Feb. 3, 1953 J. P. ENOS 2,627,239

ATTACHMENT FOR MAKING STITCHED HEMS

Filed Feb. 20, 1948 2 SHEETS--SHEET 1

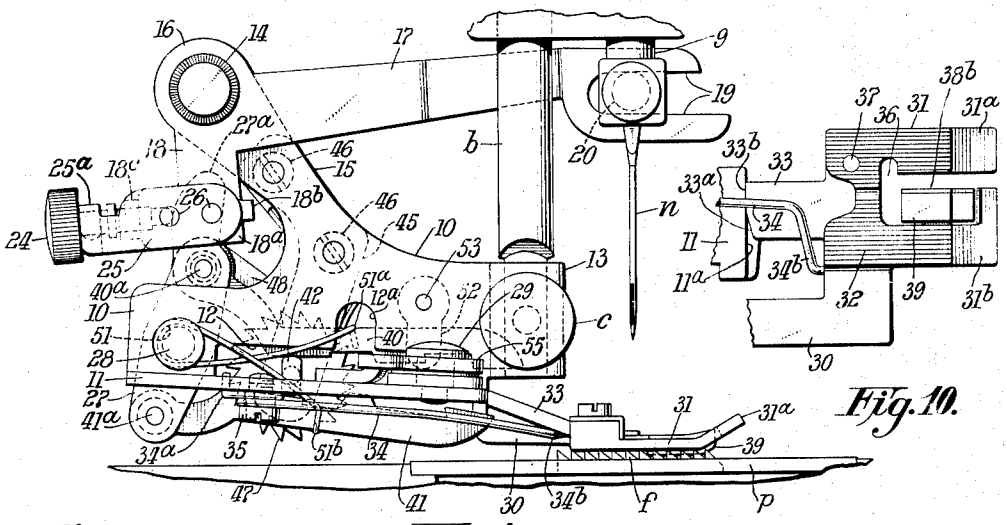


Fig. 1.

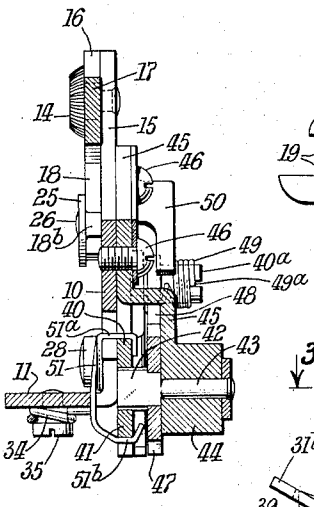


Fig. 4.

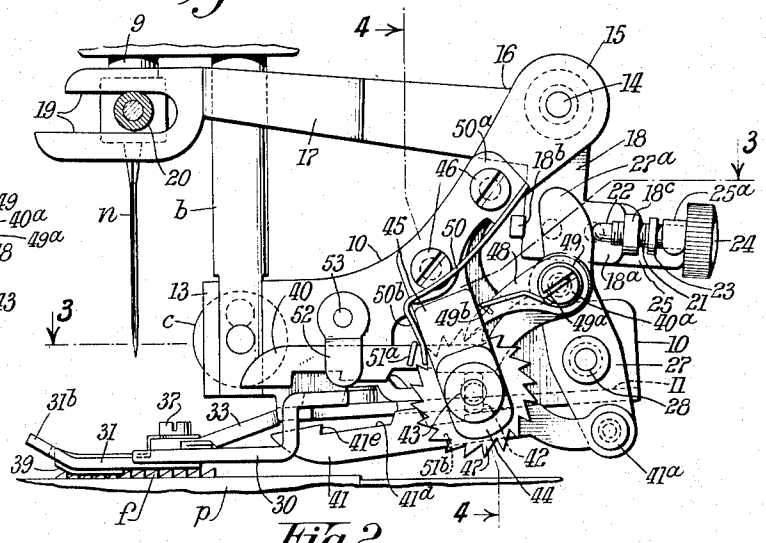


Fig. 2.

