To all whom it may concern:

Be it known that I, MALCOLM G. CHACE, a citizen of the United States, residing at 788 Broad street, Central Falls, in the county of Providence and State of Rhode Island, have invented a new and useful Improvement in Means for Cutting Corduroy Cloth, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

The races of corduroy cloth are now cut separately by means of a sharp cutting knife or blade operated by hand, and this calls for very skilled labor and is a fine and delicate operation on account of the necessity for cutting the cloth over the race which forms the pile at its center, there being great liability of the blade being deflected in the cutting up or down, and thereby either injuring the cloth or making an uneven pile.

In practicing my invention I weave into the races of the cloth by means of an additional heddle strands of small-gaged wire, preferably one in each race and as though the wires were warp-threads—that is, like warp-threads they will extend lengthwise the finished fabric to any extent desired, but unlike the warp-threads they will be held in the races and not woven with the weft-threads. The wires thus woven into the fabric are free to be withdrawn from the races, not being held in them by appreciable friction. These wires, as I have said, may be woven throughout the length of the cloth, in which case they will feed with the cloth as it is being made and will be rolled on the cloth-roll and must possess sufficient ductility to conform to the curve of the roll, or they may be held stationary during the act of weaving the cloth.

The first-named way I practice when the cutting is done off the loom and after the cloth is finished and the second when the cutting is done on the loom, and I will describe the latter method first.

The weaving of the wires into the cloth is a simple operation which involves the addition to the corduroy-loom of an extra heddle suitably timed and an extra whip-roll. This is true whether the wires are woven for the entire length of the cloth and therefore movable with it or are held stationary. At the ends of the stationary wires, preferably over the breast-beam, I have arranged a series or line of cloth-cutters, one for each race, and which cutters are connected with the wires and may be in whole or part held thereby against the draft of the cloth as it is being wound on the cloth-roll, although I prefer that the cutters be supported by a brace which will relieve the wires substantially of said draft. The purpose of the wires is to direct and guide the feeding of each race to its cutter, so that the race shall be properly and accurately presented to the cutter, for it is upon this accuracy of presentation that the value of the invention largely depends.

Any suitable type of cutter may be used. It may be a stationary blade or it may be a rotary one, and its edge may be straight or serrated. I have represented a rotary cutter with a continuous edge, one for each race. It is mounted upon a shaft to be positively turned by it and is held by a holder or carrier which has a long tapering foot substantially level on its under side, inclined upon its upper surface, provided with a slot extending from near the back forward, and in which the edge of the cutter turns. The nose or forward end of the foot extends into the race and serves to set or govern the position of the cutter by the race of the cloth. It will be understood that the cutters and their holders are free on the shaft to move lengthwise it slightly in order that they may automatically adjust themselves to the races in the cloth, which sometimes vary in spacing with relation to each other. The end of the foot which enters the race is preferably tapered on all sides and has practically a pointed end, and the wire is attached to the end in any desired way, preferably by means of a loop, as it permits universal play of the point with respect to the wire and also provides a desirable union between the wire and the point. As it is desirable to change slightly the direction of the point of the foot in order that it may be as nearly central in the race as possible, I have provided means for adjusting its position up and down, it being understood that the race governs its lateral position, and the means which I use for so adjusting the feet may also be used for supporting the knife-holders against the draft or pull on the cloth.
in the cutting, and thus relieve the race-wires from strain.

It will be understood that with the organization I have been describing the cutters are positively and automatically operated and are held substantially stationary and that the cloth is cut by being drawn by the cloth-roll past the cutters.

I will now describe the invention more in detail in connection with the accompanying drawings, wherein—

Figure 1 is a view in plan of sufficient parts of the loom to show the application of my invention to it. Fig. 2 is a view principally in vertical section, somewhat enlarged, to further illustrate the same. Fig. 3 is a view, enlarged, of one of the cutters, its holder, and a wire attached to it. Fig. 4 is a view upon the dotted line 4 4 of Fig. 3. Fig. 5 represents the cloth before the loops are cut, and Fig. 6 after they are cut. Fig. 7 represents a single guiding-wire, cutter, and cutter-holder. Fig. 8 is a view representing one method of providing the shaft carrying the cutters and cutter-holders with vertical adjustment.

