June 16, 1953 F. W. BREUL 2,642,020

TRIMMING MECHANISM FOR SEWING MACHINES

Filed Jan. 25, 1950 4 Sheets-Sheet 1

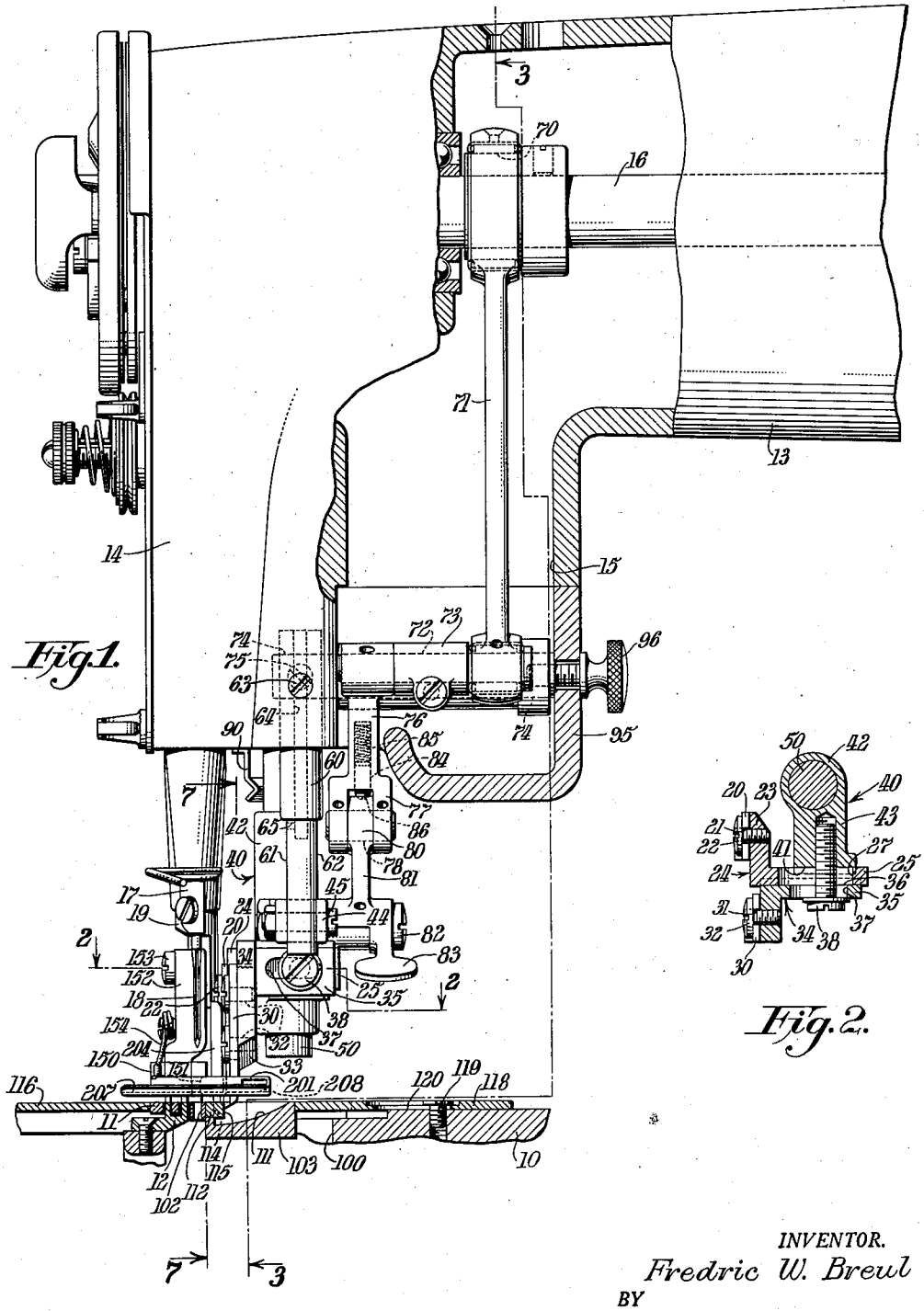

Fig. 1.

Fig. 2.

