March 8, 1938. H. E. BURR 2,110,567

LOOP CUTTING AND EDGE TRIMMING MACHINE

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Fig. 1.

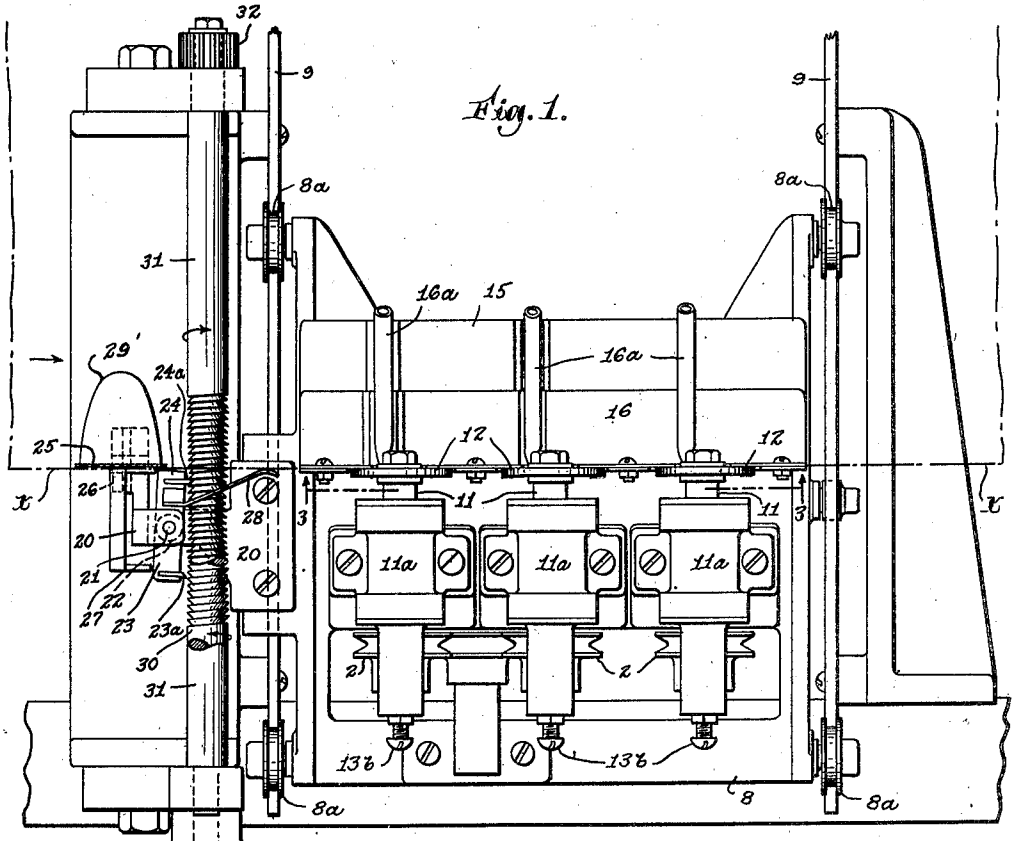
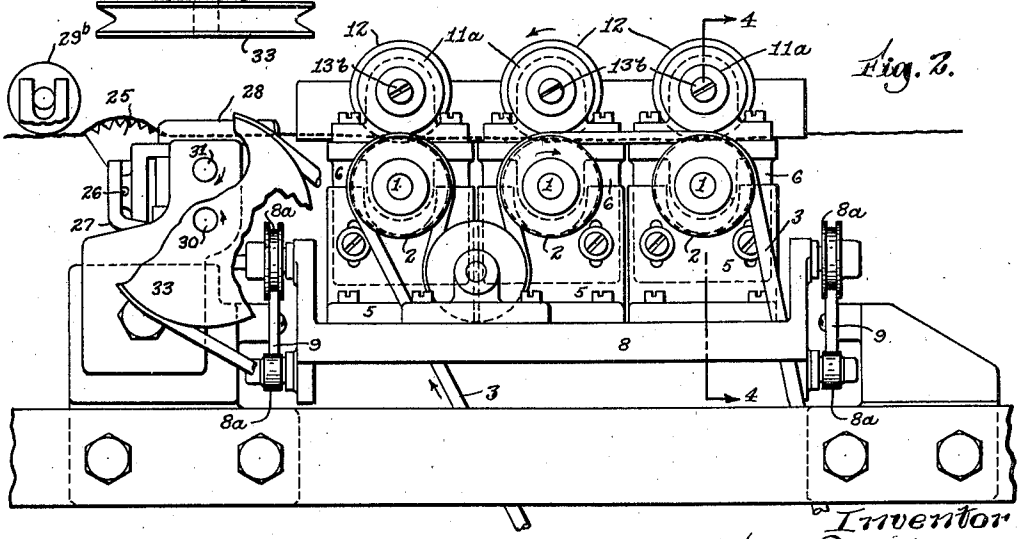


