pair of band saws on opposite sides of the bed each with a device for guiding the blade so that it will follow the contour of a row of pile loops. The exposed or operative portions of the band saw blades are arranged substantially perpendicularly to the surface of the bed and suitable apparatus is provided for moving the carpet along the bed in a direction generally parallel with the rows of pile loops therein.

The blade guiding device for each of the band saw blades is strung on the blade and is of such shape and size as to rest upon the ground of the carpet and to ride snugly in the furrow between adjacent rows of pile loops. The band saws are so arranged that the blades move vertically through the guides while performing the cutting operation. Since the band saw blades are inherently flexible they may be moved transversely by the guides as they follow the furrows through such deviations from perfect linearity as are normally encountered. If so desired, a scale and pointer may be associated with one or both of the guides to indicate the degree of displacement of the blade from its normal position. Obviously the particular apparatus shown may be used to form one or more cuts in many forms of material having a relief design which it is desired to follow. Furthermore the principle of flexing a band saw blade by moving a floating guide through which the blade is strung may be adapted to other uses wherein it is desired to form a cut of somewhat irregular contour in any material.

The object of the invention is to provide apparatus for cutting material along a line of irregular or other desired contour. Other and further objects will become apparent from a consideration of the following detailed description of a preferred but not necessarily the only

form of the invention taken in connection with the drawings accompanying and forming a part of this specification.

In the drawings:

Fig. 1 is a longitudinal sectional view of a machine embodying the present invention;

Fig. 2 is a diagrammatic transverse vertical sectional view of the cutting devices and supporting bed of the machine taken on the line 2—2 of Fig. 1;

Fig. 3 is an elevational view partly in section showing the blade guide and its supporting arm;

Fig. 4 is a section along the line 4—4 of Fig. 3;

Fig. 5 is a section along the line 5—5 of Fig. 4;

Fig. 6 is a bottom plan view of the blade guide as shown in Fig. 3.

Referring now to the drawings, there is shown a frame 10 which may be of any suitable length and provided with a cross rod 12 adapted to support a roll 14 of pile fabric such as rubber backed carpet 18. The frame 10 also may be provided with one or more guide rods 16 around which the carpet 18 may be guided as it is withdrawn from the roll 14. As shown in Fig. 1 the frame 10 is broken away so as to show the supporting and guiding means for a single roll 14. It will be understood that ordinarily two or more supporting and guiding means will be provided so that the cutting device may operate substantially continuously while the rolls are being changed. The frame 10 comprises vertically and horizontally spaced longitudinal members 20 which are connected by any suitable form of transverse members (not shown) to form a box-like structure only one side of which is shown in Fig. 1. The transverse width of the frame is such as to accommodate carpet of any particular width desired.

The frame 10 also supports a plurality of guide rods 24 which may be arranged in over and under relationship with the carpet. Each of the guide rods is equipped with flanges 26 at the opposite ends thereof for cooperation with the edges of the carpet to maintain it in a substantially true course of travel longitudinally of the frame 10.

The carpet 18 may be moved longitudinally of the frame 10 in any suitable manner as for example by feed rolls 28 which are rotated by any suitable means (not shown).

A bed 32 extends transversely of the frame 10 and may rest upon blocks 30 carried by the frame 10. The bed 32 is of such a width as to support the carpet throughout its width and the ends thereof may extend beyond the frame 10 so as to serve the function of saw tables for the band saws to be described hereinbelow.

As shown in Fig. 2 band saws 34 and 36 are positioned at the opposite ends of the bed 32. The band saws 34 and 36 may be of any conventional type so arranged that the blades 38 and 40 thereof move vertically through suitable openings 41 in the end portions of the bed 32 or in saw tables coplanar with the bed 32. The band saws 34 and 36 may be moved toward and from each other to vary the spacing between blades 38 and 40 by the operation of suitable adjusting screws 35 and 37.

As shown in said Fig. 2, the band saws 34 and 36 are so positioned as to cut relatively narrow selvage portions 42 and 44 from the opposite edges of the carpet 18. It will be understood that within the limitations of the throat depth of the particular band saws used, the width of the portions cut from the carpet may be varied at will. It also will be apparent that in the event it is not desired to trim both edges of the carpet either of the band saws 34 or 36 may be omitted or disabled if so desired.

