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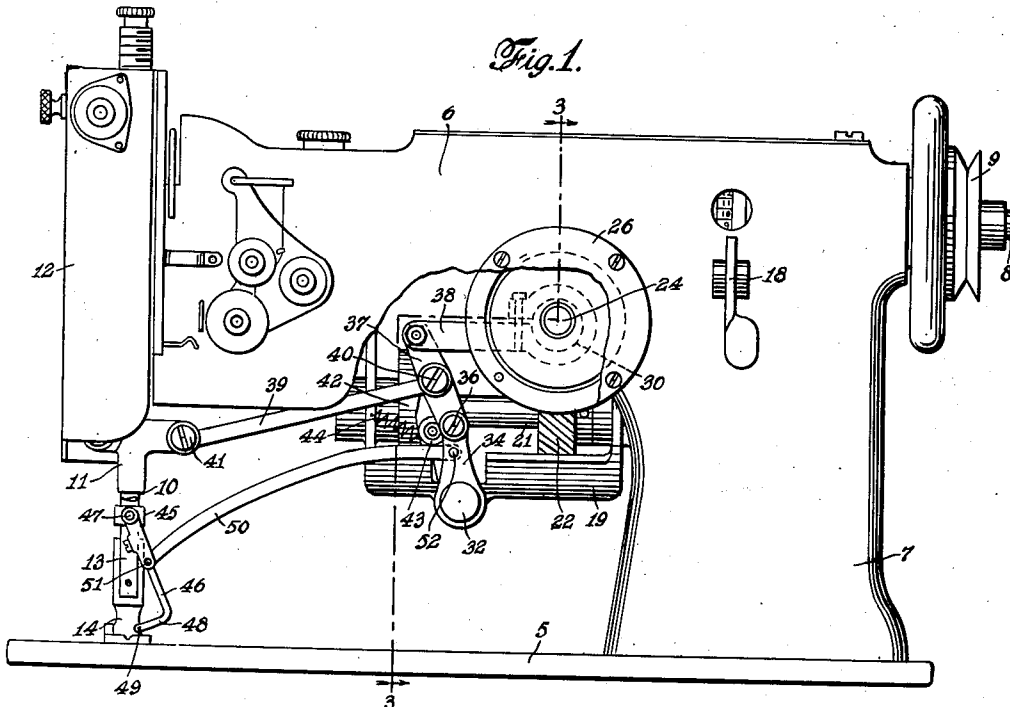
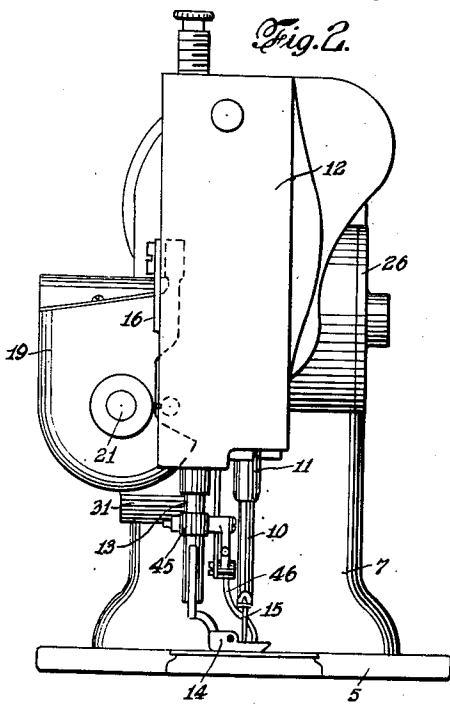
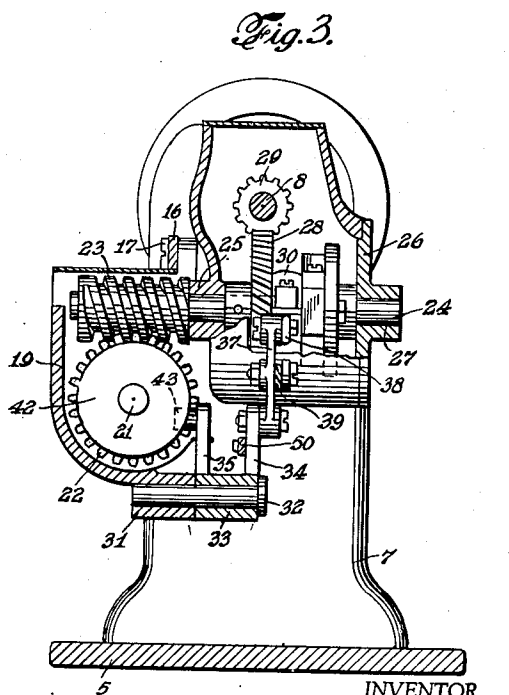
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2,365,222