Fig. 2.



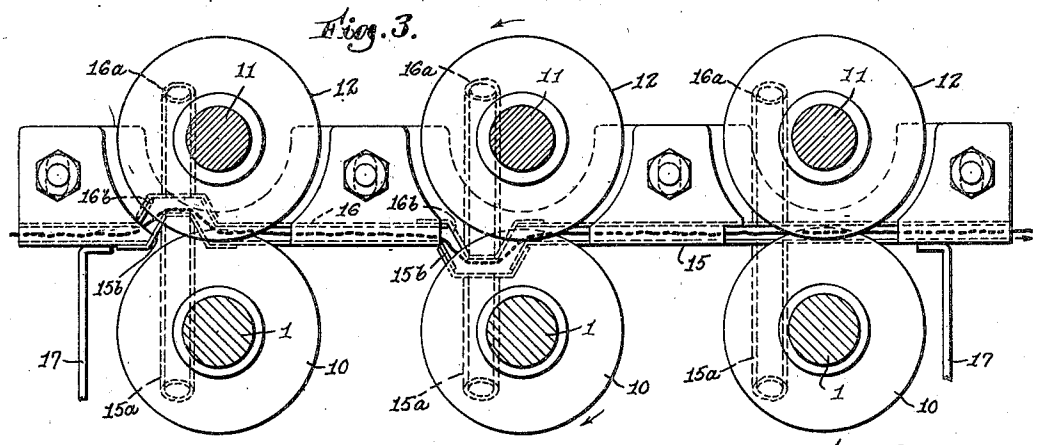
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Fig. 3.



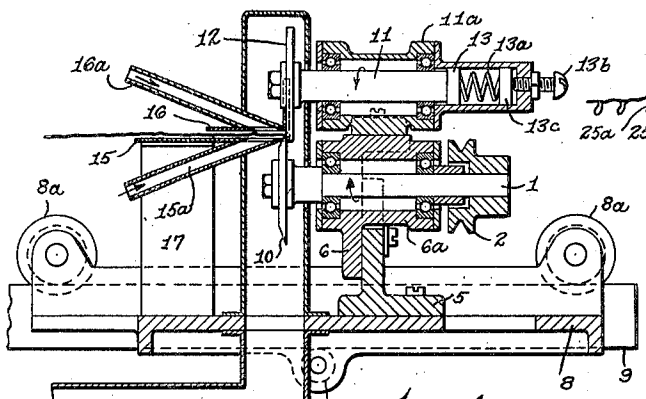
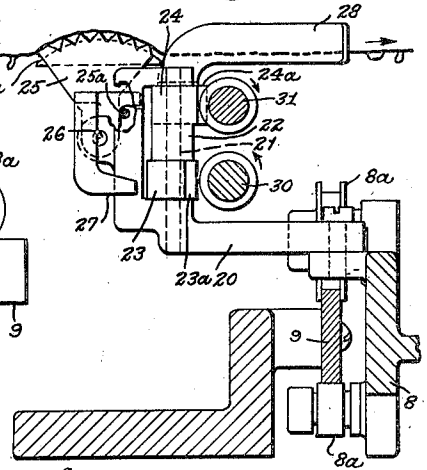


Fig. 4.