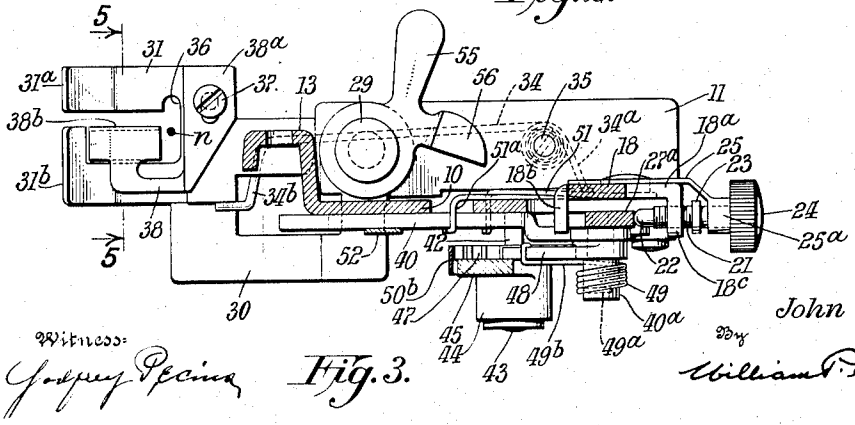


Fig. 3.

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ATTACHMENT FOR MAKING STITCHED HEMS

Filed Feb. 20, 1948 2 SHEETS—SHEET 2

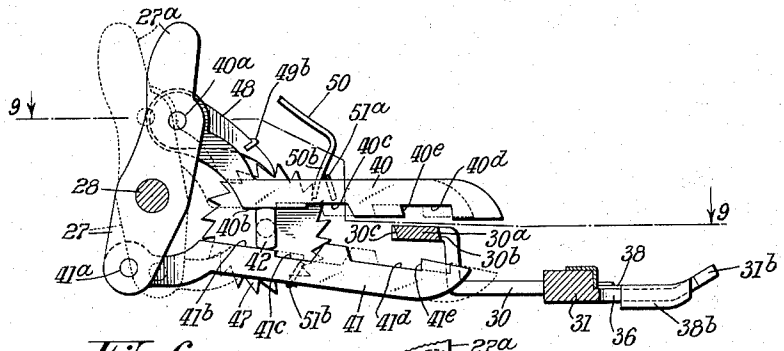


Fig. 6.

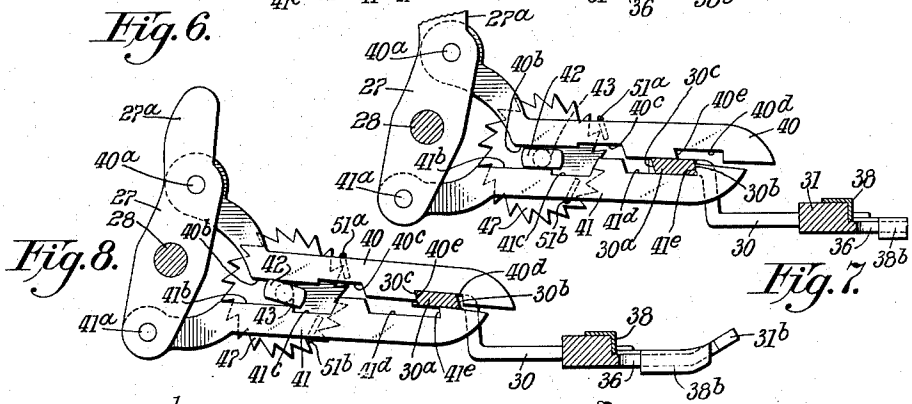


Fig. 8.

Fig. 7.