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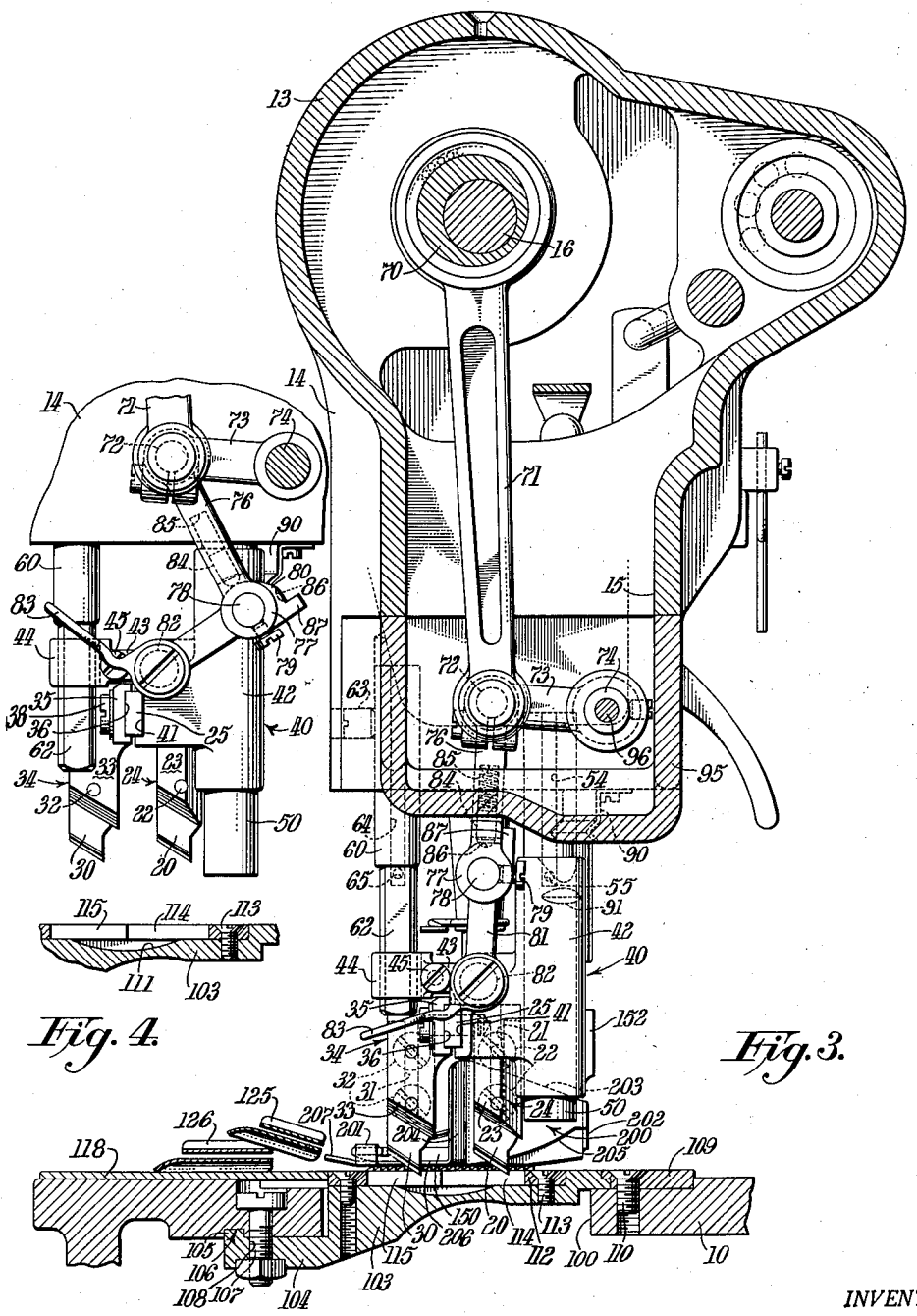

Fig. 4.

Fig. 3.

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TRIMMING MECHANISM FOR SEWING MACHINES

Filed Jan. 25, 1950 4 Sheets-Sheet 3

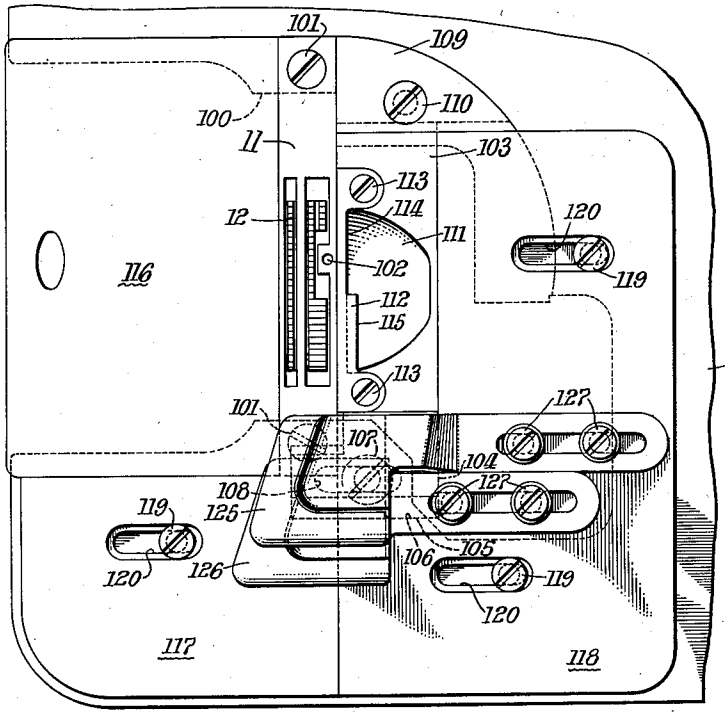

Fig. 5.

