Oct. 4, 1932. C. G. RICHARDSON 1,880,488

LOOP CUTTER

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Fig. 1.

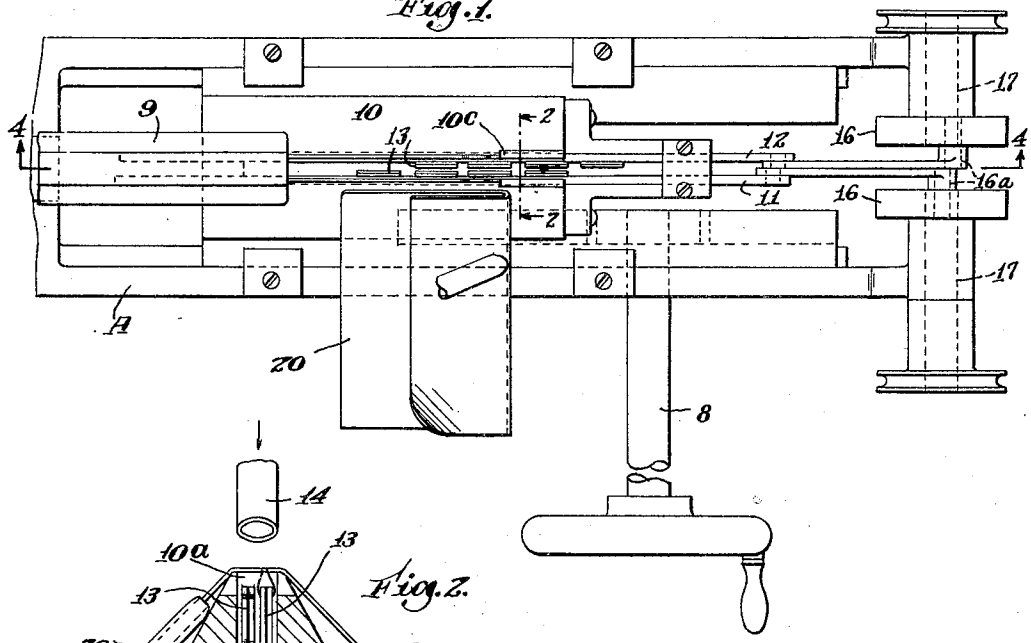


Fig. 2.

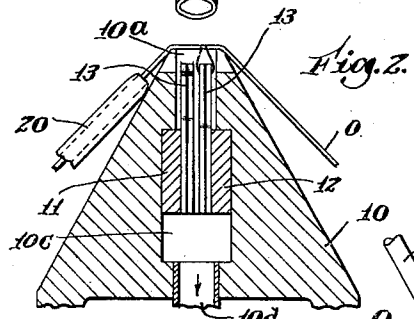


Fig. 3.

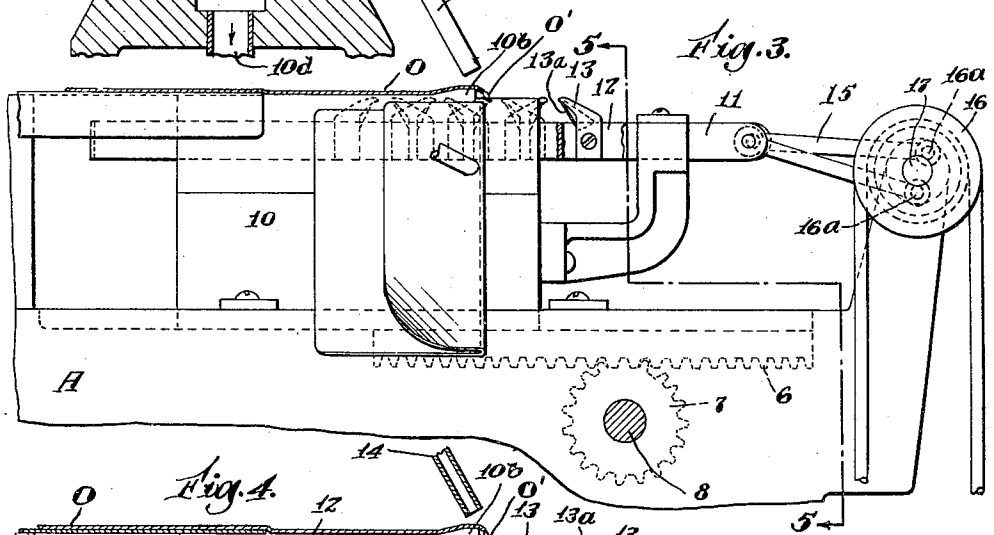
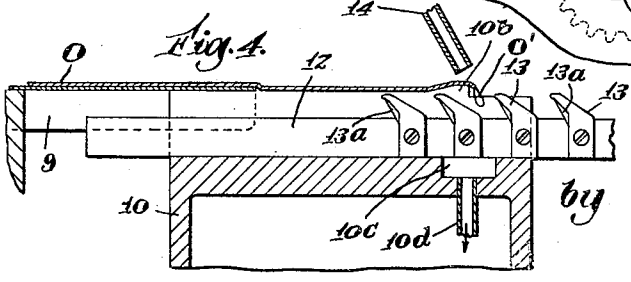