EMBROIDERY STITCHING ATTACHMENT FOR SEWING MACHINES

Filed Feb. 4, 1941

3 Sheets-Sheet 1



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EMBROIDERY STITCHING ATTACHMENT FOR SEWING MACHINES

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3 Sheets-Sheet 2

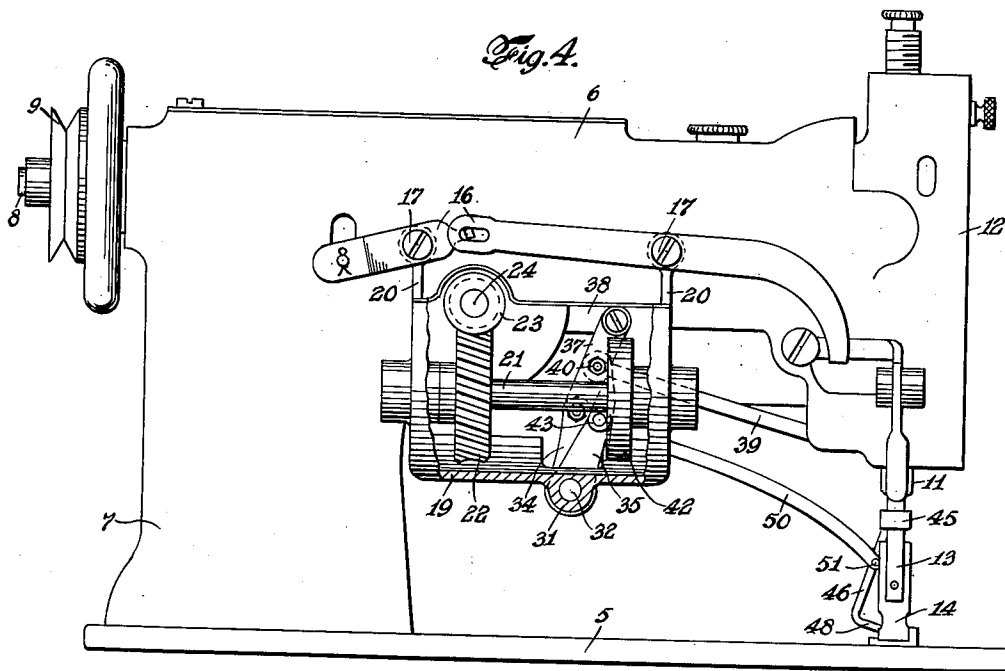


Fig. 5.

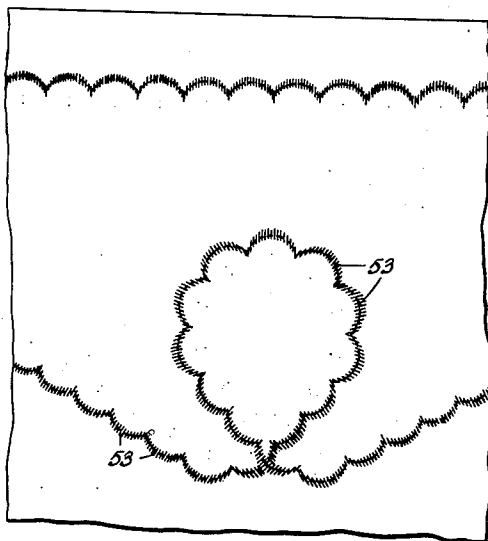
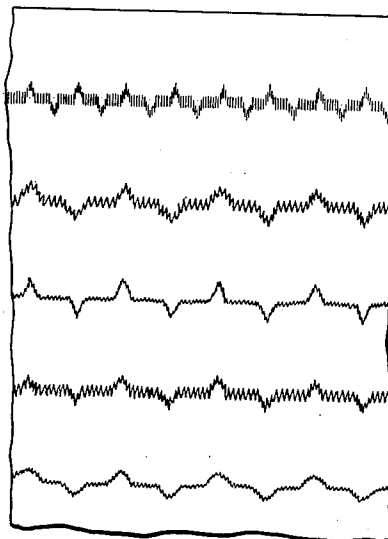


Fig. 6.