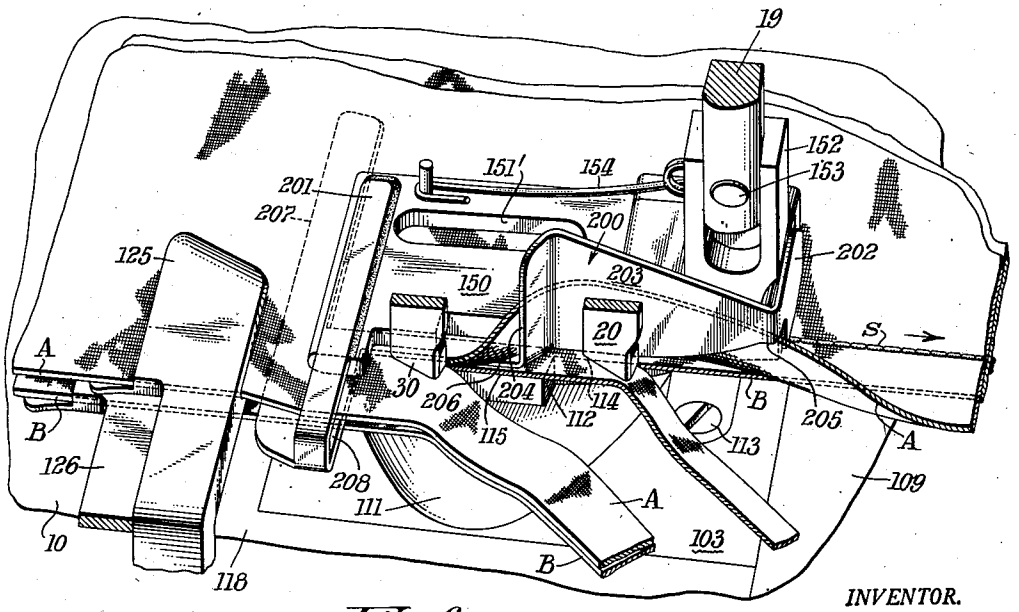

Fig. 6.

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TRIMMING MECHANISM FOR SEWING MACHINES

Filed Jan. 25, 1950 4 Sheets-Sheet 4

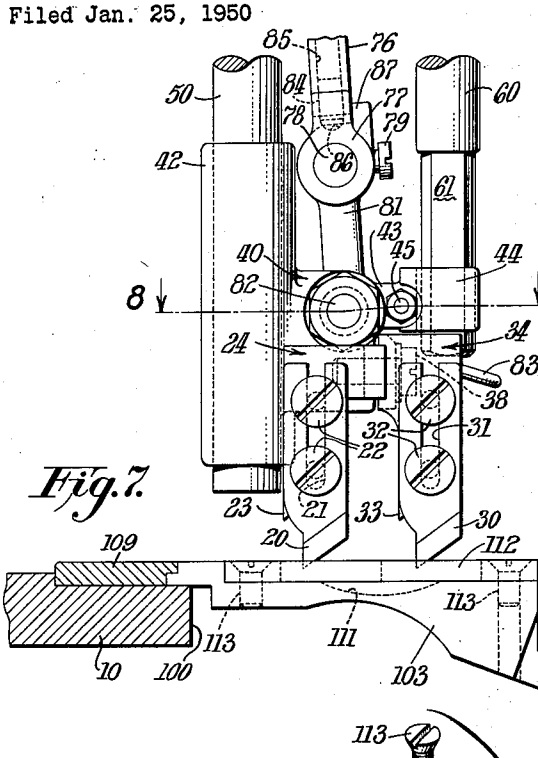


Fig. 7.

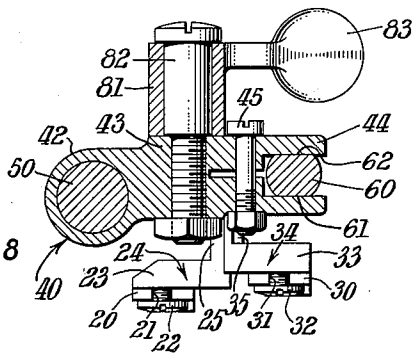
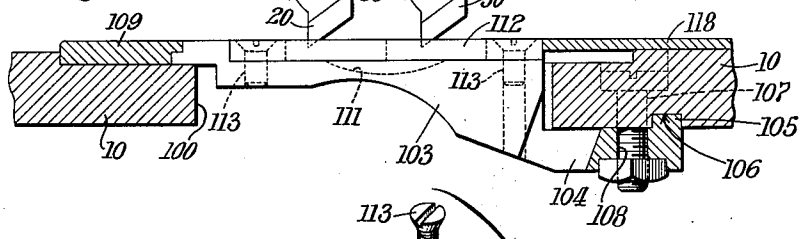


Fig. 8.