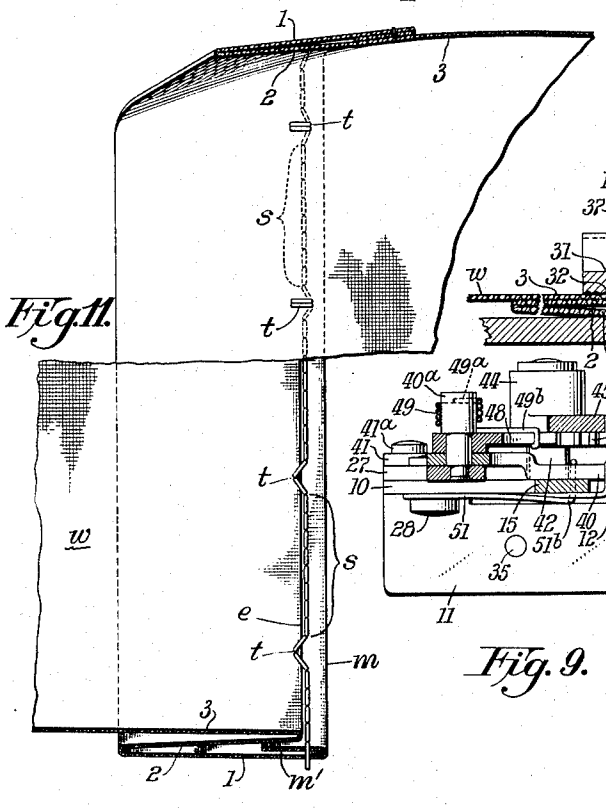


Fig. 11.

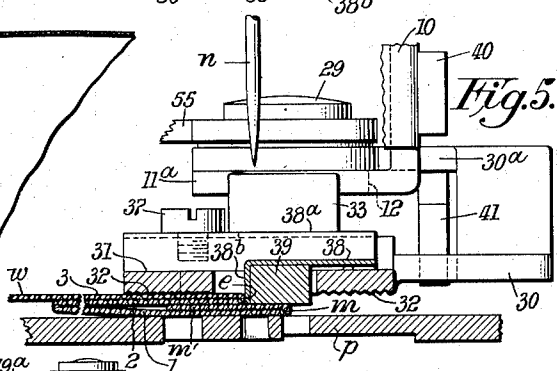


Fig. 5.

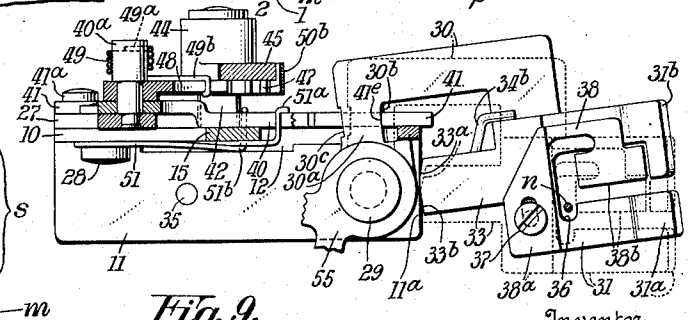


Fig. 9.

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2,627,239

ATTACHMENT FOR MAKING STITCHED HEMS

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Application February 20, 1948, Serial No. 9,678

9 Claims. (Cl. 112—160)

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This invention relates to means for making stitched hems in sheet material.

One of the objects of this invention is to devise improved means for forming and stitching a hem by a conventional straightaway sewing machine, in which the stitches, which attach the hem to the body material, will be either completely hidden at the face of the work or will appear only inconspicuously at widely spaced intervals, dependent upon the thickness of the material.

Another object of the invention is to provide an improved attachment for a conventional straightaway sewing machine which will cause the machine to produce, at a relatively high speed and with a minimum amount of help from the operator, a so-called "blind-stitch" hem similar to those formed by organized blind-stitch sewing machines and simulating the much desired hand sewn hem.

These objects have been attained by the provision of an improved attachment capable of being attached to the presser-bar of a conventional straightaway sewing machines in place of the usual presser-foot, and which will cause the machine cyclically to make a predetermined number of straightaway stitches in one ply of a hem fold, which stitches are completely hidden at the front of the work, and then to make a single offset stitch which partially or completely penetrates the body material, the offset stitches attaching the hem fold to the body material at widely spaced intervals. In materials which are reasonably thick, the spaced hem-attaching stitches may enter and emerge from the same side of the body material, without passing therethrough, and therefore will be invisible on the outside of the body material. In other materials, which are too thin for the needle to split, the hem-attaching stitches may pass through the body material and be visible at the outside thereof. However, as these stitches are small and are spaced apart a considerable distance, for example, about one inch, they are inconspicuous and resemble hand sewing.