Fig. 6.



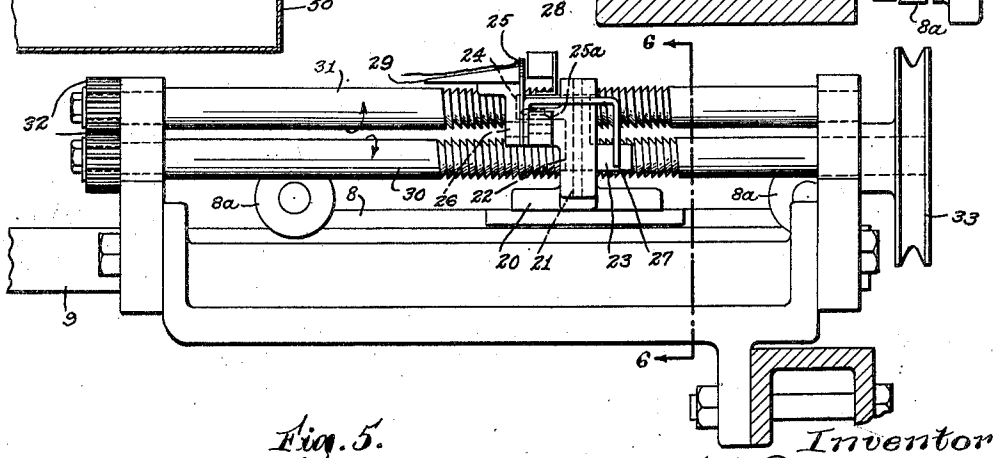


Fig. 5.

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Fig. 7.

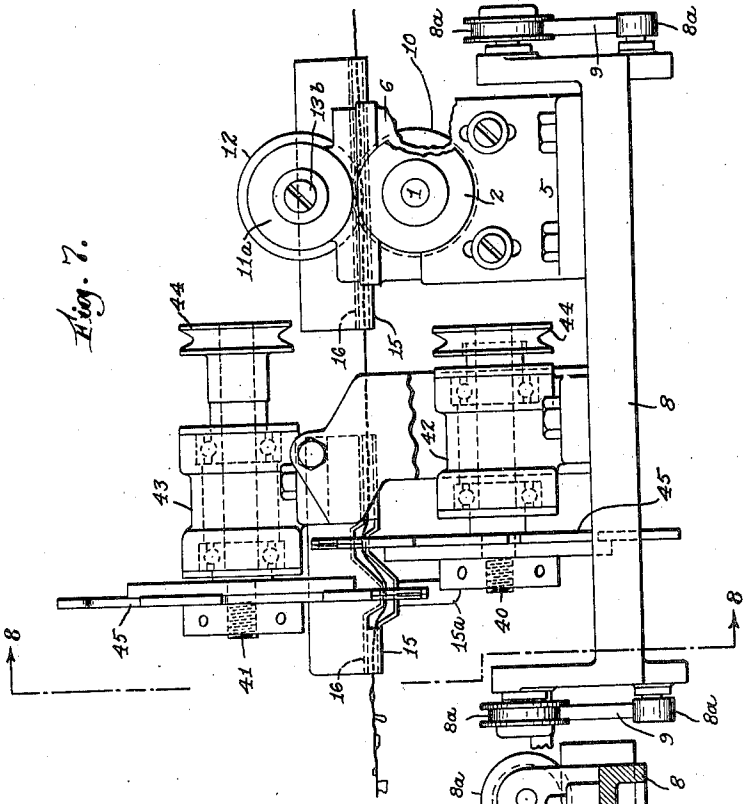
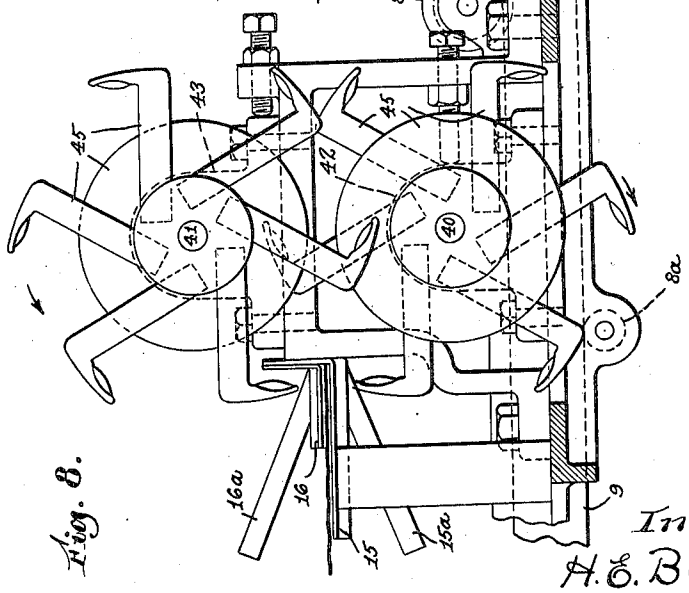