Referring to the drawings, A represents the cloth-roll of a loom; B, the breast-beam thereof; C C', the usual harnesses of a corduroy-loom in a conventional way; D, the whip-roll, and E the warp-beam. These are of the usual structure of a loom and are operated in the usual manner for making corduroy cloth. There is mounted upon the loom in addition a means for weaving the wires A' into the races of the corduroy as the cloth is being made and for cutting the cloth. The wire-weaving mechanism is adapted to either weave the wire for the entire length of the piece of cloth, in which case the cloth-cutters are not mounted on the loom, or it may weave the wire for a short length of cloth only and then become stationary with respect to the feeding of the wire, and this is the way the wire-weaving mechanism is used when the cloth is cut in the loom.

There is no difference in the mechanism whether the wires be continuously fed or started a short distance and then held, and to thus weave the wire the loom is provided with a wire whip-roll F, a wire harness G, and appropriate means for timing its reciprocation to cause the wires to be woven into the races of the cloth. The wires may extend from separate wire-holders of any desired kind.

They enter the races b of the cloth H at the fell and extend through the races to the points m of the cutter-holders M. The cutter-holders are mounted upon the shaft m', which preferably is arranged above the breast-beam and is supported upon the frame of the loom in a manner to be vertically adjustable. Any desirable means may be used for providing the shaft, cutters, and holders with the slight vertical adjustment necessary, and I have represented one means in Fig. 8, where one end of the shaft is represented as mounted upon a slide g which slides in a bracket q', fast to the beam. The bracket carries the adjusting-screw q'', which engages a nut q', carried by the slide. The end of the shaft not shown is supported by a similar slide adjustable in the same way. It is also positively turned by any suitable power, taken preferably from the loom. The knife-holder has two ears m'' m''' through holes in which the shaft extends, the fit being loose enough to permit a slight lateral movement of the holder, together with the cutter, in the adjustment of the holder and cutter by the race. The cutter m'' is keyed to the shaft between the ears m'' m''' and is loose enough on the key to be movable with the knife-holder slightly. The knife-holder has the long foot m'', which is level upon its under surface excepting at its end m, where it is drawn into a thin tapering point. The foot also has a slot m', into which the cutting edge of the cutter extends, and the cloth is cut at the intersection of the upper surface of the foot and the cutting edge of the cutter at the point m'. I prefer to use a cutter with a continual outer cutting edge so that it may not extend below the lower surface of the foot and cut the base-section of the cloth. This I accomplish by providing the cutter with the obtuse beveled surfaces m'' m''' which provides a section of the cutter wider than the width of the slot m' at a point with respect to the cutting edge m'' narrower than the depth of the slot, so that the cutting edge is positively held by the upper corners of the foot at the slot and by its beveled surfaces from extending below the lower surface of the foot and injuring the base of the cloth. It is desirable that cutters having this shape of cutting edge be revolved very fast.

The wires are connected with the points of the knife-holders by the loops n, the loop being formed at the end of each wire by turning the end of the wire back upon itself, by soldering, or by electrically brazing the end to the main length, the wire passing through the small hole n' in the point m.

To adjust the points m of the feet of the holders vertically, I use an adjusting-bar O which engages the knife-carriers and which is vertically adjustable to move the knife-carriers on the shaft sufficiently to change the vertical position of the points. Of course it will be understood that this change in the position of the points is a very slight one; but still I consider it as quite necessary that some means be used for so adjusting them.

The engagement between the adjusting-bar and the knife-carriers I have represented as provided by means of the horizontal bolts o. The adjusting-bar is mounted on the loom-frame to be vertically adjustable thereon by means of suitable screws or adjusting devices, and by being moved or adjusted upward or downward it simultaneously adjusts the vertical position of the points m. It also serves to hold the knife-holders and knives against the draft of the cloth-roll A, which is constantly and slowly drawing the cloth against
the feet of the knife-holders and the cutters, and thus relieves the race-wires from any considerable strain in the nature of a pulling or drawing action upon them.