This invention has been embodied in an attachment which is basically similar to the zig-zag attachment which forms the subject of United States Patent No. 2,175,293, October 10, 1939, of G. L. Hinman. The present attachment, however, contains features not included in the Hinman construction and which adapt the attachment for performing blind-stitch hemming as above described, instead of continuous zig-zag stitching for which the Hinman device was designed.

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With the above and other objects in view, as will hereinafter appear, the invention comprises the herein described devices, combinations, and arrangements of parts hereinafter set forth and illustrated in the accompanying drawings of a preferred embodiment of the invention, from which the several features of the invention and the advantages attained thereby will be readily understood by those skilled in the art.

In the drawings,

Fig. 1 is a side elevation of my improved attachment showing it secured to the pressure-bar of a conventional family sewing machine and actuated by the reciprocating needle-bar thereof.

Fig. 2 is a view similar to Fig. 1 but looking in the opposite direction and with an actuating stud, carried by the needle-bar, shown in section.

Fig. 3 is a horizontal sectional view taken substantially on the line 3—3 of Figure 2.

Fig. 4 is a vertical sectional view taken substantially on the line 4—4 of Fig. 2.

Fig. 5 is an enlarged transverse sectional view taken substantially on the line 5—5 of Fig. 3, together with a portion of the throat-plate of the machine shown in section.

Figs. 6, 7 and 8 are detail vertical sectional views, with the parts in various positions, of a shiftable work-holder and means for shifting it laterally at predetermined times, forming parts of my improved attachment.

Fig. 9 is a horizontal sectional view taken substantially on the line 9—9 of Fig. 6, but with the parts shown in full lines in the position illustrated in Fig. 7.

Fig. 10 is an under side view of a work holding and shifting member, later to be described, and parts closely associated therewith.

Fig. 11 is a perspective view representing a workpiece having a hem which has been blind stitched by use of a sewing machine fitted with my improved attachment, the lower portion of the figure showing the workpiece as it is folded and stitched, and the upper portion of the figure showing the body portion of the workpiece turned over to the right to expose the outer surface of the hemmed workpiece.

Referring more specifically to the drawings, the structural characteristics of the invention are disclosed as embodied in an attachment comprising a main frame member having a vertically disposed plate 10 which has, at its lower edge, a horizontally extending flange 11 connected to the plate 10 at its front and rear ends, there being a slot or opening 12 between the plate and the flange for the greater part of the length of the latter between the two points of connection. In-

termediate its ends, the slot 12 has an upwardly extending portion 12a (Fig. 1) through which extends a spring hereinafter to be described. At its forward end the portion 10 is provided with a shank portion 13, generally U-shaped in horizontal cross section, adapted to be secured upon the lower end of a presser-bar *b* of a sewing machine by a clamp-screw *c*, in place of the usual presser-foot. The sewing machine, of which the presser-bar forms a part, also includes a conventional work-feeding mechanism designated generally as *f*, which operates through a slotted throat-plate *p*, and stitch-forming mechanism including a reciprocating needle-bar 9, carrying, at its lower end, an eye-pointed thread-carrying needle *n* which cooperates with a conventional loop-taker mechanism, not shown.