Fig. 8.



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UNITED STATES PATENT OFFICE

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LOOP CUTTING AND EDGE TRIMMING MACHINE

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Application April 21, 1933, Serial No. 667,153

8 Claims. (Cl. 26—7)

This invention relates to cloth finishing and is intended to provide a safe, reliable and effective mechanism for severing the loose threads and thread loops found at the edge of the woven fabric in various types of weaving, especially in weaving by automatic looms.

It is extremely desirable that the loose thread ends and loops at the edge of the cloth be cleanly and completely severed close to the edge of the fabric without missing any threads and without danger of cutting the cloth itself, while permitting the rapid travel of the cloth through the shearing machine to minimize the expense of the shearing operation.

An important feature of the present invention consists in an effective arrangement of overlapped shearing discs or cutters located outside of the cloth in close cutting proximity to the edge of the cloth and rotating in planes that are substantially perpendicular or transverse to the edge of the cloth. Additional features include the relationship of edge-confining guides to rotary cutters, so arranged, and effective means by which the cutters, as well as the guides, are caused to automatically follow the in-and-out swerving mechanism of the cloth, although it will be understood that the principle of arrangement of the rotary cutters is applicable to shearing machines where the cutters are manually guided. These and other features of the invention will be particularly described in the following specification and will be defined in the claims hereto annexed.

In the drawings are illustrated two variant embodiments of the invention, of which

Fig. 1 is a plan view of that portion of a shearing machine carrying the overlapped rotary cutters.

Fig. 2 is a right hand side elevation of the construction shown in Fig. 1.

Fig. 3 is an elevation on the sectional plane 3—3 of Fig. 1.

Fig. 4 is a transverse sectional elevation on the section line 4—4 of Fig. 2.

Fig. 5 is a detail view showing in front elevation the cloth feeling and carriage shifting mechanism.

Fig. 6 is a side elevation of the cloth feeler and carriage shifting mechanism on plane 6—6 of Fig. 5.

Fig. 7 is a side elevation showing a modified arrangement embracing a pair of overlapped rotary cutters provided with loop cutting blades in association with a rearwardly disposed pair of disc cutters for severing the thread ends that remain after the loops are cut.

Fig. 8 is a front elevation on the plane indicated by lines 8—8 on Fig. 7 showing a face view of the modified pair of cutters in their relation to the edge-confining cloth guide.