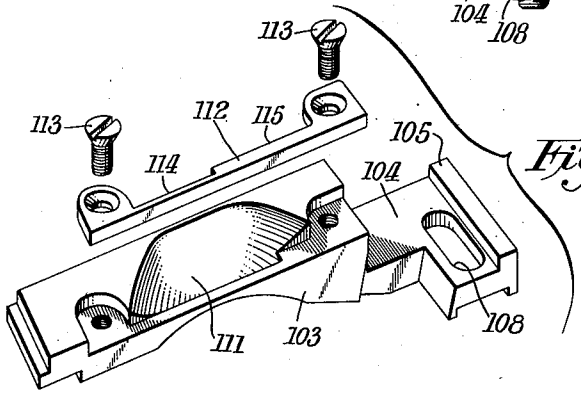


Fig. 9.

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UNITED STATES PATENT OFFICE

2,642,020

TRIMMING MECHANISM FOR SEWING MACHINES

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Application January 25, 1950, Serial No. 140,481

11 Claims. (Cl. 112—127)

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This invention relates to trimming mechanisms for sewing machines, and has for its primary object the provision of an improved mechanism for trimming the marginal edges of a plurality of superposed plies of material each at a different distance from the line of stitch formation.

A common application of this type of trimmed edge involves a later operation of folding the wider marginal edge about the narrower edge and then securing both edge portions to one of the plies of material as by an additional line of stitching so as to produce a neat and strong seam in which each of the trimmed edges is concealed. My invention comprehends mechanism adapted to be associated with a sewing machine for producing the trimmed marginal edge of the above character in a novel and improved manner.

It is an object of this invention to provide a sewing machine with a new and improved arrangement for supporting and actuating a plurality of trimming elements with each blade disposed to cut at a different distance laterally of the line of stitch formation.

A further object of this invention is to provide an improved fabric controlling means for directing a plurality of superposed plies of fabric to the stitching point of a sewing machine and past a plurality of trimming plates that are disposed to cut at different distances from the line of stitch formation, whereby the plies of material will be trimmed to different marginal widths as they are being stitched together.

Still another object of this invention is to provide trimming mechanism of the above character which will consistently produce accurately trimmed edges of narrower marginal widths than has been heretofore possible.

With these and other objects in view, as will hereinafter appear, the invention comprises the devices, combinations and arrangements of parts hereinafter described in connection with the accompanying drawings, which illustrate a selected embodiment of the invention and in which:

Fig. 1 is a front elevational view of a portion of a sewing machine, partly in section, having my invention applied thereto;

Fig. 2 is a sectional view taken substantially along line 2—2 of Fig. 1; showing the cutter mounting details;

Fig. 3 is a sectional view taken substantially along line 3—3 of Fig. 1;

Fig. 4 is an enlarged fragmentary view also taken substantially along line 3—3 of Fig. 1,

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showing the trimmer mechanism in its inoperative or throw-out position;

Fig. 5 is a plan view of a portion of the work-plate of the sewing machine having my invention applied thereto;

Fig. 6 is a perspective view of my invention, with certain of the parts in section and others removed to best illustrate the passage of the fabric through the device;

Fig. 7 is a side elevational view of a portion of the trimming mechanism taken substantially along line 7—7 of Fig. 1;

Fig. 8 is a sectional view taken substantially along line 8—8 of Fig. 7; and

Fig. 9 represents a disassembled perspective view of the ledger blade securing block.

In the drawings, the invention is illustrated as applied to a sewing machine having a bed-plate 10, to the upper surface of which is secured a throat-plate 11 provided with openings to accommodate a feed-dog 12. A portion of the sewing machine frame is shown in Fig. 1 including an overhanging arm 13 having a hollow head 14 formed at the outer extremity thereof. The head 14 is formed in its lower portion to provide an open-bottom housing 15 shaped to accommodate a portion of the actuating connections of the hereinafter described trimming mechanism. Journaled in the overhanging arm 13 is a main shaft 16 which is provided with suitable driving connections (not shown) for reciprocating a needle-bar 17 which is slidably journaled in the head 14, and carries at its lower extremity a needle 18. Also journaled in the sewing head 14 is the usual spring-loaded presser-bar 19.

The selected embodiment of my invention is adapted to trim the marginal edges of superimposed plies of material to two unequal marginal widths. To this end, two trimming knives 20, 30 are employed, both carried by a single carrier-member 40 upon which the knives are supported for independent lateral and vertical adjustment in a manner to be described presently. The rearward knife 20 is provided with a vertical slot 21 to receive a pair of fastening screws 22—22 which secure the knife to a vertical arm 23 of an angle bracket 24. The bracket 24 is provided with a horizontal arm 25 which is offset forwardly of the vertical arm 23, as clearly shown in Fig. 2, and is rectangular in cross section so as to enter a correspondingly shaped shallow groove 41 formed in the carrier-member 40.