Fig. 4.



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LOOP CUTTER

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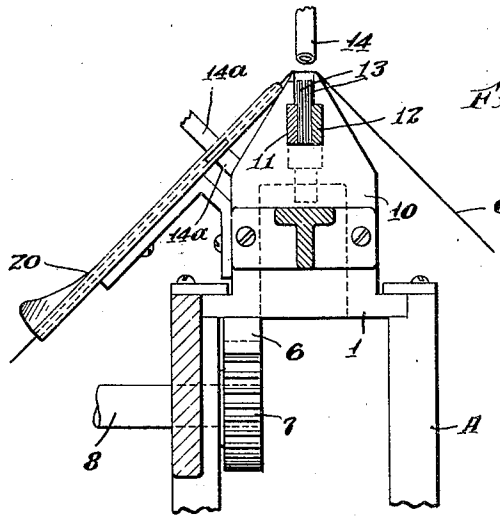


Fig. 5.

Fig. 6.

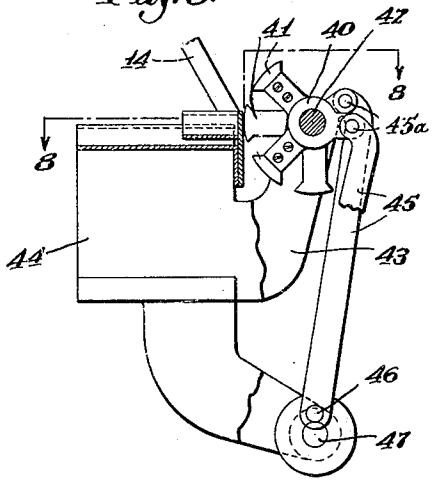
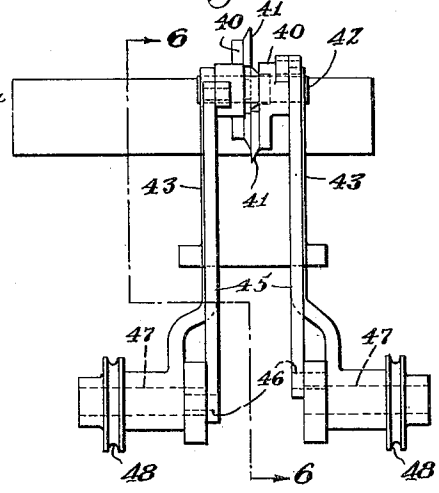


Fig. 7.



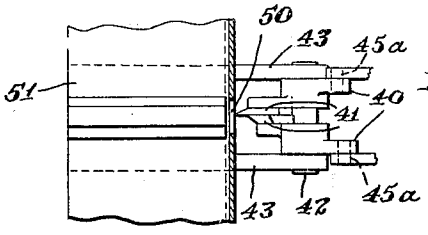


Fig. 8.

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LOOP CUTTER

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Fig. 9.