Both the forms illustrated in the drawings comprise pairs of rotary cutters located outside the edge of the cloth that is to be trimmed, the cutters of each pair being rotated about axes on opposite faces of the cloth, one above the plane of the cloth and the other below the plane of the cloth at the shearing line.

It will be understood that both forms of rotary cutters are shown mounted upon a transversely movable carriage or support which also carries an associated cloth guide movable transversely in unison with the cutters and preferably controlled as to in and out position by the swerving movements of the cloth.

The preferred form and arrangement of cutter illustrated in Figs. 1–4 will first be described. In this form of the invention there are mounted on a transversely movable carriage 8, supported and guided by track rollers 8a engaging transverse horizontal track members 9, horizontal cutter shafts 1 carrying cutter discs 10 arranged below the level of the plane of the cloth and mounted in bearing boxes 6a carried by a head 6, that is adjustably clamped to a vertically slotted stand or upright 5 on the carriage in order to position the cutters at the proper level to present the cutter disc carried at the inner end of each shaft in proper relation to the level of the edge of the cloth to be trimmed. Each cutter shaft 1 is provided with a driving sheave 2 which receives a driving belt 3 connected with any suitable driving shaft carried by the machine and travelling so as to rotate the cutter discs 10 with their upper edges moving in the direction of the travel of the cloth.

Above the bearing head of each lower cutter shaft 1 is mounted a rotary cutter shaft 11 carried by an upper bearing box 11a and having at its inner end the upper cutter disc 12, which is preferably, although not necessarily, made flat on both sides. The lower cutter disc has its inner face bevelled while its outer face slightly overlaps and engages the upper cutter disc 12, which it drives through frictional contact. The bearing box 11a contains a follower piece 13 arranged to receive the thrust of the spring 13a and transmit it to the outer end of the cutter shaft 11. By means of the screw 13b and a thrust block 13c engaged thereby, the end thrust or

pressure of the spring 13a can be varied to meet different requirements and to give the proper frictional pressure of the upper disc 12 against the outer face of the lower disc 10. The two co-acting cutters are arranged to rotate about axes extending in the direction of the in and out travel of the cloth with their cutters revolving as close as practicable to the marginal edge of the cloth passing by them, so that the outwardly projecting threads or loops at the edge of the cloth will be presented to the nip of the cutters. The bevelling of the inside face of the inside or lower cutter permits the adjustment of the cutters very closely to the travelling edge of the cloth so that the outwardly projected threads and loops may be severed very close to the cloth edge.

The edge-confining cloth guide is very similar in construction to that illustrated in Patent No. 1,180,488, and comprises a lower guide plate 15 provided with an oblique angle air blast tube 15a and an upper guide plate 16 provided with an oblique air blast tube 16a. As actually shown herein, the upper and lower guide plates are provided with salient portions 15b, 16b immediately in advance of the overlapped portions of each pair of cutters and windows or openings are left in the outer edge-confining portion of the guide member to allow the marginal threads and loops to be projected through such openings across the shearing line formed by the two cutters. It is the purpose of these salients to produce a slackening or fullness of the selvage loops at the edge of the cloth to enable them to bulge or belly out into the nip of the rollers when the slack loop is blown out through the adjacent openings in the edge of the cloth confining guides. The cloth edge follows an offset detour around each salient, while the loops coming opposite the openings are projected beyond the salient and therefore travel in substantially the normal plane of the cloth. The edge-guiding and thread-projecting device, thus described, is mounted on standards 17 on the carriage and the cutters are vertically adjustable as before explained in relation to the line of travel of the edge of the cloth at the opening through which the threads are projected across the path of the rotary cutters. Since the air blasts are arranged opposite each face of the cloth, threads and loops on both faces of the cloth are projected through the opening in the cloth guide and to still further insure against the missing of threads or loops the second set of cutters are arranged adjacent to an oppositely disposed salient portion of the guide plates, which salient projects downwardly instead of upwardly but in all other respects is of like construction to that above described. The third pair of cutters are arranged in proper relation to a flat non-salient portion of the guide provided with a window or opening through which the threads of the previously severed loops are projected.