The shank of the forward knife 30 is slotted as at 31 to receive a pair of fastening screws 32—32 which secure the knife to a vertical arm

33 of an angle bracket 34 in the same manner as that of the rearward knife 20. The bracket 34 is formed with a horizontal arm 35 which is offset rearwardly from the vertical arm 33 and has a shallow groove 36 providing a seat for the horizontal arm 25. The horizontal arms 25 and 35 are each provided with elongated apertures 27 and 37 respectively, the apertures being disposed to register one with the other so as to provide passage for a fastening screw 38 which is threaded into the carrier-member 40. As best illustrated in Fig. 3, the rectangular arm 25, by entering both the groove 41 of the carrier member 40 and the groove 36 of the horizontal arm 35 serves to lock both of the angle brackets and the carrier-member securely together when the screw 38 is tightened. It will be appreciated that the apertures 27 and 37 permit a wide range of lateral adjustment of the position of either knife independently of the other; while the slots 21 and 31 provide for a similar independent vertical adjustment of knife position. It will be noted that the horizontal arms 25 and 35 are offset in opposite directions from their corresponding vertical arms 23 and 33 thus providing a tandem or fixed spaced relationship between the trimmer knives in the direction of the line of feed.

The knife carrier-member 40 is journaled for vertical reciprocation on guide rods 50 and 60 which depend vertically from the head 14 of the sewing machine. The rod 50 is cylindrical and is secured to the head preferably by a force fit, while the rod 60 is formed with parallel slabbed surfaces 61 and 62 and is secured in the head by means of a set screw 63. Provided at one side of the carrier-member 40 is a vertical tubular sleeve 42 which is freely journaled on the cylindrical rod 50. Extending horizontally from the vertical sleeve 42 at a point above the groove 41, is a horizontal arm 43. The free extremity of the arm 43 is bifurcated as at 44 and adapted to slidingly embrace the slabbed surfaces 61 and 62 of the guide rod 60 to prevent angular movement of the carrier-member. A screw 45 is provided in the arm 43 for adjusting the bifurcated portion 44 to a snug sliding fit on the rod 60.

It will be understood that during operation of sewing machines of the type disclosed in the drawings, a fine spray or mist of lubricant is ordinarily set up within the hollow frame and serves as a means for lubricating the mechanism therein. In order to make available this source of lubrication to the sliding surfaces between the carrier-member 40 and the guide rods 50 and 60, the rods at their upper extremities are formed to extend well within the sewing head 14 and as shown in Fig. 3 are each provided with an axial lubricant conducting bore 54 and 64 respectively, and radial ports 55 and 65 respectively for directing the lubricant to the surfaces requiring lubrication. Since the rods extend upwardly into the sewing head, lubricant settling in the bottom of the head is prevented from flooding or draining freely onto the trimming mechanism.

Reciprocatory movement is imparted to the two trimmer blades from an eccentric 70 on the main shaft 16 of the machine through a mechanical linkage which includes a means for rendering the trimmer mechanism inoperative at the will of the operator.

The trimmer actuating mechanism comprises an eccentric pitman 71 which is connected by a pin 72 to a rock-arm 73 that is pivoted to the sewing head 14 of the machine by a stud shaft 74 fixed in the head 14 by the set screw 75. Also pivotally carried by the pin 72 at the extremity of the rock-arm 73, is the upper link 76 of a toggle connection, which link is formed at its lower extremity with a clevis 77. A pin 78, secured in the clevis by means of a set screw 79, pivotally connects the clevis with a knuckle 80 which is formed on link 81 of the toggle. The link 81 is, in turn, pivoted to the horizontal arm 43 of the carrier-member 40 by a pin 82.

The link 81 is provided with a hand lever 83 by which the toggle connection may be manually turned about the pivot-pin 82 so as to move the actuating mechanism either into operative or inoperative position. When the hand lever 83 is moved downwardly the trimmer actuating mechanism is moved into operative position as shown in Fig. 3. In this position the links 76 and 81 are in substantially vertical alignment as determined by a stop lug 87 which is formed on the knuckle 80. The links are held against accidental movement out of vertical alignment by a spring loaded plunger 84 which is carried in a bore 85 of the clevis 77 and is adapted to enter a hollow 86 in the knuckle 80 to lock the toggle and to form, in effect, a single unbroken link to transmit the motion of the eccentric 70 to the trimmer carrier-member 40.

When the link 81 is manually rotated in a clockwise direction by the hand lever 83 into the inoperative position as shown in Fig. 4, the plunger 84 is thereby forced out of the hollow 86 and the knuckle 80 and clevis 77 will also be rotated with respect to each other, so that the links 76 and 81 assume an angular relationship. This movement of the actuating mechanism causes the carrier-member 40 to be lifted along the guide-rods 50 and 60 so that the trimming knives 20 and 30 are raised to inoperative position. Since the links 76 and 81 are unlocked from the aligned operative position, further operation of the machine results in slight angular movement of these links rather than reciprocation of the trimming knives. When placed in inoperative position, the knives are retained against accidental downward movement during the above described slight angular movement of the links by means of a detent which preferably comprises a spring clip 90 secured to the sewing head and formed to enter a notch 91 in the sleeve 42 of the carrier member 40.

