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Fonio

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[54] **CLAMP DEVICE FOR LAYING-UP MACHINES SUITABLE TO KEEP EACH LAYER OF FABRIC DURING ITS LAYING-UP**

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[52] **U.S. Cl.** **270/31**

[51] **Int. Cl.** **B65h 29/46**

[58] **Field of Search** 270/31, 30; 269/254

[56] **References Cited**

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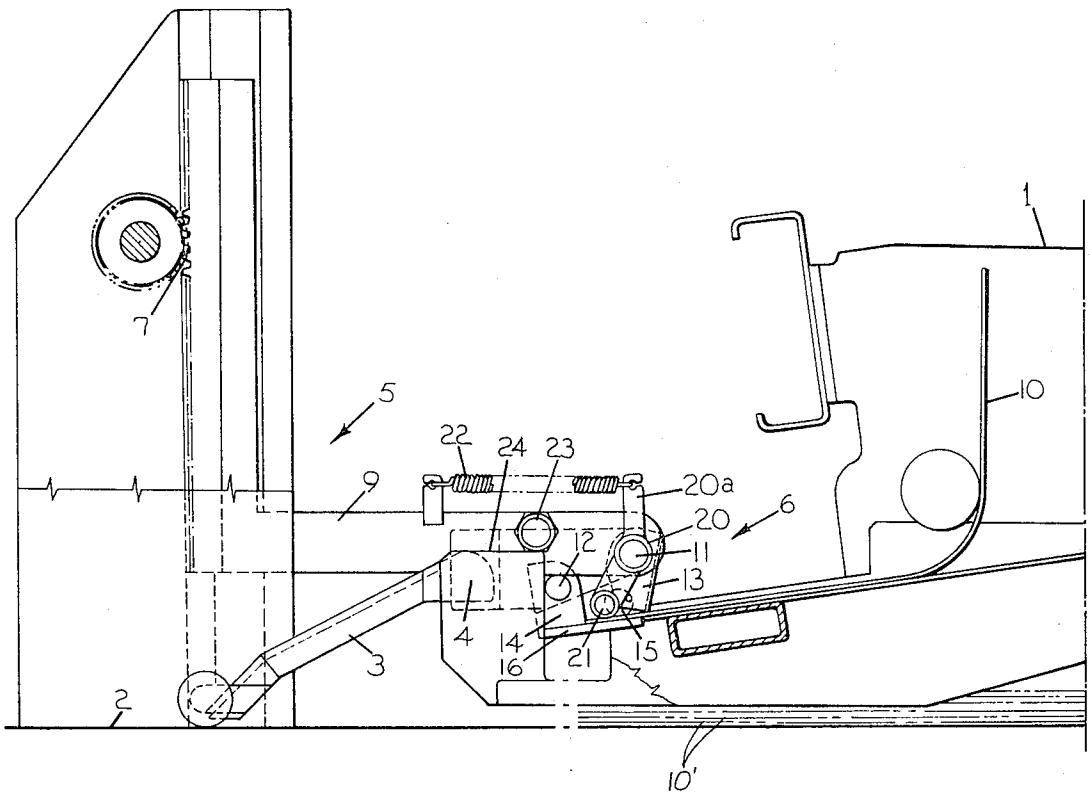
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[57] **ABSTRACT**

A clamp device for laying-up machines for gripping and holding the end of a source of fabric presented to it by the carriage of the machine and to hold the end of fabric while a predetermined amount has been withdrawn and cut and then release it for stacking on the machine's table prior to repeating the cycle.