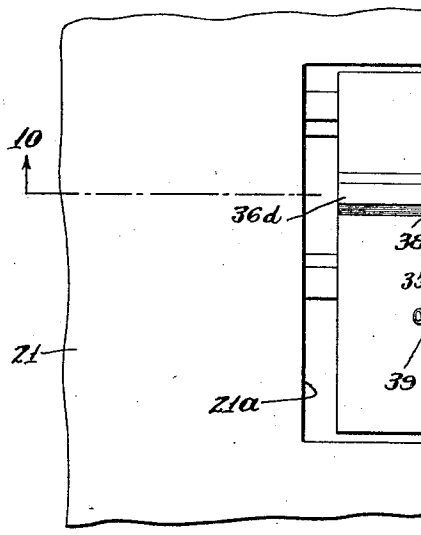


Fig. 14.

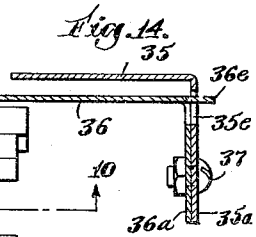


Fig. 13.

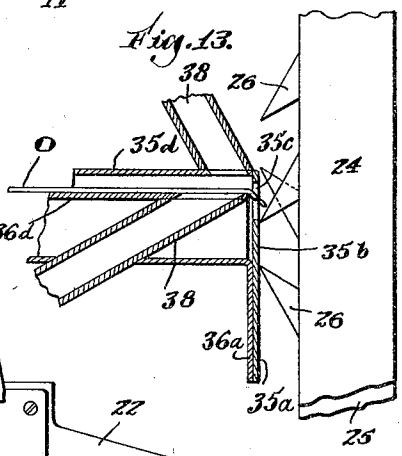


Fig. 10.

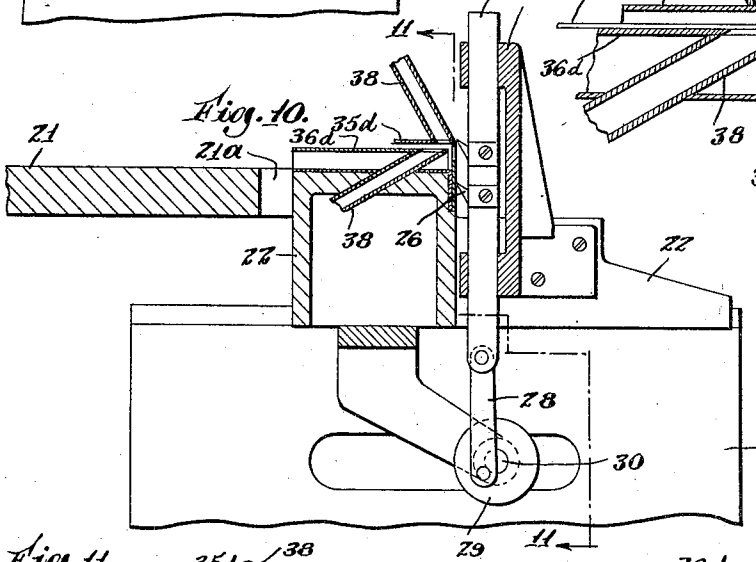


Fig. 11.

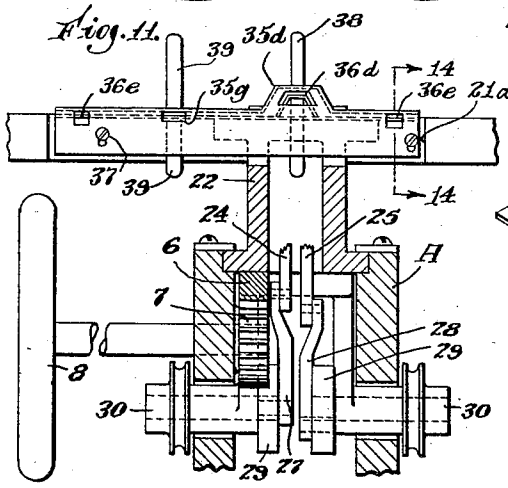
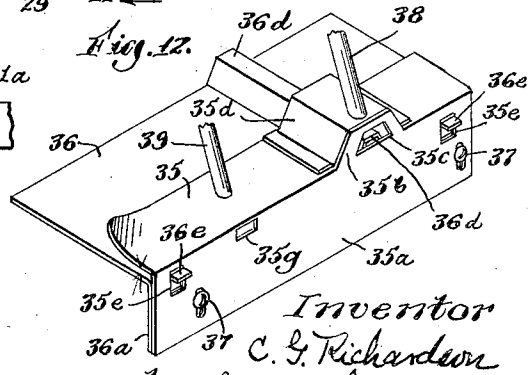