A cover 95 is provided to substantially close the open bottom of the housing 15 and to afford sufficient clearance for the operation of the link 76 of the trimmer toggle links as clearly shown in Fig. 1. The cover 95 is secured to the machine by means of a knurled thumb screw 96 which is threaded into the extremity of the stud shaft 74.

Referring in particular to Fig. 5, that portion of my invention which is carried by the bed-plate 10 of the sewing machine will now be described.

The bed-plate is formed with the usual opening 100, a portion of which is covered by the throat-plate 11, which is secured in position across the opening 100 by fastening screws 101 and has a needle-aperture 102. Adjacent the throat-plate 11, a block 103 (Figs. 7 and 9) spans the opening 100. At one side of the block 103, a forwardly projecting arm 104 extends beneath the bed-plate and is formed at its extremity with an upstanding rib 105 which is adapted to enter a confining groove 106 formed perpendicular to the line of feed in the under surface of the bed-plate 10. A bolt 107, which extends through a clearance hole in the bed-plate and also through a laterally elongated slot 108 in the arm 104 is used

to secure the block 103 to the bed-plate. It will be understood that the groove 106 and rib 105 maintain the block in parallel relationship with the line of feed while the elongated slot 108 permits lateral adjustment of the position of the block toward or away from the throat-plate. At its other extremity, the block 103 rests upon the top surface of the bed-plate 10 and may be secured in any desired position of lateral adjustment by a clamp member 109 which is secured on the bed-plate by the fastening screw 110. The block 103, on its top surface is provided with a concave depression 111 and is formed to receive in the preferred embodiment a unitary ledger blade 112 which is secured to the block by fastening screws 113—113. The unitary ledger blade is formed with stepped cutting edges 114 and 115, each edge being disposed at a different distance from the line of stitch formation, so as to have predetermined spaced lateral relationship.

In adjusting the mechanism for a particular trimming operation, a ledger blade 112 having the desired lateral relationship between cutting edges 114 and 115 is selected and secured to the block 103 with screws 113—113. By loosening the screw 110 of the clamping member 109 and the bolt 107, the position of the block 103 is adjusted laterally of the line of feed until the cutting edges 114 and 115 are disposed at the desired distances from the needle aperture 102 in the throat-plate 11. The knives 20 and 30 must then be adjusted to correspond with the ledger blade position. This is done first by loosening screw 38 on the carrier member 40 so that the angle brackets 24 and 34 may each be independently adjusted laterally of the line of feed, whereby the knife 20 on angle bracket 24 may be vertically aligned with the ledger blade edge 114 to provide a shearing relationship, and knife 30 similarly adjusted with respect to edge 115, at which time the screw 38 is tightened. Next, each knife may be shifted vertically with respect to the angle bracket upon which it is carried by loosening the screws 22—22 for knife 20 and screws 32—32 for knife 30. It will be appreciated that the above described construction provides, in addition, a means for adjusting the knife position to compensate for wear, etc.

Referring again to the parts of this invention which are supported on the bed-plate and particularly to Fig. 3, it will be apparent that the top surface of the ledger blade block 103, the clamp member 109 and the throat plate 11 are disposed at a common elevation higher than that of the bed-plate 10. In order to provide a continuous flat work supporting surface, a slide plate 116 and work supporting plates 117 and 118 are also disposed on the bed-plate at the elevation of the aforementioned members. The work supporting plates 117 and 118 are secured to the bed-plate by means of fastening screws 119 which pass through elongated slots 120 in the plates to provide for adjustment of the positions of the plates to accommodate any change in the position of the ledger blade carrying block 103.

To properly introduce the work into the trimming mechanism, edge guides 125 and 126 of usual construction, one for each of the plies of fabric to be trimmed, are disposed one above the other and secured by means of fastening screws 127 to the work supporting plate 118.

In order to insure proper feeding of the work past the tandem trimmer blades, a presser-foot 150 is used, preferably of sufficient length to engage the work adjacent both of the trimming knives 20 and 30. The usual needle hole 151 is provided in the presser-foot, as well as a work inspection aperture 151'. The presser-foot 150 is pivoted to a shank member 152 adapted to be secured upon the lower extremity of the presser-bar 19 by a screw 153. A wire spring 154, anchored to the shank 152 and bearing upon the presser-foot 150 serves to bias the forward portion of the presser-foot into contact with the work.

The means for directing the plies of fabric through the trimming mechanism each to the proper trimming knife, as best illustrated in the perspective view Fig. 6, will now be described.