Pivotally mounted on a stud 14, secured in an upwardly and rearwardly extending arm 15 of the plate 10, is a bell-crank actuating lever 16, having a relatively long forwardly extending arm 17 and a relatively short downwardly extending arm 18. The arm 17 is formed with a forked forward end 19 which straddles a stud 20 carried by the needle-bar 9. The arm 18 of the lever 16 has, at its lower end, a transverse portion 18a from which project lugs 18b and 18c. Threaded through the lug 18c is a screw 21 having a rounded free end 22, a collar 23 and a knurled head 24. The screw 21 is embraced, between the shoulder 22 and the head 24 by the offset arcuately shaped end 25a of a flat spring 25 which is secured to the portion 18a of the arm 18 by rivets 26. The spring is tensioned to frictionally engage the screw 21 by means of its curved end 25a and thus holds the screw in its adjusted positions. From the foregoing it will be understood that reciprocatory movements of the needle-bar 9 are translated into oscillatory motions in the actuating lever 16. During such oscillatory motions of the lever 16, the lug 18b and the rounded end 22 of the adjustable screw 21 are successively brought into contact with the upper free end 27a of a lever 27 fulcrumed on a stud 28 carried by the plate 10, thereby oscillating that lever for a purpose hereinafter to be described. Inasmuch as the lever 16 has a fixed range of movement, the amount of movement transmitted to the lever 27 will be determined by the setting of the screw 21, adjustment of which varies the amount of lost motion between the end 27a of the lever and the lug 18b and the end 22 of the screw 21.

Pivotally mounted on the upper surface of the forward end of the flange 11 by a stud 29 is the horizontally disposed shank 30 of a work-holding and shifting element 31, in the nature of a presser-foot. Hereinafter, this element will be referred to as a work-holder. The under surface of the work-holder is serrated, as shown at 32, in Figs. 5 and 10, to cause it to grip the work and shift it laterally when the element is shifted transversely of the line of feed as hereinafter explained. The work-holder is formed with a rearwardly extending portion 33 (See Figs. 1, 2, 9 and 10) having flat surfaces 33a and 33b adapted to abut the forward end 11a of the plate 11 to limit the lateral movements of the work-holder. The work-holder is normally yieldingly maintained in the position shown in Fig. 3 and in dotted lines in Fig. 9, by a spring 34 secured to the under surface of the flange 11 by a screw 35. The spring is coiled about the screw and has a rearwardly extending leg 34a engaging the inner edge of the flange 11 adjacent the slot 12 and a forwardly extending leg having an offset portion 34b which bears against the right side of the work-engaging foot portion of the work-holder 31. The work-holder is formed with spaced upturned toe portions 31a, 31b and a transverse needle slot 36. Adjustably secured upon the upper side of the work-holder 31, by a screw 37, is the shank 38a of a spring steel edge-guide 38 having a downturned edge-guiding portion 38b (Fig. 5). The member 38 carries, at its under side a block 39 which, as shown most clearly in Fig. 5, bears upon the folded marginal portion *m* of the workpiece *w* while the portion 38b is guiding the so-called fold-edge *e* thereof, all hereinafter described.

Oscillation of the levers 16 and 27 from the needle-bar effect periodic lateral shifting of the work-holder 31 and the workpiece *w* therebeneath, as now will be described. Pivotally connected to the lever 27, at 40a and 41a, are upper and lower slide-bars 40 and 41, respectively. These bars are urged toward each other by the action of a spring 51 having its mid-portion secured behind the head of the stud 28 and its crossed legs 51a and 51b engaging respectively the slide-bars 40 and 41. The offset bar-engaging portion of the spring leg 51a extends through the slot 12a in the plate 10. The slide-bar 40 is held against the rear face of the plate 10 and guided during its sliding movements by a guide member 52 secured to the rear side of the plate as by a rivet 53 (Fig. 2). When the lever 27 is oscillated, the slide-bars 40 and 41 are reciprocated simultaneously in opposite directions. In nine stitches of each ten-stitch cycle these reciprocations are idle movements and perform no function, the machine sewing straightaway stitches. During the making of the tenth stitch the backward movement of the bar 41 and the next forward movement of the bar 40 shift the work-holder 31, and the work therebeneath, first to the right, as viewed from the front of the machine, and then to the left. This lateral movement of the work, relative to the stitch forming mechanism, causes the machine to make a stitch transversely of the main line of straightaway stitches as hereinafter will be described.