Fig. 12.



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Patented Oct. 4, 1932 1,880,488

UNITED STATES PATENT OFFICE

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LOOP CUTTER

Application filed March 9, 1931. Serial No. 521,200.

This invention relates to loop cutters for cutting the selvage loops formed on one edge of a piece of cloth when it is woven in patterns on an automatic loom.

These loops are a necessary incident of the pattern weaving on automatic looms, but as their presence is not desired in the finished cloth they must be trimmed off from the selvage as part of the cloth finishing operation. The present invention is intended to sever the loops, leaving the free ends formed by such severance to be trimmed off by an edge trimming device. The problem of severing these loops is one presenting considerable difficulty by reason of the fact that the loops must be severed while the cloth is travelling longitudinally and the loop cutting device must be arranged to avoid on the one hand the cutting of the selvage itself, while on the other hand it should avoid allowing the loop threads to pass by without being severed. The problem is further complicated by the swerving of the cloth as it runs through the machine which carries the loop cutting attachment, which may be a shear or other cloth finishing machine.

In my earlier application, Serial No. 424,556, I showed an arrangement of loop cutting mechanism employing a rotary cutter mounted inside a salient cloth rest, while in my application, Serial No. 499,002, I disclosed an arrangement embodying a rotary cutter mounted outside the cloth rest combined with a cloth limiting guard. The present invention comprises certain further improvements and modifications on the inventions disclosed in the aforesaid applications, one important feature being the use of vibratory loop cutting blades in place of a rotary cutter, the vibratory principle being applied both to cutting blades that are mounted inside a salient cloth rest, as well as to cutting blades that are mounted outside of the edge of the cloth. A further feature of the invention resides in specific improvements in the cloth guiding means, including the construction of the cloth rest itself and of the cloth limiting device, both of which coact to form guiding means for the cloth as it travels by the shearing line.

These and other features of the invention will be described in detail in the following specification and will be defined in the claims hereto annexed.

In the accompanying drawings I have illustrated different forms and arrangements embodying the principle of a vibratory cutter, in which

Fig. 1 is a plan view of the cloth supporting and guiding means and the vibratory cutting blades mounted inside the cloth supporting guide.

Fig. 2 is a vertical section on the plane 2—2 of Fig. 1.

Fig. 3 is a front elevation of the construction shown in Fig. 1.

Fig. 4 is a vertical section transversely of the travel of the cloth on the sectional plane 4—4 of Fig. 1.

Fig. 5 is a side elevation, partly in vertical section, of the form of cutter shown in Fig. 1.

Fig. 6 shows, in front elevation partly in section, a modified form in which the vibratory cutter blades are mounted on oscillatory heads on plane 6—6 of Fig. 7.

Fig. 7 is a side elevation of form of cutter mechanism shown in Fig. 6 in a plane at right angles thereto.

Fig. 8 is a plan view showing the cloth edge guard, partly in section, on the plane 8—8 of Fig. 6.

Fig. 9 is a plan view of another modified construction of cutter mechanism characterized by vertically reciprocating cutter blades.

Fig. 10 is a vertical section on plane 10—10 of Fig. 9 further showing this same modification.

Fig. 11 is a vertical section at right angles to the plane of Fig. 10 on the plane 11—11 of Fig. 10.

Fig. 12 is a detail perspective view of one form of cloth guiding and guarding member.