Rigidly secured to the front and rear of the presser-foot 150 and extending the entire length thereof, is a ply-deflecting member indicated generally as 200. This ply deflector 200 is preferably formed of sheet metal and is provided with inturned arms 201 and 202 by which it is welded or otherwise rigidly secured to the front and rear portions respectively of the presser-foot soleplate. A vertically disposed ply-deflecting fin 203, spaced slightly from the presser-foot, extends forwardly from the rear inturned arm 202 between the line of stitch formation and the rear trimming knife 20 to a point slightly in advance of the rear trimming knife. At its forward extremity, the deflecting fin 203 is formed with a vertical leading edge 204 which is curved away from the line of stitch formation. The bottom edge of the fin 203 curves upwardly toward the rear forming at the juncture of the fin and the rear inturned arm 202, an opening 205 through which the deflected ply may pass beyond the deflector.

A flat horizontal strip 206, disposed substantially at the level of the bottom of the presser-foot, extends from the bottom of the leading edge 204 of the fin 203 to a point forwardly of the front trimming knife 30. At its forward extremity, the strip 206 branches laterally in both directions to form at one side a ply separating finger 207 which is disposed in front of the presser-foot. At the side opposite the ply separating finger 207 the strip 206 is formed with an outwardly extending portion 208 which supports at its outer extremity, the inturned arm 201 by which the front portion of the deflector is secured to the presser-foot.

The mode of operation of my improved trimmer mechanism is best described with reference to the perspective view, Fig. 6, in which only two plies of material A and B are shown, each being trimmed to a different marginal width. The directional arrow indicates the direction of feed of the work and the line of stitch formation is indicated at S. Each of the two superposed plies of material, A and B, are directed toward the presser-foot 150 in flat, horizontally extended position, with their untrimmed marginal edges maintained substantially parallel and in vertical alignment by means of the edge-guides 125 and 126. Before entering beneath the presser-foot, the plies A and B are directed one on either side of the ply separating finger 207; the ply A passing above, and the ply B below the finger. The strip 206 of the deflector 200, which extends rearwardly from the ply separating finger 207 is therefore also disposed between the plies A and B. It will be apparent that the plies of material will not be disturbed appreciably by the presence of the ply separating finger 207 or the strip 206 since these elements are relatively thin and are dis-

posed in substantially parallelism with the line of travel of the fabric.

The action of the feed-dog 12 advances both of the plies in normally extended position to the front trimming knife 30, which trims both of the plies to the same marginal width. As the plies are moved beyond the front trimming knife 30 and are stitched together along the line of stitch formation S, the upper ply A is deflected upwardly by the vertical leading edge 204 of the deflecting fin 203, thereby exposing the lower ply B in its flat normally extended position. The fin 203 maintains the ply A in vertically deflected position out of the path of the rear trimming knife 20 so that the knife 20, being disposed to trim closer to the line of stitch formation S than the blade 30, trims the lower ply B to a narrower marginal width than that of ply A. The opening 205 at the bottom of the fin 203, permits the marginal portion of the ply A to pass beyond the deflector 200.

It is again pointed out that each of the plies, prior to being trimmed, is disposed in normally extended position, so that an accurate and even is trimmed on each ply in a positive manner, without requiring complicated work controlling mechanism. Furthermore, the manner in which the ply A is deflected out of the path of the rear trimming blade 20 is not critical to the accuracy or consistency of the final trimmed edge and, therefore, the curve of the leading edge 204 of the deflecting fin 203 may be a relatively gradual one so as to minimize the frictional drag that is exerted upon the work.

Although the operation of my improved trimming mechanism has been described above in connection with only two superimposed plies of material, it will be understood that a greater number of plies may be trimmed simutaneously; the width to which the additional plies of material will be trimmed depending upon which side of the ply separating finger 207 the additional ply is directed. If directed under the ply separating finger as is the ply B, it will be trimmed to the marginal width equal to that of ply B. If, however, the additional ply is directed over the finger 207, as is ply A, it will follow the course of ply A through the trimming mechanism and, consequently, will be trimmed to a marginal width equal to that of ply A.

It is understood that the illustrated and described preferred embodiment of my invention is capable of modification, and I therefore do not wish to be limited to the precise details set forth, but desire to avail myself of all changes of modifications coming within the scope of the invention as defined in the following claims.

Having thus set forth the nature of the invention, what I claim herein is:

1. A multi-ply trimming mechanism for sewing machines having stitch-forming instrumentalities and work feeding means, comprising a first trimming device arranged to cut in a plane spaced from the normal line of stitch formation of said sewing machine, a second trimming device disposed rearwardly of and arranged to cut in a plane offset laterally from the plane of said first trimming device, and a ply deflector having a ply-engaging surface arranged parallel to the plane of action of said second trimming device, said surface having a leading edge portion disposed between said first and second trimming devices.

2. In a sewing machine having stitch-forming instrumentalities including a needle and a work-feeding device adapted to produce a line of stitches, a mechanism for trimming the edges of a plurality of superposed plies of material to unequal marginal widths as they are being stitched together, said mechanism comprising a first trimming device disposed to cut at a predetermined distance to one side of the line of stitch formation of the sewing machine, a second trimming device disposed to cut between said first trimming device and said line of stitch formation, and a ply deflecting member disposed between said second trimming device and said line of stitch formation for removing one or more of said plies from the action of said second trimming device.