4 Claims, 8 Drawing Figures



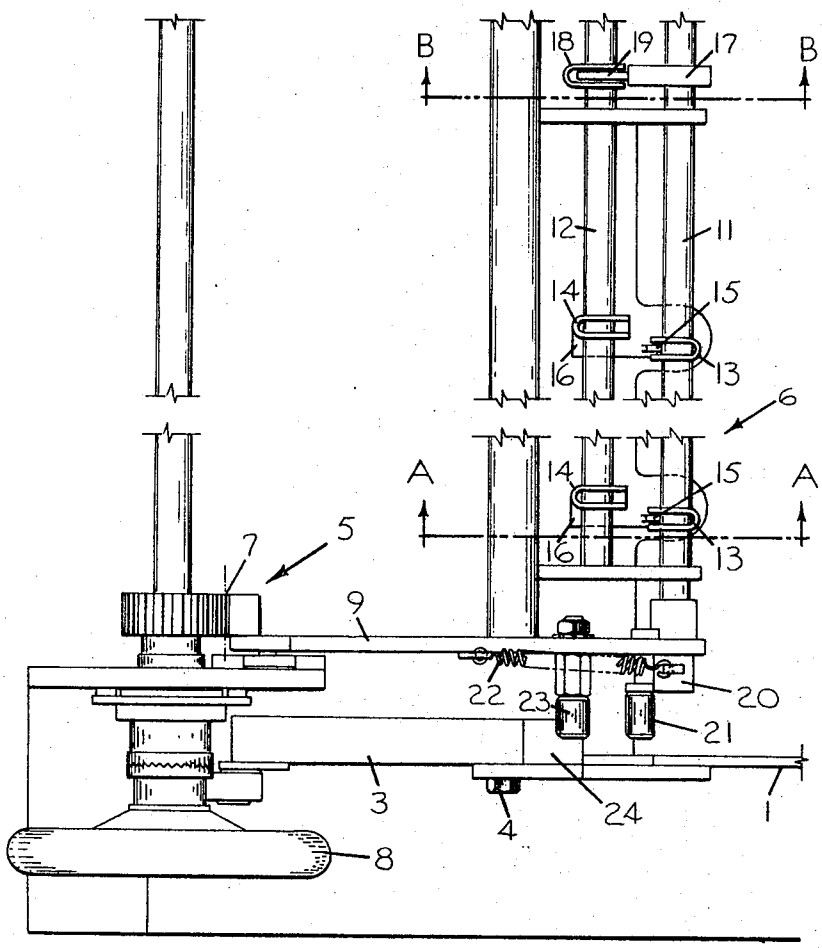


Fig. 1

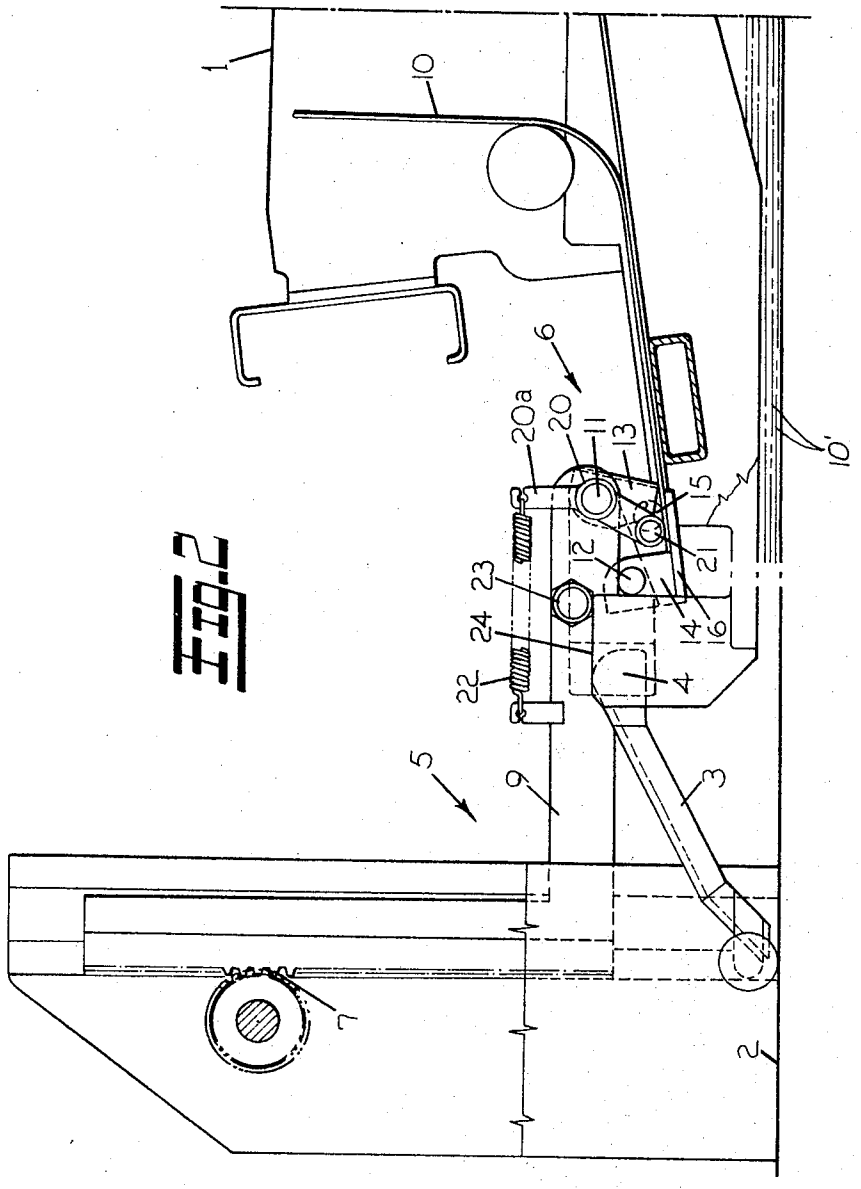


Fig. 2

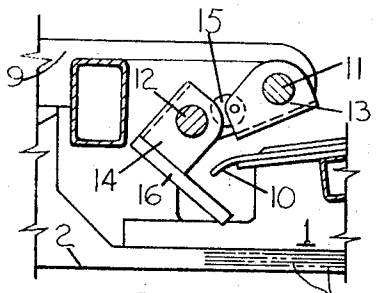


Fig. 3

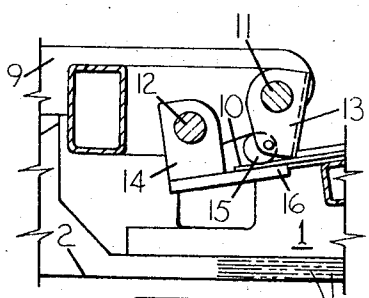


Fig. 6

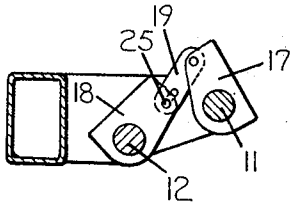


Fig. 4

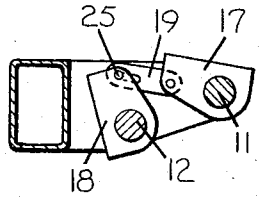


Fig. 7

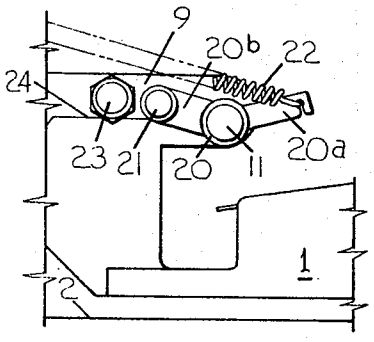


Fig. 5

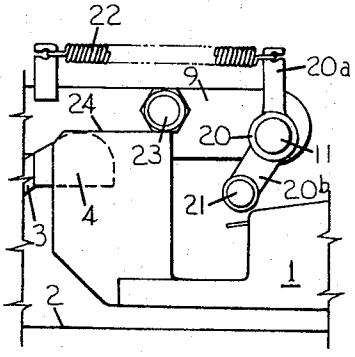


Fig. 8

CLAMP DEVICE FOR LAYING-UP MACHINES SUITABLE TO KEEP EACH LAYER OF FABRIC DURING ITS LAYING-UP

BACKGROUND OF THE INVENTION

The present invention is concerned with a clamp device for laying-up machines, suitable for holding each layer of fabric during the stretching process.

The clothing industry uses known laying-up or tentering machines which, running in two directions along a horizontal plane or table, cause the stretching on this plane of the fabric from a source of cloth wound up on a roll, forming in this way the so-called "padding" from which are subsequently obtained by cutting the known articles of clothing that are desired. These machines, running in both directions along the above-mentioned plane, cause successive layers of the fabric to be stretched as it moves forward and cut the end of the stretched piece of cloth upon the completion of the course in question.