The slide-bars 40 and 41 are provided at their adjacent edges, respectively, with straight surfaces 40b, 41b, rear recesses or notches 40c, 41c and forward recesses or notches 40d, 41d. The forward wall 41e of the notch 41d is inclined upwardly and rearwardly and is adapted, at certain times, to engage the upwardly and rearwardly inclined forward edge 30b (see Figs. 7 and 9) of a transverse portion 30a of the shank 30 of the work-holder 31. When the work-holder is so engaged by the slide-bar 41, rearward movement of the bar swings the work-holder about its pivot 29 from the position shown in dotted lines in Fig. 9 to the position shown in full lines. During the next forward movement of the slide-bar 40 the upwardly and rearwardly inclined wall 40e of the notch 40d engages the inclined rear edge 30c of the portion 30a and turns the work-holder 30—31 about its pivot 29 from the position shown in full lines in Fig. 9 to the position indicated in dotted lines, thereby shifting the workpiece therebeneath back to its original position.

During the making of the first nine stitches of each ten-stitch cycle the slide-bars 40 and 41 are held out of engagement with the transverse portion 30a of the shank of the work-holder. Therefore, during that period the bars are reciprocated but have no effect on the work-holder 31. The holding of the bars 40 and 41

out of engagement with the portion 30a is effected by a rotary control element 42 in the form of a rectangular block having rounded ends. As shown most clearly in Fig. 4, this control element 42 is carried by a stud 43 journaled in a hub 44 forming a part of a bracket 45 secured by screws 46 to one side of the plate 10. Secured upon the control element, coaxial with the stud 43 is a twenty tooth ratchet wheel 47 adapted to be engaged and shifted, one tooth at a time, by an actuating pawl 48 journaled upon the pivot pin 40a which pivotally connects the slide-bar 40 with the lever 27. A coil spring 49, surrounding the pivot pin 40a, has an inturned limb 49a connected to the pivot pin and a laterally extending limb 49b which bears upon the pawl to hold it in contact with the ratchet wheel. A retaining pawl 50, the shank 50a of which is secured to the side of the bracket 45 by the screws 46, has a depending finger 50b lying against the side of the bracket 45 and engaging the teeth of the ratchet wheel to prevent retrograde movement of the wheel.

As hereinbefore stated reciprocation of the needle-bar effects, through the lever 16, oscillatory movements of the lever 27 and reciprocatory motions of the slide-bars 40, 41. During such movements the pawl 48 is advanced and retracted, thereby transmitting to the ratchet wheel step-by-step rotary motions equal in length to the angular spacing of the teeth of the wheel. This intermittent rotation of the ratchet wheel effects similar step-by-step rotation of the control member or block 42, the rounded ends of which are adapted to engage the opposed surfaces 40b, 41b of the slide-bars 40, 41, thereby to separate the bars in opposition to the influence of the spring 51. In the position shown in Fig. 7, the block 42 is arranged parallel with the surfaces 40b, 41b and therefore the slide-bars are moved toward each other by the spring 51 until they engage the portion 30a of the shank of the work-holder. With the parts in this position, the next retractive movement of the slide-bar 41 will shift the work-holder from the position shown in dotted lines in Fig. 9 to the position shown in full lines. These lateral movements of the work-holder and the work therebeneath causes the machine to make a stitch to one side of the normal line of straightaway stitches. During the next succeeding forward movement of the slide-bar 40, it will engage the rear edge of the portion 30a and shift the work-holder back to the position shown in dotted lines in Fig. 9. During the next nine reciprocations of the needle, the rounded ends of the control block 42 engage the surfaces 40b and 41b of the slide-bars and hold them apart, in opposition to the spring 51 (see Fig. 6), so that the slide-bars reciprocate without engaging the shank of the work-holder, which therefore remains in the position shown in Fig. 2 and in dotted lines in Fig. 9. While the slide-bars are held out of contact with the portion 30a, the sewing machine forms a line of nine straightaway stitches. This cycle is repeated during each half turn of the ratchet wheel or, in other words, once for each ten stitches.