3. A multi-ply trimming mechanism for sewing machines comprising, a plurality of trimming devices disposed to cut at different distances from the line of stitch formation of the sewing machine, each of said trimming devices including a movable element and a stationary element, said movable elements being adapted to be actuated simultaneously by a single actuating mechanism, and said stationary elements together forming a single ledger member; and a ply deflecting member for deflecting one or more of the plies out of the line of action of certain of said trimming devices.

4. In a sewing machine, a mechanism for trimming the edges of a plurality of superposed plies of material to unequal marginal widths as they are being stitched together, said mechanism comprising a pair of trimming knives, a single carrier member for both of said knives, actuating mechanism for imparting operative movement to said carrier-member, a single ledger blade having a pair of cutting surfaces disposed to coact with said trimming knives, and a deflector adapted to move one or more of said plies from the action of one of said trimming knives.

5. In a sewing machine, a mechanism for trimming the edges of a plurality of superposed plies of material to unequal marginal widths as they are being stitched together, said mechanism comprising a pair of cutting surfaces fixed on the sewing machine in spaced relationship in the direction of feed and at different distances from the line of stitch formation, said fixed cutting surfaces being disposed beneath all of the plies of material as they are being stitched; a pair of trimming knives, a carrier-member, means including a pair of supporting brackets for adjustably securing said knives to said carrier-member each in position to coact with one of said fixed cutting surfaces, actuating mechanism for imparting operative movement to said carrier-member; and a deflector adapted to move certain of said plies from the action of one of said trimming knives.

6. In a sewing machine, a mechanism for trimming the edges of a plurality of superposed plies of material to unequal marginal widths as they are being stitched together, said mechanism comprising a presser-foot; a pair of trimming devices disposed at one side of said presser-foot substantially in tandem relationship in the direction of feed of the sewing machine, said trimming devices arranged to each cut at a different distance from the line of stitch formation; and a ply deflecting member carried by said presser-foot, said ply deflecting member including a ply separating finger disposed in front of and substantially at the level of the bottom of said presser-foot, and a ply deflecting fin adapted to deflect those plies separated by said ply separating finger out of the line of action of one of said trimmer devices.

7. In a sewing machine, a mechanism for trim-

ming the edges of a plurality of superposed plies of material to unequal marginal widths, said mechanism comprising a movable cutting member; a stationary cutting member cooperating with said movable cutting member; more than one cutting surface formed on each of said members, the cutting surfaces of each member spaced apart laterally of the line of stitch formation of the sewing machine, the cutting surfaces of one of said members being adjustable laterally with respect to each other, the other of said cutting members having cutting surfaces permanently fixed thereon, said sewing machine being formed to receive said last named cutting member for ready replacement with a cutting member having a different lateral spacing between the cutting surfaces thereon; and a ply deflecting member for removing one or more of said plies from the action of one or more of said cutting surfaces.

8. In a sewing machine trimming mechanism for severing more than one ply of fabric, a plurality of trimming devices disposed to operate on the fabric plies in seriatim, said trimming devices comprising movable knives adapted to be actuated simultaneously, a single actuating mechanism therefor, and stationary cutting elements disposed to coact with said movable knives, said stationary cutting elements together forming a unitary ledger member.

9. In a multi-ply trimming mechanism for sewing machines, a plurality of trimming devices arranged each to cut at a different distance from the line of stitch formation, a ply-deflecting member including a ply-separating finger extending between the plies, and a deflecting fin joined angularly to said ply-separating finger at a point immediately in advance of one of said trimming devices and arranged in the path of one of said separated plies.

10. In a sewing machine having feeding means, a mechanism for trimming a plurality of plies of fabric comprising, a plurality of trimming devices disposed substantially in tandem with respect to the normal direction of feed, said trimming devices including complemental movable elements and stationary elements, said stationary elements being disposed at the same side of all of the plies passing through said sewing machine, means for reciprocating said movable elements from the opposite side of the plies into ply-severing relation with said stationary elements, and a stationary ply-deflecting member having at least a portion disposed immediately in advance of one of said trimming devices with respect to said normal direction of feed to deflect less than all of the plies out of the line of action of said last mentioned trimming device.

11. A multi-ply trimming mechanism for sewing machines having stitch-forming instrumentalities and work-feeding means, comprising a plurality of knives supported for movement in spaced vertical planes at one side of said stitch-forming instrumentalities and arranged to cut in seriatim in relation to the direction of feed, and a ply-deflecting member having a continuous work-engaging surface including a horizontally arranged ply-separating portion and a vertically disposed ply-deflecting fin extending between said stitch-forming instrumentalities and that vertical plane of knife movement closest to said stitch-forming instrumentalities.

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