With the cloth edge travelling successively through a path following the double salient and a straightline path, it is virtually impossible for any threads or loops to escape severance close to the edge of the cloth, because the threads on opposite faces of the cloth are given every possible chance to be projected across the path of the rotary cutters and, in case any projected threads are not severed close to the edge of the cloth, the third pair of cutters will finish the trimming close up to the edge.

It will therefore be understood that both loops and loose end threads are trimmed off close to the edge of the cloth and that the device acts both to cut selvage loops and trim off end threads, leaving a clean margin free from float threads of any kind.

Special provision is made for shifting the cutters and the associated cloth guide easily and quickly in response to the in and out swerving movements of the cloth edge, as best shown in Figs. 2, 5, and 6. On the forward side of the carriage is secured a feeler supporting bracket 20 of angular form, which carries a vertical spindle 21 on which is mounted an oscillating post or rocker 22 provided near its lower end with a laterally projecting arm 23 carrying a rearwardly projecting knife edge or pawl tooth 23a and provided near its upper end with an oppositely or inwardly projecting arm 24 carrying a similar reversely bevelled knife edge or pawl tooth 24a. Opposite each of the described pawl teeth are disposed transversely extending threaded lower and upper ratchet shafts 30 and 31, which are interconnected at their inner ends by intermeshing pinions 32. The lower ratchet shaft carries a belt driven sheave 33 and it will be understood that these two driving ratchet shafts are mounted in fixed brackets carried by the frame of the machine and not on the carriage. While the threads forming the ratchet teeth are cut in the same direction helically, yet the abrupt thrust faces of the ratchet threads of the respective shafts face in opposite directions and the pawl teeth 23a and 24a are bevelled in opposite directions. Therefore, when the upper tooth 24a is engaged with the ratchet shaft 31, the cutter carriage or carrier will be moved outwardly and when the lower ratchet tooth 23a is engaged with the lower shaft or spindle 30, the carriage will be shifted inwardly, since the ratchet pawl is mounted on a bracket fastened to the carriage.

The control of the shifting connection between the feeler mechanism and the actuating rotary ratchet shafts is effected in the following manner. On the vertical arm of the bracket 20 is carried a serrated sector shaped feeler 25 pivoted on a horizontal pin 26. The feeler 25 is provided with a downwardly and rearwardly extending toe member 27 which forms an overbalancing weight tending normally to swing the feeler in a forward direction or counterclockwise, according to the illustration in Fig. 6. The rearward movement of the feeler 25 is limited by a stop pin 25a carried by the bracket. When the travelling cloth engages the serrated upper edge of the feeler 25 it causes clockwise rotation of the feeler 25 and, so long as the cloth contact continues, holds the feeler against the stop pin 25a with the toe member 27 out of engagement with the pawl and leaves the ratchet pawl in neutral or inactive position. If the cloth swerves inward losing contact with the serrated feeler 25, the gravity overbalanced feeler turns in a counterclockwise direction bringing its toe 27 against the outer or lowermost pawl member 23, thereby engaging the tooth 23a with the lower ratchet shaft 30, which then acts to shift the carriage inwardly until the pawl 23 is released by re-engagement of the cloth with the feeler. Should the edge of the cloth swerve outward slightly beyond the plane of the feeler 25 it will then contact with the feeler finger 28, which is a thin blade secured to the upper end of the pawl and projecting rearwardly and inwardly, as shown in Fig. 1, to engage the edge of the cloth when the

edge has swerved very slightly beyond the plane of the feeler 25. The pressure of the cloth against the feeler finger 26 turns the pawl arm 24 inwardly so that the tooth 24a is engaged with the upper ratchet shaft 31, thus causing the carriage or cutter carrier to move outward until the feeler 25 has been shifted outward beyond the edge of the cloth, at which point the feeler 25 being released acts again through gravity to restore the pawl to ratchet engaging position.