Fig. 13 is a detail view showing in enlarged scale the relation of the vertical vibratory cutter to the cloth guiding and guarding means.

Fig. 14 is a detail view showing in verti-

cal section the details of construction of the protective guide shown in Fig. 12.

The arrangement of loop severing mechanism shown in Figs. 1 to 5 embraces an upstanding horizontal cloth supporting rest 10 mounted on a horizontally slidable carriage 1 carried in a runway or slideway formed in an appropriate portion of the frame A of the machine. At its inner side the horizontally movable cloth rest has telescopic engagement with a sheet metal extension 9 of the permanent or fixed cloth rest, of which the cloth rest 10 forms an extension movable inward and outward to follow the lateral swerving movements of the cloth travelling over the rest.

The in and out movement of the cloth rest in correspondence with the lateral swerving of the cloth may be accomplished through movement of the carriage by any suitable means. In my aforesaid application, Serial No. 424,556, I have shown how the carriage of the cloth rest may be moved in and out by means of a feeler controlled mechanism, whose feeler engages the cloth. In the present instance I have shown simply a rack bar 6 secured to the carriage and intermeshed with a pinion 7 on the end of a hand wheel shaft 8 to allow the operator to shift the carriage manually to follow the swerving movements of the cloth in order that the shearing line, that is, the line where the loops are exposed to the action of the cutters, may be shifted in and out as the swerving cloth travels by.

The cloth rest 10 is provided at the middle of its top with a groove or channel extending lengthwise of the movement of the rest, or transverse to the travel of the cloth, O, leaving a gap over which the edge portion of the cloth travels. In this channel or gap are mounted two knife bars 11 and 12, to each of which is secured a series of cutters 13 constructed on the principle of the revolving cutters shown in my aforesaid application, Serial No. 424,556, comprising angular or hook-like blades, whose tips are rounded to prevent digging into the cloth, and which carry sharp cutting blades 13^a located on the interior side of the hook so that the tip of the blade enters the subtending loop which slides over the inclined cutter edge 13^a and is severed thereby as the carrier blade moves toward the exposed loop.

Where, as in the present instance, I use a pair of side by side cutters, their vibratory movement is effected by pitman rods 15 secured to eccentric pins 16^a on adjacent parallel discs 16 secured to aligned rotating shafts 17 which may be belt driven, or otherwise actuated.

The cloth rest at the outer end of its apex is preferably slightly elevated beyond the horizontal level of the remainder of the apex to form a slight protuberance or upward projection, as shown at 10^b, it being found that this slight projection, which is inside the extreme edge of the selvage, serves to present the downwardly depending loops O′ of the cloth O more effectively to the path of the moving cutters.

As shown in Fig. 2 and Fig. 4, the channel forming the slideway for the knife bars 11 and 12 may be provided with a downward extension or recess 10^c with which is connected a suction pipe 10^d. This recess and pipe is arranged directly beneath the protuberant ledge 10^b of the cloth rest in order to coact with the blast pipe 14 in moving the overhanging loops into the path of the vibratory cutters.

To aid in guiding the edge of the cloth as it passes the shearing line, I provide a protective guard or guide member 20 formed of sheet metal doubled over upon itself to form a narrow flat passage, the outer edge of which is closed to limit the outward movement of the edge of the cloth to a definite line. As this guide member moves to and fro with the movement of the carriage, it may be made to follow the inward swerving of the cloth while limiting its outward swerving movement.

In Figs. 9 to 14 I have illustrated a construction and arrangement for cutter knives that are mounted entirely outside of the edge of the cloth and of the cloth guard, the knives being vertically reciprocated to cut the loops.

In this case, the cloth passes over a horizontal plate or tab 21 in the machine, which is cut out at 21^a to allow inward and outward movements of the carriage supported parts, namely, the protective guide and the associated cutters together with air blast pipes arranged to blow the loops outwardly through an opening in the protective guard into the path of the reciprocating cutters.

In this case, as in the form previously described, there is mounted in a straight part of the frame A a horizontal, transversely slidable carriage 22 on the top of which is supported a cloth guide limiting the outward movement of the cloth, as will presently be described.