Referring to Fig. 5 and the lower portion of Fig. 11, it will be understood that to perform the blind-stitch hemming operation the workpiece *w* is folded into a flat Z-shape, comprising plies 1, 2 and 3, and placed beneath the work-holder 31 with the marginal portion *m* beneath the block 39 and the fold-edge *e* against the side of the edge-guiding portion 38b of the edge-guide 38. The marginal portion *m* may be unfolded or it may be folded back to place the edge portion *m'* thereof between the plies 1 and 2, as shown in Figs. 5 and 11. The workpiece thus folded and guided is fed to and past the stitching mechanism which cyclically produces a line of straightaway stitches *s* through the marginal portion *m* (folded or unfolded) closely adjacent the fold-edge *e*, and, at every tenth reciprocation of the needle, a lateral or transverse stitch *t* which passes through the fold-edge *e* and the marginal portion *m*, thereby anchoring the fold-edge to the marginal portion at spaced intervals. At the completion of the hemming operation the workpiece is opened out, as indicated at the upper portion of Fig. 11, to place the blind-stitch hem at the rear face of the workpiece.

The attachment may be rendered ineffective to shift the work-holder and the workpiece laterally so that continuous straightaway stitching may be performed upon the machine. This is effected by means of a hand lever 55 fulcrumed upon the screw 29 and having a toe portion 56 adapted to be swung horizontally through the slot 12 in the plate 10 to a position in which it lies between the slide-bars 40, 41 and holds those bars out of engagement with the cross-bar 30a of the shank of the work-holder, as described more fully in the above mentioned Hinman Patent No. 2,175,293.

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

1. A hemming attachment for a sewing machine having a reciprocating needle-bar and a needle carried thereby, comprising a frame; a work-holder connected to the frame for back and forth shifting movements in a horizontal plane in a direction generally transverse to the feed of the work beneath the work-holder; an edge-guide carried by said work-holder for guiding a folded edge of the work relative to the line of reciprocation of the needle with a marginal portion of the work projecting beneath the edge guide and beyond the fold of the work guided by the edge-guide; automatic means actuated by the needle-bar for laterally shifting the work-holder, the edge-guide and the work relative to the line of reciprocation of the needle to cause the machine to make laterally offset stitches through the folded edge of the work; and automatic means periodically rendering the work-holder shifting means ineffective during the formation of a plurality of stitches thereby to cause the machine to form a series of straightaway stitches through the marginal portion of the work between successive offset stitches.

2. A hemming attachment for a sewing machine having a reciprocating needle-bar and a needle carried thereby, comprising a frame; a work-holder connected to the frame for back and forth shifting movements in a horizontal plane in a direction generally transverse to the feed of the work beneath the work-holder; an edge-guide carried by said work-holder for guiding a folded edge of the work relative to the line of reciprocation of the needle with a marginal portion of the work projecting beneath the edge-guide and beyond the fold of the work guided by the edge-guide; automatic means for effecting lateral shifting of the work-holder, the edge-guide and the work relative to the line of reciprocation of the needle; and means actuated by the needle-bar for rendering the work-holder shifting

means effective and ineffective in a predetermined cycle to cause the machine to sew a plurality of series of straightaway stitches through the projecting marginal portion of the work to one side of said folded edge separated by a lateral stitch formed through said folded edge.

3. A hemming attachment for sewing machines comprising a frame; a work-holder connected to the frame for back and forth shifting movements in a horizontal plane in a direction generally transverse to the feed of the work beneath the work-holder; a lever fulcrumed on said frame and having one end operatively connected to the needle-bar of the sewing machine for oscillation thereby; a pair of slide-bars carried by said frame and reciprocated by said lever; operative connections between said slide-bars and said work-holder for shifting the work-holder in opposite directions by the reciprocatory movements of said slide-bars; and means actuated by said lever for periodically rendering said slide-bars effective and ineffective to shift said work-holder.

4. A hemming attachment for sewing machines comprising a frame; a work-holder connected to the frame for back and forth shifting movements in a horizontal plane in a direction generally transverse to the feed of the work beneath the work-holder; a lever fulcrumed on said frame and having one end operatively connected to the needle-bar of the sewing machine for oscillation thereby; a pair of slide-bars carried by said frame and reciprocated simultaneously in opposite directions by said lever; shoulders on said slide-bars adapted to engage said work-holder to shift it in opposite directions to cause the work to be shifted back and forth laterally of the line of seam formation; means for holding said slide-bars out of engagement with said work-holder during the formation of a plurality of straightaway stitches; and means actuated by said lever for periodically permitting said slide-bars to engage and shift said work-holder laterally after a plurality of straightaway stitches have been formed, thereby to cause the machine to make an offset stitch.