Referring now to Fig. 1, the band saw 36 is provided with a bracket 46 rigidly secured to the upper blade guard or other immovable part as by bolts 48. The bracket 46 is provided near its free end with a vertically disposed opening to slidably receive a rod 50 which extends vertically downwardly of the bracket and may be held in adjusted position by means of a set screw 52 carried by the bracket 46. At its lower end the rod 50 supports an arm 54 which carries the blade guiding mechanism 56 to be described in detail hereinbelow. The blade guiding mechanism 56 is arranged to receive the blade 40 and to deflect it transversely of the carpet 18 in response to deviations which may occur in the rows of pile loops adjacent which a cut is to be made.

Referring now to Figs. 3, 4 and 5, it will be observed that the rod 50 is arranged to support the arm 54 for free pivotal movement in a plane parallel with the bed 32. To this end the arm 54 is provided with an enlarged hub 62 in which is located a bushing 64 and a set of roller bearings 66 which surround the rod 50. A retaining washer 68 is secured by a screw 70 to the lower end of the rod 50 to support the arm 54.

At its free end the arm 54 has an enlarged hub 72 within which is carried a bushing 74 and a set of roller bearings 76. A hollow tubular sleeve 78 is received in the roller bearings and is free for vertical motion therein as well as for angular motion relative to the arm 54. The sleeve 78 is provided with a set collar 80 which may be adjustably secured thereto by means of a set screw 82 and which serves to limit vertical movement of the sleeve 78 relative to the hub 72. At its lower end the sleeve 78 carries the blade guide generally indicated at 56. It will be recognized that the construction just described provides a support for the blade guide 56 whereby it may move laterally in accordance with the contour of the rows of pile loops in the carpet 18 and vertically to accommodate carpet or fabrics of various thicknesses.

In the detailed views, Figs. 4, 5 and 6 through 10, it will be observed that the blade guide 56 comprises a slotted block which is secured as by welding to the lower end of the sleeve 78. The guide may be machined from a single piece of metal as illustrated or may be assembled from separate parts if so desired. The guide 56 as shown comprises a rectangular upper portion 84 of sufficient width and length to be securely fastened, as by welding 88, diametrically across the lower end of sleeve 78. The ends of portion 84 extend beyond the sleeve 78 to provide convenient handles for manipulation of the guide when necessary and to limit upward movement of the guide 56 relative to the arm 54. The lower portion 90 of the guide 56 is machined to a width, as viewed in Fig. 4, such as to be snugly received between adjacent rows of pile loops in the particular pile fabric for which the guide is designed. It will be noted that the lower corners are preferably rounded as at 92 and also that the entering end 94 is rounded to facilitate relative movement thereof in the furrow between adjacent rows of pile loops. The lower face of the portion 90 is preferably tapered, as indicated in Figs. 1 and 3, toward the entering end to further facilitate such movement.

The guide 56 has a slot 96 formed therein which

extends vertically from the lower face of portion 90 through the upper surface of the portion 84 and opens into the hollow of the sleeve 78. The band saw blade is passed through the sleeve 78 and through the slot 96 of the guide 56 as clearly shown in Figs. 3 and 4 for example. The slot 96 is of a width, as viewed in Fig. 4, such as to receive the band saw blade snugly but without binding. As shown in the drawings the slot 96 is on the vertical center of the guide 56 and will thus cause the blade to cut the carpet in the center of a furrow. If the slot is offset slightly the blade may be caused to cut off the center of a furrow if so desired.

It will be understood that the structure just described is provided on both of the band saws 34 and 36 so that the blades 38 and 40 may be displaced laterally in either direction by the guides 56 in accordance with the contour of the furrows in which the guides are riding. Since the guides are freely pivoted on the ends of the arms 54 there is no tendency for the guides to twist the blades in the course of such displacement. The blades 38 and 40 may be displaced from their normal positions for a considerable distance due to the flexibility of the blades and the characteristics of the blade tensioning mechanism (not shown) which forms a part of the usual band saw.

It is preferred to provide indicating means whereby an operator may determine when the blades 38 and 40 are in normal position. This is convenient when starting to slit a new roll of carpet. The indicating means also will enable enable the operator to make necessary corrections when it is indicated that the blades have been displaced an abnormal amount by some major deviation in the weave.