I have represented the knife-holder and the knives as mounted on one shaft. This brings them closely together and requires the use of thin knife-holders, and it is not necessary to mount them all on one shaft, as they can be arranged in two or three groups—one in advance of the other—or "staggered," as it is sometimes termed.

In operation the race-wires are woven into the races of the cloth as the cloth is woven, and as the cloth is drawn past the cutters the loops which form the races are cut to form the pile or finish required, so that the cloth as it is wound on the cloth-roll is completed so far as the cutting of the loops is concerned.

When the cutters are not attached to the loom or operated on the loom, the cloth, with the wires woven into the races, is mounted on a mechanism similar to the loom mechanism, with the exception that it will contain no weaving devices and run from a feed-roll to a drawing-roll past the cutters attached to the wires, or the cutters can be drawn by the wires aided or not by accessory drawing or pushing devices, while the cloth may remain stationary.

I do not confine myself to the form of cutter shown and may use a stationary one or a reciprocating one or a shearing one in lieu of the rotary one shown. As there may be a tendency for the threads not to weave together uniformly at the fell on account of the introduction of the race-wires and their tendency, because of their stiffness, to lift or lower the cloth at that point, I have mounted upon the loom a felling-point, which consists of two bars, one above the cloth and one below it, separated by a space equal to the thickness of the cloth and attached at their ends to the loom-frame and one of which may be adjustable with respect to the other. This determines the line of the fell and causes the wire to conform to the cloth from that line on.

The throat is lettered P and the cross-bars which form it p p.

The points n of the cutter-holders are not only made adjustable, as above described, but they are also slightly flexible and to a sufficient degree conform automatically to the races of the fabric while it is being fed to them, while they at the same time bear a permanent relation to the cutting edge of the cutter, so that while they possess some freedom of adjustment to the races they still serve to guide the fabric to the cutters and without cramping them with respect to each other the cutters. The cutters are guarded by their own bevels or shoulders, which extend over the guarding parts of the holder upon one or both sides and prevent the cutting edge of the cutters from extending below the feet, and thus injuring the portion of the fabric which passes beneath the feet as the races are being cut.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States—

1. A cutting device for cutting the loop-threads of corduroy or similar fabrics, comprising a cutter-holder having a forward-extended pointed foot adapted to extend into the race of the cloth, a slot or recess in the upper surface of the foot and a rotary cutter mounted in said holder, having a cutting edge extending into said slot or recess formed by bevels which extend from the cutting edge over the foot on each side of the slot or recess whereby they serve in conjunction with the foot as guards to the cutting edge of the cutter.

2. In a device for cutting loop-threads of corduroy or similar fabrics, a rotary shaft, cutter-holders mounted on said shaft having a forward-extended pointed foot to enter the race of the cloth and rotary cutters mounted on said shaft.

3. In a device for cutting the loop-threads of corduroy or similar fabrics, a rotary shaft, feet mounted on said shaft, each having forward-extended pointed ends and cutter-guards, and rotary cutters on said shaft.

4. In a device for cutting the loop-threads of corduroy or similar fabrics, cutter-holders mounted on a rotary shaft having forward-extended pointed feet and cutter-guards, the rotary cutters and means for adjusting the cutter-holders.

5. In a device for cutting the loop-threads of corduroy or similar fabrics, cutter-holders mounted on a rotary shaft, having forward-extended feet and cutter-guards, rotary cutters mounted upon the shaft and means for adjusting the shaft, cutters and cutter-holders vertically, simultaneously.

6. In a device for cutting the loop-threads of corduroy or similar fabrics, a rotary cutter, a cutter-guard, having a forward-extended foot to enter the race, the foot being shaped and hung to guide the fabric to the cutter and the cutter-guard, and the cutter and cutter-guard being shaped to prevent the cutting edge of the cutter from injuring the portion of the fabric passing beneath the guard.

MALCOM G. CHACE.

In presence of—
J. M. DOLAN,
F. P. RAYMOND, 2d.