It is also known that the successive layers of fabric must be placed on top of each other without straining or creasing and that the beginning and end of each layer must correspond perfectly to the end of the underlying layer so that the "padding" assumes a basically parallelepiped form. Towards this objective, the fabric is unwound from the feeding piece mounted on the machine by means of devices activated by the same mechanical devices which cause the machine to advance, so that there is a certain stretch of unwound fabric corresponding to a movement of the latter machine along the plane.

Nevertheless, it is known that the cloth cannot be tentered or stretched in a uniform manner, especially in the case of slippery fabrics which may be oriented in various directions during the unwinding of the feed roll, particularly due to the air cushion which forms beneath the same fabric layer. In order to avoid such disadvantages, which may result in a tier-like arrangement of the padding, rather than a vertical walled conformation, bars or fallers are used which are capable of holding the fabric at one end either due to their weight alone or due to the fact that they have a rough surface or are covered with numerous pins or teeth. No matter how they are constructed, these bars according to the known technique are able by their weight not only to hold the layer of fabric as it is being stretched, but also press down on the underlying layers causing a loss of shape due to compression at one end of the padding, which consequently progresses in an adequate manner — the upper layer having a greater development than the underlying layers. This loss of shape, which is all the more noticeable as the padding is higher and as the fabric is softer, results in upwardly increasing dimensions of the overlapping layers of fabric. This means, for example, that there may be a total or partial absence in the lower layers of that portion of fabric corresponding to the profile of a particular piece of clothing, traced on the upper layer of the padding by the subsequent execution of the cutting operation along its contour. As a result, there is an excessive consumption and wasting of material.

A device has now been conceived, constituting the subject of the present invention, consisting of a clamp apparatus suitable for eliminating the above-mentioned disadvantages of the bars according to the known technique for holding the fabric during stretching in a laying-up machine.

SUMMARY OF THE INVENTION

The device according to the present invention includes a clamp element which holds the fabric layer by layer during stretching, and is characterized by the fact that said clamp is lifted during each stretching operation by an amount such as to avoid any interference with the material already laid up, and equivalent to the degree to which the part of the carriage feeding the fabric is lifted in a known manner, whereby the activation of the said clamp element may be caused by the said part of the carriage near the end of its return course, thus releasing the end of the same fabric layer during the preceding course and thus holding the fabric end emerging from said part before the latter part initiates the new stretching operation.

An important characteristic of the clamp device according to the present invention is that it is activated by the same carriage when the emerging or feeding part of the fabric is near the end of the course from which the stretching of the fabric is initiated, the clamp device being mounted in correspondence with the fabric. This clamp device is first opened so as to release the layer of fabric already stretched and then closed on the strip projecting slightly from the feeding part of the carriage, with a degree of lifting movement equal to the degree to which the feeding part of the carriage has already been lifted, in order to be kept at a level with the latter, and proportional to the thickness of the fabric which is stretched.

Another important characteristic of the device according to the present invention consists in the fact that not only does this apparatus not affect the underlying layers of fabric already stretched, but it only holds the layer during stretching without having a pulling effect on the fabric, which is consequently laid up freely without being exposed to undue stress.

These and other characteristics of the clamp device according to the present invention will be obvious to those conversant in the art upon reading the following detailed description of one exemplified embodiment, given by way of unlimited example, and referring to the attached drawings in which:

FIG. 1 represents a partial and schematic plan view from above of the device according to the present invention;

FIG. 2 represents a side view of the end of the device according to the present invention corresponding to FIG. 1;

FIG. 3 represents a sectional view along line A—A of FIG. 1 shown with the clamp device in the open position;

FIG. 4 represents a sectional view along line B—B of FIG. 1 in the open position;

FIG. 5 represents a detail of FIG. 2 in the open position corresponding to FIGS. 3 and 4;

FIG. 6 represents the same view in section of FIG. 3, showing the clamp device in the closed position;

FIG. 7 represents the same view in section of FIG. 4, in the closed position; and

FIG. 8 represents the same detail as in FIG. 5, in the closed position corresponding to FIGS. 6 and 7.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to the drawings, **1** indicates the carriage of the laying-up machine which is capable of sliding in two directions along a plane or table **2**, and more precisely that part of the carriage which feeds fabric **10** emerging for the stretching or laying-up operation, unwound from one or more feed rolls not shown. Carriage **1** is provided with a rotatable inclined arm **3**, pivotable on a hinged clasp **4**, whose purpose is to cause the clamp carrying group **5** to rise by the required amount and to effect the opening of clamp **6**. The clamp carrying group **5** is provided with a rack system **7**, represented schematically in FIGS. **1** and **2**, having an arm **9** which supports and effects the raising of clamp **6**. This rack system is provided with a known friction which permits the clamp group to move away and with a free wheel **8** which permits the clamp group to be manually lifted and lowered.