On the carriage 22 is secured a bracket 23 forming a guide for vertically reciprocating bars 24, 25 placed side by side and carrying sharp cutting blades 26 which, in this case, are not provided with the curved runner tips, but are sharp points inclined preferably in opposite directions on each bar to engage and sever the loops blown in their path.

In this case the short pitman rods, or links, 27, 28, which actuate these knife bars, are attached to eccentric pins on the discs 29 secured on the ends of the short aligned shafts 30 carrying pulleys for a driving belt. In this case as the edge of the cloth would swerve directly into the path of the exterior knives, I use a form of cloth guide embracing two

angle plates, the upper one 35 being formed with a vertical downwardly projecting flange 35^a at right angles with the horizontal portion 35. The middle portion of the horizontal flange is cut out and over this is mounted an arched or salient connecting plate 35^d. A portion of the middle that is cut out to give interior access to the underside of this trough-like arch or salient plate 35^d is left standing vertically, as shown as 35^b, and in this upwardly extending portion 35^b is formed an opening or window 35^c extending upward to the level of the top or apex portion of the trough 35^d.

The companion member of the guide comprises a similar angle plate, whose horizontal member 36 is parallel with the horizontal member 35 of the upper guide member and whose depending portion 36^a is fitted snugly up against the inner face of the depending flange 35^a of the upper member. In alignment beneath the salient arch 35^d of the upper member there is provided on the lower member a similar uprising salient plate 36^d, leaving the horizontal flanges forming parallel guides spaced apart sufficiently to allow the cloth to pass between them as it travels along the machine and follow the salient path between the two upraised arch pieces 35^d and 36^d. The clamping screw and slot connection at 37 permits variation of the spacing between the upper and the lower members to accommodate different thicknesses of cloth. To prevent the edge of the cloth from being caught in the crack between the vertical flanges of these two members, the upper member is provided in its horizontal face with two small openings 35^e, while tongues 36^e are struck out of the depending flange at the angular bend to form a continuation of the horizontal member 36, thus bridging over any gap or crack formed between the two vertical flanges and forming a positive means of preventing the edge of the cloth from entering the crack. These openings 35^e have sufficient vertical dimension to permit adjustment of the lower member nearer to, or farther from, the upper member according to the thickness of the cloth.

Upper and lower air blast pipes 38 are arranged at an inclination to the top and bottom members of the salient portion of the guide and, as the opening or window 35^c in the upstanding tab 35^b subtends the space between the top and bottom members of the salient, the air blasts entering this space serve to expel the loop threads through this window or opening, which is directly opposite the movement of the reciprocating cutters 24 and 25, so that the loops are caught and severed by the reciprocating cutters while at the same time the outside face of the guide member forms a positive limit against further outward movement of the swerving cloth and, as above explained, the carriage is moved inwardly when the cloth swerves inwardly to cause the guide and the cutter to follow the edge of the cloth.

It will facilitate removal of the loop threads, that adhere to either the upper or lower face of the cloth, if one or more pairs of advance air blast tubes are attached to the guide, as shown at 39, there being a window 35^g to allow the escape of the air outward from the air blast pipes. Therefore, the preliminary blast tubes move the loop threads adhering to the face to the outer edge of the cloth, where they are ready for quick expulsion through the window 35^c opposite the cutters.

A further improvement in the protective cloth guide is effected by bending up the inner forward corner of the upper member to form an upraised deflecting lip so that wrinkles in the cloth are prevented from entering the guiding space through which the cloth travels without interfering with the travel of the cloth. This deflector lip acts to smooth out the wrinkles as they approach the narrow space of the guide and prevent them from causing trouble by wedging in the guide or otherwise, very much as a flat iron serves to iron out wrinkles in a garment that is being ironed.