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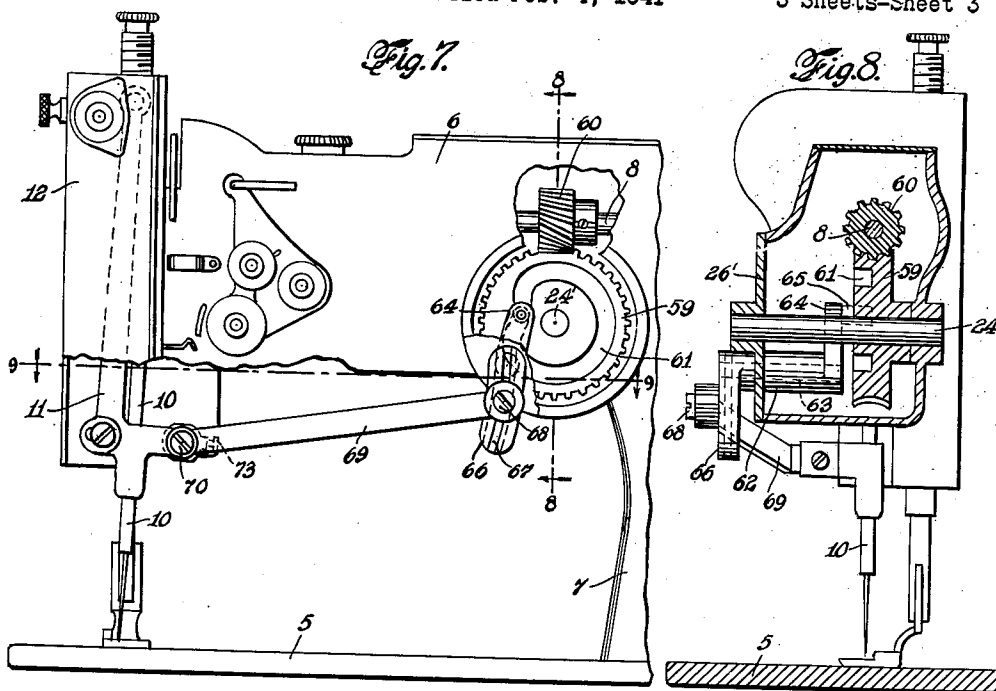
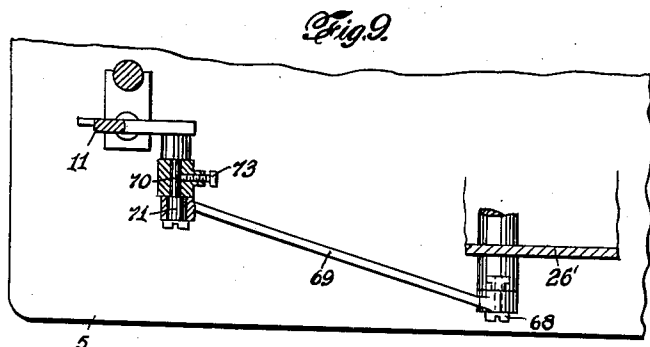
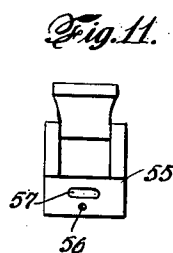
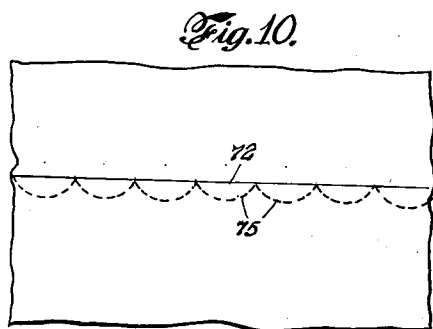
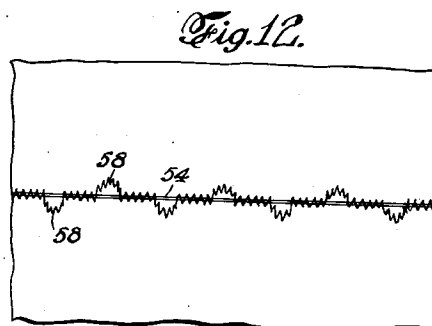
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EMBROIDERY STITCHING ATTACHMENT FOR SEWING MACHINES