As may be seen in the figures and in particular in FIG. **1**, the clamp consists of two shafts **11** and **12** on which are fixed pairs of clasps **13** and **14** provided with clamp elements preferably including a knurled roller **15** pivotable eccentrically and a bracket element **16**, respectively, capable of gripping the layer of fabric between them as represented in FIG. **6**. The two shafts **11** and **12** are connected to each other mechanically by at least one pair of levers **17** and **18** respectively fixed on shaft **11** and shaft **12**, which are joined by a small cross-bar **19** so that corresponding to a clockwise or counterclockwise rotation of one of the two shafts there is a rotation in the same direction of the other shaft.

One of the two shafts, and precisely that indicated by **11** in the drawings, has a two-armed lever **20** fitted flush with one end and is provided with a roller **21** on the end of one of its arms which is identified by **20***b*. This roller is capable of coming into contact with the rotating arm **3** with the end of the other arm identified by **20***a* being connected to one end of a return spring **22** and the opposite end of said spring being anchored to a fixed point on arm **9** and adapted to urge the above-mentioned clasps closed against each other. Parallel to roller **21** and in a slightly higher position with respect thereto is a roller **23**, free to rotate on its axis, and supported by the clamp carrying group **5**. As will be more fully explained below, rotating arm **3**, besides coming into contact with roller **21**, will also after a slight delay encounter roller on the upper surface of said arm **3** which is basically horizontal and indicated by **24** in FIG. **2** and will cause the entire clamp carrying group **5** to be lifted. Actually, there is a second roller and a second arm **3**, not represented in the figure, at the other end of the clamp unit **6**.

Near the end of the return course of the carriage that is just before carriage **1** finishes its run empty after having deposited and cut a layer of fabric, arm **3** comes into contact first with roller **21** of lever **20** causing it to rotate upwards and thus effecting a clockwise rotation of the same against the action of spring **22**. When roller **21** reaches a position corresponding to the upper surface **24** of inclined arm **3**, lever **20** is found in the position indicated in FIG. **5** and has caused the clockwise rotation of shaft **11** on which lever **17** is carried and in turn by means of cross-bar **19** transmits the clockwise rotation to lever **18** and consequently to shaft **12**. The rotation in the same direction (clockwise) of both shafts **11** and **12** causes clasps **13** and **14** carried on these shafts to rotate in a clockwise direction from their closed position. Since the centers of rotation of the two clasps, coinciding with the axes of the two shafts **11** and **12** are external with respect to their contact point in closed position, rotation in the same direction results in a movement of the clasps so that roller **15** of one clasp and bracket element **16** of the other clasp move away from each other, freeing the end of the layer of fabric already stretched during the preceding run of the carriage (FIG. **3**).

After each layer of fabric is stretched and then released from the grip of the clasps **13** and **14** they assume a stacked position on the table **2** and are shown by phantom lines identified in FIGS. **2**, **3** and **6** by numeral **10'**.

Inclined arm **3** subsequently comes into contact with roller **23**, which is, as was previously indicated, is in a higher position than roller **21** in the normal position of lever **21**. Since the axis of roller **23** around which it may rotate is integral with arm **9** supporting clamp group **6**, the latter group is lifted until the upper surface **24** of arm **3** does not correspond to roller **23**, where it remains to the end of the return course of the carriage.