Instead of having the externally disposed cutter in the form of reciprocating bars, the cutter may be of a rotatable type comprising a radial armed head 40 carrying at their extremity peripheral cutter blades 41, whose cutting edges are inclined in opposite directions to cut the thread when moving either way. As shown in the drawings, I provide two such heads loosely mounted on a common horizontal shaft 42 supported in a projecting bracket 43 of the carriage 44 and each of these heads is connected by a pitman 45 with an eccentrically disposed pin 46 carried by two aligned rotary shafts 47. The radial distance of the center of the eccentric pin to the center of the shaft 47 is substantially less than the radial distance from the center of the shaft 42 to the center of the pin 45^a on the head to which the respective pitmen are secured, so that the rotary motion of the shafts 47 is translated into an oscillatory movement of each cutter head 40. Preferably the eccentrics 46 are set a few degrees out of the diametrically opposite positions, so that one is always moved when the other is idling at the end of its stroke. This same arrangement was used in the case of the horizontal reciprocating cutters, as shown in Fig. 3. Belt pulleys on the respective shafts serve to drive them from any convenient driving pulley on the machine. The two opposed cutter knives rotate in very close proximity to each other opposite a window 50 in the protective guide structure 51, which is similar to the protective guide 35, 36 shown in Figs. 12 to 14.

It will therefore be seen that the principle

of the vibratory cutter may be applied either to cutter knives mounted in the cloth supporting rest itself, or in cutter knives mounted outside the edge of the cloth and its protective guide. It will also be seen that the vibratory cutter knives can be made in the form of reciprocating knives moving in straight lines, or in the form of oscillating knives. The advantage of using two knife bars oppositely reciprocating is that one of them can be kept in motion while the other makes its end of the stroke pause, so that no loops are missed by reason of the temporary pause in the movement of one of the knives, which is incidental to a reciprocating or oscillating cutter. While I have shown these knives reciprocating or moving in opposite directions with their cutting edges facing in opposite directions, it will be understood that the opposite facing of the cutter knives is not an essential requisite of successful operation. The direction of the cutting edge for each knife bar is of less importance than the maintaining of one or the other of the knife bars in movement all the time the machine is operating, so that no loops may pass by the knives without being cut as the cloth travels rapidly through the machine.

While I have shown in each instance the cloth O guided to travel in a salient path, it will be understood that this salient path of travel is not essential, particularly when the cutter is mounted outside the edge of the cloth so long as the machine is provided with means of some sort, preferably air blast tubes, for projecting the loop threads into the path of the cutter.

What I claim is:

1. A machine for cutting selvage loops of cloth embracing in combination, means for supporting and guiding the edge of the cloth, a pair of side by side vibratory cutters, means for imparting vibratory movements to said cutters in predetermined sequence to maintain one of said cutters in motion when the other pauses at the end of its stroke, and means for directing selvage loops into the path of said cutters.

2. A machine for cutting selvage loops of cloth embracing in combination, a carriage movable transversely of the travel of the cloth, guiding means for guiding the edge of the cloth mounted on said carriage, vibratory loop cutting means also mounted on said carriage and movable to and fro across the edge line of the cloth in a predetermined relation to the cloth edge guiding means, and means for directing the loop threads into the path of the vibratory cutting means.

3. A machine for cutting selvage loops of cloth embracing in combination, means for supporting and guiding the edge portion of the cloth, horizontally reciprocating loop cutting means mounted to travel in a groove formed in said cloth support beneath the cloth passing over it, and means for directing loop threads downward into the path of said reciprocating cutters to sever the loop threads.

4. A machine for cutting selvage loops of cloth embracing in combination, a salient cloth rest for supporting and guiding the edge portion of the cloth through a salient angle in its travel by the cutter, said cloth rest being provided at its apex with a horizontal groove, reciprocatory cutters mounted in said groove to travel to and fro across the edge line of the cloth, and means for directing selvage loops into the recessed portion of the cloth rest in order to present them to the path of the reciprocating cutters for severance.

5. A machine for cutting selvage loops of cloth embracing in combination, a transversely movable carriage, means mounted thereon for supporting and guiding the edge portion of the cloth into a salient path of travel, said supporting means being provided with a horizontal groove at the apex of the salient reciprocatory cutters mounted to travel to and fro across the edge line of the cloth, the end of the cloth support being recessed to expose the upper ends of the cutters above that portion of the groove, and means for drawing the selvage loops into the path of the cutters, said means including a suction conduit below the level of the cutters.