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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EMBROIDERY STITCHING ATTACHMENT
FOR SEWING MACHINES

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Application February 4, 1941, Serial No. 377,305

8 Claims. (Cl. 112—98)

This invention relates to an embroidery stitching attachment for sewing machines and has for its general object and purpose to provide a simple and inexpensive attachment unit applicable to a standard zigzag type of sewing machine without necessitating radical changes or alterations therein, and which will accurately produce at high speeds a predetermined ornamental design of embroidery stitching upon various kinds of fabrics.

It is a further object of the invention to provide an attachment which replaces the conventional mechanism for imparting lateral vibratory motion to the sewing machine needle and which, in addition to imparting such lateral vibration, also includes means for automatically controlling the field of vertical reciprocatory motion of the needle whereby the zigzag stitches are applied to the fabric in a predetermined ornamental design.

A further object in one embodiment of the invention is to provide the attachment unit with means for laying a fillet thread upon the cloth or fabric in advance of the needle to be covered by the zigzag stitches so that the embroidered design will be raised above the surface of the fabric or in relief.

A further object is to provide an attachment embodying mechanism compactly arranged in a housing of relatively small dimensions, adapted for attachment to the arm of the sewing machine, including eccentric actuated means having a link operatively connected with the needle carrying frame to laterally vibrate the same and a rockable member providing a movable fulcrum for one end of said link, together with cam actuated means controlling the movement of said member, and thereby positioning said frame to govern the field of reciprocatory motion of the needle whereby the embroidery stitching of the desired design is produced.

With the above and other objects in view, the invention consists in the improved embroidery stitching attachment for sewing machines and in the form, construction, and relative arrangement of its several parts as will hereinafter be more fully described, illustrated in the accompanying drawings and subsequently incorporated in the subjoined claims.

Referring to the drawings, in which I have disclosed several simple and practical embodiments of the invention, and in which similar reference characters designate corresponding parts throughout the several views:

Fig. 1 is a side elevation with certain parts

broken away, illustrating one embodiment of the improved attachment as applied to a well-known standard type of sewing machine.

Fig. 2 is an end elevation.

Fig. 3 is a transverse sectional view taken substantially on the line 3—3 of Fig. 1.

Fig. 4 is an elevation of the reverse side of the machine from that shown in Fig. 1, a part of the attachment housing being illustrated in section.

Fig. 5 is a plan view of a section of fabric showing embroidery design as applied thereto by the present invention.

Fig. 6 is a similar view showing various designs in zigzag stitching which may be produced by the use of interchangeable pattern cams, and without the fillet cord or thread.

Fig. 7 is a fragmentary side elevation illustrating a modified form of the invention.

Fig. 8 is a transverse section taken substantially on the line 8—8 of Fig. 7.

Fig. 9 is a horizontal sectional view taken on the line 9—9 of Fig. 7.

Fig. 10 is a plan view illustrating the conventional stitch applied in an ornamental design by the machine of Fig. 7.

Fig. 11 is a detail plan view of a special form of presser foot used in producing the design shown in Fig. 12, and

Fig. 12 is a plan view showing a design produced by the machine of Fig. 1 without the means for laying the fillet cord or thread, and in which said cord is laid in a straight line through an opening in the presser foot.