Meanwhile, just before the carriage reaches the end of its course, roller **21** falls from upper surface **24** and spring **22** abruptly pulls back lever **20** into the position indicated in FIGS. **2** and **8**, causing in this way a counterclockwise rotation of shaft **11** and, through the kinematic system described previously, also of shaft **12**. In this way, clasps **13** and **14** of each pair are exposed to a counterclockwise rotation so that the knurled roller **15** of clasp **13** is lowered and the bracket element **16** of clasp **14** is raised so as to come into contact and lock between them the end of fabric **10** slightly projecting from the fabric feed portion of the carriage **1**. It should be noted that roller **15** is knurled in order to improve the grip on the fabric and is mounted eccentrically in order to promote the tightening against the bracket **16** of the lower clasp. The presence of the roller substitutes for the adjustment between the clasps which would be necessary due to the possible variations in the thickness of the fabric. Furthermore, cross-bar **19**, although it is simply fastened to lever **17**, also preferably has a translating movement with respect to lever **18**, pivoting in a seat in the form of an elongated eye **25** (FIGS. **4** and **7**). It follows that shaft **11** and consequently clasp **13** produce a rotation of greater amplitude than that caused by shaft **12** and therefore by clasp **14**. This permits the upper clasp **13** to have an amplitude of rotation greater than that of the lower clasp **14** and, because of the eccentricity of knurled roller **15**, consistently urged downwardly by spring **22**, there is a tighter grip on the fabric against bracket **16** of lower clasp **14**, such that in the event that the layer of fabric may exert a pulling action on the clamp during the stretching operation, the roller would be made to rotate around its axis so as to tightly squeeze the same fabric against bracket **16** of clasp **14**. This is also due to the particular reciprocal position of the two clasps which both tend to rotate in a counterclockwise direction, and therefore in the direction of closing, under the effect of a possible pulling by the fabric.

As is obvious from the preceding description, the clamp carrying group **5** is lifted by the carriage, before the carriage reaches the end of the course, by means of inclined arms **3** as was explained in the preceding ex-

ample, being supported on these arms by means of rollers **23**, and subsequently said rack device **7** acts to keep the clamp carrying group at the height reached corresponding to the upper surface **24** of inclined arm **3**. At the beginning of the next feed course, arms **3** may easily overcome levers **20** in that, since they are rotating, they are first lifted by roller **21** reducing their inclination, and they are subsequently lowered without interfering with the motion of the carriage. By means of known devices, during each forward run, lifting takes place of the same portion of the carriage **1** which is preferably proportional to the thickness of the fabric and which serves to prevent any interference between the fabric and parts of the carriage. It is therefore obvious that the feed portion of the carriage **1** is lifted at the beginning of each return course towards the clamp under the action of the above-mentioned known devices, not represented on the drawings. The clamp carrying group is in turn lifted by the same portion of the carriage **1**, as said previously, towards the end of the return course of the latter, so that it moves higher along rack **7**, which then holds it in this position by its friction when the clamp apparatus is no longer supported by the carriage through roller **23**.

Further additions and/or modifications may also be made in the above-described and illustrated exemplified embodiment of the clamp device according to the present invention without exceeding the boundaries of the invention. In particular, a different form may be provided for the clasps capable of squeezing the fabric between them and a different system may be provided for activating the same clamp device corresponding to the end of the carriage course.

I claim:

1. In a fabric laying-up machine of the type having a supporting table and a carriage with a fabric supply movable to and fro on the table for tentering and cutting successive layers of fabric of pre-determined length on the table, a fabric clamping device comprising:

a. clamping means adjacent one end of the table for receiving the end of a supply of fabric presented by the carriage including separately mounted cooperating series of clasps with means mechanically linking said clasps one to the other;

b. means movable with the carriage to effect actuation of said clamping means;

c. operating means operatively associated with one series of said clasps and with said actuating means to effect gripping and release of each layer of fabric; and

d. means included with said clamping means to be operatively contacted by said actuating means to cause raising of the clamping means during the tentering of a layer of fabric an amount preventing interference of each new layer with the previous tentered layer of fabric.

2. The fabric clamp device according to claim **1** wherein said series of clasps are carried on adjacent parallel shafts and said operating means defines a two-armed lever operatively connected to one of said shafts.

3. The fabric clamp device according to claim **2** wherein said two-armed lever includes a roller carried on one arm thereof and disposed for engagement with said actuating means.

4. The fabric clamp device according to claim **3** wherein said two-armed lever includes a biasing means connected therewith for continually urging said series of clasps in a direction to effect gripping of the fabric.

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