6. A machine for cutting selvage loops of cloth embracing in combination, a transversely movable cloth rest arranged to support the edge portion of the cloth and guide the same into a salient angle of travel, said cloth rest being provided at its apex with a groove, reciprocatory cutters mounted in said groove to travel across the line of the edge portion of the cloth, an edge limiting guide secured to said carriage to limit the outward movement of the cloth approaching the cutting line, and means for directing the loop threads into the path of movement of the cutter, said means embracing an overhead inclined blast pipe and an underneath suction pipe.

7. A cloth supporting guide for directing the marginal portion of the travelling cloth through a salient angle of travel, said guide being provided with a horizontal groove forming a cutter-receiving gap at the apex of which the cloth travels, said apical portion having its outer end somewhat raised above the level of the inward portion to form a protuberant ledge whose end edge is above the level of the cutting line.

8. A cloth engaging and supporting rest whose outer end portion is provided with a protuberant portion reaching to the end edge thereof thereby producing a tension on the marginal portion of the cloth travelling over, while allowing the extreme edge of the cloth selvage to overhang the end edge of the rest

to present the selvage loops to an associated loop cutter.

9. In a machine for cutting selvage loops of cloth, the combination of cloth supporting and guiding means movable inwardly and outwardly to follow the swerving movement of the cloth, vertical reciprocatory cutters mounted outside said cloth guiding means and partaking of the inward and outward movements of the guiding means, and means for directing selvage loops outwardly from the edge of the cloth into the path of the reciprocatory cutter.

10. An edge limiting guide for a loop cutter or the like embracing in its construction, upper and lower plates spaced apart horizontally in substantial parallelism with each other, and means for securing said plates in different positions of adjustment for varying the depth of the cloth guiding passage between them, the outer side of said guiding space being partly closed to limit the outward movement of the cloth.

11. An edge limiting guide embracing in its construction, upper and lower parallel plates, means for connecting their outer edges together and limiting the outward movement of the edge of the cloth passing between said plates, and means for diverting wrinkles in the cloth from entering the guiding space between said plates.

12. An edge guiding device for cloth embracing upper and lower parallel members spaced apart sufficiently to admit the passage of the cloth between them and connected together by means limiting the outward movement of the edge of the cloth, the inner forward corner of the upper member being upwardly curved to form a deflecting lip for deflecting wrinkles in the cloth from entering the guiding space between said members.

13. An edge limiting guide for a loop cutter or the like embracing in its construction, upper and lower substantially parallel plates spaced apart to leave a passage between them for the travelling cloth, means limiting the outward movement of the cloth travelling between said plates, and means for directing outward beyond the cloth edge limiting means selvage threads at the edge of the cloth in order to expose them to an associated cutter.

14. An edge limiting guide for cloth embracing in its construction, upper and lower substantially parallel members spaced apart, means for uniting the outer edges of said members and limit the outward movement of the edge of the cloth, blast pipes arranged to direct selvage threads outwardly beyond the edge of the cloth at substantially the thread shearing line, and additional blast pipes arranged in advance of the shearing line to direct the selvage threads outwardly to the edge of the cloth before the loop threads reach the cutting line.

15. An edge limiting guide for cloth embracing in its construction, upper and lower parallel sheet metal members having vertical flanges adjustably secured together and forming means for limiting the outward movement of the edge of the cloth, one of said members being provided with extension tongues projecting through openings in the other to prevent the cloth edge from being drawn into the crack between the two vertical connecting flanges.

16. In a machine for cutting selvage loops of cloth, the combination with cloth guiding means provided with an opening adjacent the edge of the travelling cloth, a reciprocatory toothed cutter arranged at said opening in close proximity to the edge of the cloth, an air conduit arranged in communication with said opening for maintaining a current of air over the edge of said cloth into said opening, thereby directing selvage loops into the path of said reciprocatory cutter teeth.

In witness whereof I have subscribed the above specification.

CHARLES G. RICHARDSON.