5. A hemming attachment for sewing machines comprising a frame; a work-holder connected to the frame for back and forth shifting movements in a horizontal plane in a direction generally transverse to the feed of the work beneath the work-holder; a pair of slide-bars carried by said frame and actuated from the needle-bar of the sewing machine and designed to engage said work-holder for effecting lateral shifting of the work-holder and the work therebeneath relative to the line of reciprocation of the needle; a control element engaging said slide-bars to hold them out of engagement with said work-holder during a plurality of reciprocations of the needle-bar; and means actuated by the needle-bar for shifting said control element into a position in which it permits said slide-bars to engage and shift the work-holder, and the work carried thereby, laterally during one reciprocation of the needle-bar.

6. A hemming attachment for sewing machines comprising a frame; a work-holder connected to the frame for back and forth shifting movements in a horizontal plane in a direction generally transverse to the feed of the work beneath the work-holder; a pair of spaced, spring-biased slide-bars carried by said frame and actuated from the needle-bar of the sewing machine and normally tending to engage said work-holder for effecting lateral shifting movements of the work-holder and the work therebeneath relative to the line of reciprocation of the needle; a control member located between said slide-bars and holding said slide-bars out of engagement with said work-holder during a plurality of reciprocations of said needle-bar, whereupon a plurality of straightaway stitches are made by the sewing machine; and a ratchet device actuated from said needle-bar for shifting said control-bar for shifting said control member to a position in which it permits said slide-bars to engage and shift the work-holder, and the work carried thereby, laterally after said plurality of straightaway stitches have been made, thereby to permit said slide-bars to shift said work-holder and work laterally.

7. A hemming attachment for sewing machines as set forth in claim 6, in which the ratchet device includes a ratchet wheel carried by the frame of the attachment and an actuating pawl therefor which is shifted by the movements of the needle-bar; and in which the control member comprises a stud which projects coaxially from and rotates with said ratchet wheel and lies between said spring-biased slide-bars, said control member having major and minor diametrical dimensions and acting in all positions, except when its minor diametrical dimension separates said spring-biased slide-bars, to hold said slide-bars out of engagement with said work-holder.

8. A hemming attachment for a sewing machine having a reciprocating needle-bar and a needle carried thereby, comprising a frame, a work-holder connected to the frame for back and forth shifting movements in a horizontal plane in a direction generally transverse to the feed of the work beneath the work-holder, an edge-guide for guiding a folded edge of the work relative to the line of reciprocation of the needle with a marginal portion of the work projecting beyond the fold of the work guided by said edge-guide, a lever pivotally carried by the frame for automatic oscillation by the needle-bar of the sewing machine, means for normally maintaining the work-holder in a fixed predetermined position during a series of oscillations of the lever whereby to cause the machine to form a series of straightaway stitches in the projecting marginal portion of the work, and means actuated by said lever for periodically shifting the work-holder and the work therebeneath transversely of the frame to cause the machine to make transversely offset stitches through the folded edge of the work between successive series of straightaway stitches in said marginal portion.

9. A hemming attachment for a sewing machine having a reciprocating needle-bar and a needle carried thereby, comprising a frame, a work-holder connected to the frame for back and forth shifting movements in a horizontal plane in a direction generally transverse to the feed of the work beneath the work-holder, an edge-guide for guiding a folded edge of the work relative to the line of reciprocation of the needle with a marginal portion of the work projecting beyond the fold of the work guided by said edge-guide, a lever pivotally carried by the frame for automatic oscillation by the needle-bar of the sewing machine, means including a spring biased against said work-holder for normally maintaining the latter in a fixed predetermined position during a series of oscillations of the lever whereby to cause the machine to form a series of straightaway stitches in the projecting marginal portion of the work, and means actuated by said lever for periodically shifting the work-holder and the work therebetween transversely of the frame to

cause the machine to make transversely offset stitches through the edge fold between successive series of straightaway stitches.

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