A simple and effective indicating means is disclosed in the drawings. In Figs. 1, 2 and 3 such means is shown on the band saw 36. It will be understood that the indicator may be positioned on either or both of the band saws as desired. Referring first to Fig. 3 a flange 57 is secured to the rod 50 just above the hub 62 of guide supporting arm 54. The flange 57 has secured thereto a scale plate 58 and a pivot pin 59 upon which is pivoted a pointer 60. The lower end of pointer 60 loosely engages a pin 61 secured to the hub 62. Angular movement of hub 62 incident to the movement of guide 56 will be transmitted to the pointer 60 causing it to move across the scale plate 58. As shown in Fig. 2 the scale plate 58 and pointer 60 may be positioned on one of the band saws in such a location as to be visible from the end of the machine where the supply roll 14 is located. The scale plate 58 may be graduated or not as desired and the parts should be so adjusted that the pointer 60 stands vertically when the band saw blade is in its normal position.

The operation of the device will now be described with particular reference to Figs. 3 and 5. In said Figs. 3 and 5 the pile fabric 18 is shown as a carpet comprising a ground material 100 made up of suitable warp and weft threads. The ground material 100 is permanently bonded to a backing 102 preferably made of sponge rubber. The pile comprises parallel rows of pile loops 104 which may cut or uncut as illustrated depending upon the particular type of fabric or carpeting. The device of the present invention will operate upon any fabric having clearly marked furrows between adjacent rows of pile loops or relief patterns or the like. As described above the blade guide 56 is so dimensioned as to ride snugly in the furrow between adjacent rows or patterns in the particular type of fabric being cut.

The blade guide 56 rests upon the ground material as a result of the weight of the parts. While the blade 38 or 40 may move in either direction it is preferred to move it downwardly through the guide 56 to assist in holding the guide against the carpet. Thus when the fabric 18 is moved in the direction of the arrow the blade guide 56 will remain in the furrow and will carry the blade laterally to conform with such variations in linearity as may exist in that particular furrow. After passing the blade 38 or 40 the usable portion of the carpet will present a vertically disposed cut edge 106 which is uniformly spaced from the adjacent row of loops throughout the length of the piece of carpet. As discussed above an edge cut in this manner may be abutted with a similarly cut edge and secured, as by cementing or taping, so as to form a substantially invisible seam in which the rows of pile loops at the joined edges are continuous and spaced from one another by substantially the same distance as all of the other rows in the carpet. Similarly, when the present embodiment or suitable modifications of the present invention are used to cut along the outline of a pattern formed in relief or otherwise upon a sheet material, the edges may be abutted with similarly cut edges to form seams which coincide with the contour of the pattern. Such seams will be much less prominent than any seams which might cut across the pattern.

Modifications and variations in detail may occur to those skilled in the art, and since the present disclosure is illustrative rather than limiting, it is intended that the invention shall include such modifications and variations as fall within the proper scope of the following claims.

We claim:

1. In a device for cutting sheet material, a bed, a band saw having a frame and a flexible blade disposed substantially at right angles to said bed, means for moving a length of sheet material along said bed in a substantially straight-line path of travel, a blade guiding device including a member having a slot therein through which said blade is freely threaded, and means for enabling said blade guiding device to move in directions generally transverse to the direction of movement of said sheet material to deflect said blade and cause said blade to cut said material along a line having portions which are not parallel with the path of travel of said sheet material relative to said bed.

2. In a device for cutting sheet material having a relief pattern thereon along a line parallel with an edge of said relief pattern, an elongated flexible cutting blade, means for moving said sheet material in a substantially straight-line path of travel, and a blade guiding device slidably carried by said blade and being movable with said blade transversely of the path of travel of said sheet material, said blade guiding device being adapted to rest upon the surface of said sheet material with an edge of said blade guiding device in contact with an edge of said relief pattern whereby to deflect said blade relative to said sheet material in accordance with variations in linearity of said edge of said relief pattern.

3. In a device for cutting pile fabric along a line parallel with a row of pile loops in said fabric, the combination of an elongated flexible cutting blade, means for moving a length of pile fabric in a direction generally parallel with the

rows of pile loops in said fabric and with the direction of cut of said blade, and a blade guiding device slidably carried by said blade and being movable with said blade transversely of the direction of movement of said pile fabric, said blade guiding device having an edge parallel with the direction of cut of said blade and being adapted to rest upon the ground of said fabric with said edge in contact with a row of pile loops whereby to deflect said blade in accordance with variations in linearity of said row of pile loops.