It will therefore be seen that the inward shifting movement of the carriage occurs only when the marginal portion of the cloth is out of engagement with the feeler 25, while the outward movement of the carriage occurs only when the cloth has swerved outwardly beyond the plane of the feeler 25. The requisite shifting movements of the carriage are practically responsive instantly to slight in and out swerving movements of the cloth so that the shearing plane of the cutters is promptly adjusted to any swerving of the cloth edge. The edge portion of the cloth runs over a convex guide piece 29 on the inside face of the feeler 25 over which the cloth travels and serves to guide the edge of the cloth upward to position for engagement with the top serrated edge of the feeler. Immediately in advance of the feeler 25 there is mounted in slotted brackets a weight roller 29b which serves to keep the cloth at this point pressed down to keep the cloth in contact with the feeler.

Instead of using plural pairs of disc cutters, as above described, for severing the loops and end threads, there may be used a pair of cutters of the type shown in Richardson's Patent No. 1,815,585 comprising blade carrying arms that rotate transversely of the edge line of the cloth to engage and cut the loops. This form of the invention is illustrated in Figs. 7 and 8 in which are shown a pair of parallel shafts 40 and 41 mounted above and below the level of the cloth and supporting radiating arm cutters revolving in parallel laterally offset planes in opposite directions with their cutting edges travelling in partly overlapped relation at the level of the cloth passing by. The cloth guiding means, embracing the space plates 15, 16 and their blast tubes 15a, 16a, is the same as that shown in the other figures of the drawings and the supporting carriage 8 is constructed and operated in the same manner, except that the bearing boxes 42 and 43 for the respective shafts 40, 41, respectively, are positioned to align the cutter shafts of the cutters 45 in a direction transverse to the movement of the carriage 8 otherwise supported in a direction substantially parallel with the travel of the cloth. In this case each of the cutter shafts 40, 41 are provided with belt sheaves 44 for driving them in opposite directions, so that the adjacent or overlapping portions of the cutters move outwardly at the level of the cloth edge. As actually shown, the forward and upper cutter 45 is arranged opposite a downwardly turned salient of the cloth guide, while the lower rearwardly offset cutter 45 travels in a path opposite the upward salient of the cloth guide. Since this type and arrangement of cutter are intended to merely sever the loop threads on the edge of the cloth, there is located behind it a pair of overlapped disc cutters 10 and 12 precisely like the disc cutters illustrated in the other figures of the drawings and described above.

It will therefore be seen that in both forms of loop cutting and edge trimming devices the loops are cut and the end threads are severed while the cloth is being passed through the machine at any desired rate of speed. In both cases the cutters of each couple or pair are mounted to rotate in vertical planes or planes perpendicular to the travel of the cloth, the cutters of each pair being mounted at opposite sides of the cloth and outside the edge of the cloth that is to be trimmed by them.

The oppositely offset open end salients for each pair of cutters, arranged in proximity to the shearing nip of each pair, insures the expulsions of edge threads or loops adhering to opposite faces of the cloth. In practice an exhaust shield or casing 50 will preferably be used to enclose the cutters in order to carry away the thread clippings and prevent clogging.

What I claim is:

1. In a cloth shearing machine, edge trimming means embracing front and rear pairs of rotary cutters, those of each pair being revoluble in partly overlapped relation about upper and lower axes across the edge of the cloth to be trimmed, edge guiding and protecting means inclosing the edge of the cloth while leaving openings adjacent the overlapped portions of the rotary cutters for the expulsion of threads, said guiding means being provided with upwardly and downwardly offset salient portions adjacent the shearing lines of the respective pairs of cutters, and means for effecting expulsion of edge threads on opposite faces of the marginal portion of the cloth through the respective openings into the path of the overlapped shearing cutters.