4. In a device for cutting pile fabric along a line parallel with a row of pile loops in said fabric, the combination of a band saw having a frame and an endless flexible cutting blade, means for moving a length of pile fabric in a direction generally parallel with the rows of pile loops in said fabric and with the direction of cut of said blade, and a blade guiding device slidably carried by said blade and being movable with said blade transversely of the direction of movement of said pile fabric, said blade guiding device having an edge parallel with the direction of cut of said blade and being adapted to rest upon the ground of said fabric with said edge in contact with a row of pile loops whereby to deflect said blade in accordance with variations in linearity of said row of pile loops.

5. In a device for cutting pile fabric along a line parallel with and between adjacent rows of pile loops in said fabric, the combination of an elongated flexible cutting blade, means for moving a length of pile fabric in a direction generally parallel with the rows of pile loops in said fabric and with the direction of cut of said blade, and a blade guiding device slidably carried by said blade and being movable with said blade transversely of the direction of movement of said pile fabric, said blade guiding device having spaced walls on opposite sides of said blade and being adapted to rest upon the ground of said fabric with said walls in engagement with adjacent rows of pile loops whereby to deflect said blade in accordance with variations in linearity of said rows of pile loops.

6. In a device for cutting pile fabric along a line between and parallel with adjacent rows of pile loops, the combination of a bed, a band saw having a frame and a flexible blade disposed substantially at right angles to said bed, means for moving a length of pile fabric along said bed in a direction generally parallel with the rows of pile loops in said fabric, and a blade guiding shoe having a slot therein for the passage of said blade and being movable with said blade transversely of the direction of movement of said pile fabric, said guiding shoe being elongated in the direction of cut of said blade and having a width crosswise of said blade such as to be received between adjacent rows of pile loops in said fabric.

7. In a device for cutting pile fabric along a line between and parallel with adjacent rows of pile loops, the combination of a bed, a band saw having a frame and a flexible blade disposed substantially at right angles to said bed, means for moving a length of pile fabric along said bed in a direction generally parallel with the rows of pile loops in said fabric, a blade guiding device through which said blade is threaded and having a portion adapted to rest upon the ground of said fabric between adjacent rows of loops, said blade guiding device being immovable relative to said blade in directions transverse of the line of cut thereof and being movable with said blade in said directions whereby to deflect said blade relatively to said frame in accordance with variations in linearity of the rows of loops between which said guiding device is received.

8. In a device for trimming the opposite edges of pile fabric along lines between and parallel with adjacent rows of pile loops, the combination of a bed, a band saw positioned at each end of said bed, each of said band saws having a flexible blade disposed substantially at right angles to said bed, means for moving a length of pile fabric along said bed in a direction generally parallel with the rows of pile loops in said fabric, and a blade guiding shoe slidably carried by the blade of each of said band saws and being movable with said blade transversely of the direction of movement of said pile fabric, said guiding shoes being elongated in the direction of cut of said blades and having a width crosswise of said blades such as to be received between adjacent rows of pile loops in said fabric.

9. In a device for cutting pile fabric along a line parallel with and between adjacent rows of pile loops in said fabric, the combination of a band saw having a frame and an endless flexible cutting blade, means for moving a length of pile fabric in a direction generally parallel with the rows of pile loops in said fabric and with the direction of cut of said blade, a blade guiding device slidably carried by said blade and being movable with said blade transversely of the direction of movement of said pile fabric, said blade guiding device having spaced walls on opposite sides of said blade, and being adapted to rest upon the ground of said fabric with said walls in engagement with adjacent rows of pile loops whereby to deflect said blade relative to said frame in accordance with variations in linearity of said rows of pile loops, and means for indicating the amount of deflection of said blade.

10. In a device for cutting pile fabric along a line between and parallel with adjacent rows of pile loops in said fabric, the combination of a bed, a band saw having a frame and a flexible blade disposed substantially at right angles to said bed, means for moving a length of pile fabric along said bed in a direction generally parallel with the rows of pile loops in said fabric, an arm freely pivoted upon the frame of said band saw for movement in a plane substantially parallel with the plane of said bed, and a blade guiding device freely pivoted on the free end of said arm having a slot for slidably receiving said blade, said blade guiding device having a portion elongated in the direction of cut of said blade and of a width crosswise of said blade such as to be received between adjacent rows of pile loops in said fabric, the slot in said blade guiding device extending through said elongated portion whereby said blade is caused to cut said fabric along a line between the rows of pile loops between which said elongated portion is received.

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