2. In a machine for trimming loops and thread ends at the edge of a piece of cloth, the combination with cloth guiding means arranged to inclose the edge portion of the cloth and limit its outward movement, a pair of mutually overlapping shearing cutters located close to, but outside, the edge guiding means and revoluble about approximately horizontal axes disposed respectively above and below the level of the cloth guide, and means for rotating said cutters to sever loops and threads expelled through an opening in the edge of the guide in front of the nip of the cutters.

3. In a machine for trimming off the loops and thread ends at the edge of a piece of cloth, the combination of upper and lower shearing discs rotating in overlapped relation close to, but outside of, the edge of the cloth in planes substantially perpendicular to the plane of the cloth being trimmed and in planes substantially parallel to the direction of travel of the cloth, cloth guiding means embracing the edge portion of the cloth and limiting the outward movement thereof and having openings in its outer edge adjacent the nip of the cutters, said discs and said guide being movable transversely of the travel of the cloth in correspondence with the lateral swerving movements of the edge of the cloth and its confining guide.

4. In a machine for cutting and trimming loops and thread ends at the edge of a piece of cloth, the combination of guiding means inclosing the edge portion of the cloth and limiting its outward movement and provided with an opening at its outer edge to permit expulsion of the loops and threads beyond the edge of the cloth, a pair of upper and lower shearing discs revoluble in overlapped relation close to the edge of the cloth and outside said edge and in planes parallel to the direction of travel of the cloth, a transversely movable carriage supporting in predetermined relationship both the guide and the cutters, and means for shifting said carriage with its sup-

ported guide and shearing discs simultaneously in and out in correspondence with the swerving movements of the edge of the cloth.

5. In a machine for trimming off the loops and thread ends at the edge of a piece of cloth, the combination with a plurality of edge-embracing, edge-limiting guides arranged along the edge of a piece of cloth being fed through the machine, each guide having an opening in its outer edge to permit the expulsion of loops and threads at the edge of the cloth, a plurality of power driven shearing elements arranged close to, and outside, the openings in the edge of said guide, each shearing element comprising a pair of shearing discs arranged in overlapped relation to each other and to the opening in the guide, one of said discs being power driven and acting through its overlapping contact with the other disc to cause rotation of said disc in a direction opposite to the rotation of the driving disc.

6. In a machine for trimming off loops and thread ends at the edge of a piece of cloth, the combination with an edge inclosing and limiting guide provided with an opening at its edge for the expulsion of such loops and thread ends by air blasts directed through said guides, a pair of shearing discs arranged in overlapping relationship and contact opposite said opening, means for rotating said discs so that their overlapping edges travel in the direction of travel of the cloth, said discs being arranged in approximately vertical planes outside, but close to, the edge of said cloth and in parallelism with the direction of travel of the cloth as it travels by the opening in the guide.

7. In a cloth shearing machine the combination of a hollow guide inclosing the edge portion of the cloth travelling through it and limiting the outward movement of the cloth edge, means for expelling float threads at the edge of the cloth through an opening in the edge of the guide, a pair of coacting disc cutters arranged outside the edge of the guide and in close proximity thereto, said cutters being revoluble about axes above and below the level of the cloth travelling through the guide and having their adjacent edges arranged on overlapping contact with each other and rotating in the direction of travel of the cloth whereby both unservered and severed loop threads may be severed close to the edge of the cloth.

8. In a cloth shearing machine the combination of cloth guiding means inclosing the edge portion of the cloth travelling through it and limiting the outward movement of the cloth edge, said guiding means being provided with successive upward and downward salient portions provided with openings at the edge to permit the expulsion of float loops attached to the edge of the cloth and also with a rearward non-salient opening for the expulsion of severed loop threads, and a pair of overlapping contacting disc cutters revoluble, respectively, about axes above and below each of said openings with their overlapping portions travelling in the direction of travel of the cloth.

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