While the attachment forming the subject matter of my present invention may be advantageously used in connection with different makes of zigzag type sewing machines, as herein disclosed the said attachment has been designed for application to the Singer sewing machine type 107W1. This machine includes the usual cloth plate or base 5 and a horizontal arm 6 extending laterally from the upper end of the pedestal 7. Within the arm 6 the main shaft 8 is mounted and provided at one of its ends with the drive wheel 9. This shaft at its other end is operatively connected with the vertically reciprocating needle bar 10 carried by the frame 11 pivotally mounted within the upper end of the head 12 in the usual manner for lateral vibratory motion. The vertically movable presser foot bar 13 is also mounted in the head 12 and carries the presser foot 14 at its lower end having the usual guide opening for the needle 15 on the lower end of needle bar 10.

On one side of the sewing machine arm 8, connected levers 16 are fulcrumed on the spaced supporting bolts 17 and are operable to lift the presser foot bar 13. These lifting levers are standard parts of the machine above referred to. Likewise, the usual adjusting means indicated at 18 is provided for the feed dog operating mechanism to regulate the movements of the feed dog which determines the spacing or number of stitches per inch in the movement of the fabric beneath the presser foot 14. Of course, also the reciprocatory needle 15 cooperates with the usual loop taker mounted beneath the machine base 5. However, since the latter features of such sewing machines are well known in the art and constitute no essential part of my present improvements, they need not be herein further referred to in detail.

In the Singer zigzag stitching machine above referred to, a transverse shaft is mounted in the machine arm 6 and driven from the main shaft 8. This transverse shaft carries an adjustable eccentric which actuates a pitman connected with the needle carrying frame 11 to impart lateral vibratory motion thereto. In the application of the attachment of my present invention, this operating unit for the frame 11 is removed. As shown in Figs. 1 to 4 of the drawings, the present invention includes a housing structure 19 open on one side and provided at opposite ends thereof with vertically extending lugs 20 terminating in apertured ears to receive the bolts 17 upon which the lever elements 16 are pivotally mounted. Thus the housing structure 19 may be easily, quickly and rigidly secured to the sewing machine arm 6 without altering the structure of the latter, and with the use of the standard pivot bolts 17 for the presser foot bar actuating levers.

Within the housing 19 the shaft 21, in parallel relation with the main shaft 8, is journaled in suitable bearings at its opposite ends and carries the worm gear 22 in mesh with the worm 23 on one end of a transverse shaft 24. This shaft is rotatably supported adjacent to the worm 23 in the bearing 25 formed on one side wall of the arm 6. 26 designates the usual cover plate for an access opening in the opposite side wall of said arm having the central bearing 27 to receive the other end of the shaft 24. To the shaft 24 a spiral gear 28 is fixed and is in mesh with the gear 29 secured to the main shaft 8. On one side of the gear 28, the shaft 24 carries an adjustable eccentric 30 which is of the standard type in common use in the art.

The wall of the housing 19 at the lower side thereof is formed with a transversely positioned boss 31 in which one end of the pivot rod 32 is fixed. A sleeve 33 is oscillatably supported on the other end of this rod and at its opposite ends is provided with the arms 34 and 35 respectively. The arm 34 provides a movable supporting fulcrum at 36 for the lower end of a link 37 to the upper end of which one end of the bar 38 is pivotally connected, the other end of said bar being engaged with the eccentric 30 as shown in Fig. 1 of the drawings. The pitman rod 39 is pivotally connected at one of its ends as at 40 with the link 37, substantially at the center thereof, the other end of said pitman rod being pivotally connected as at 41 with the vibratory needle carrying frame 11.

Upon the shaft 21 a pattern cam 42 is suitably secured, and with said cam the roller indicated at 43 on the end of the arm 35 is held

in yielding engagement by a suitable spring 44 connected with said arm.

Upon a collar 45 secured to the presser foot bar 13 the upper end of a fillet thread carrying member 46 is pivotally mounted as at 47. This member at its lower end has an angularly projecting part 48 terminating in a guiding eye 49 for the fillet thread. To the pivoted member 46 intermediate of its ends one end of a rod 50 is pivotally connected as at 51, the other end of said rod being pivotally connected at 52 with the oscillating arm 34.

From the above description, the operation of the attachment will be readily understood. In the operation of the main shaft 8 to vertically reciprocate the needle bar in the frame 11, the gears 28 and 29 transmit rotation to the transverse shaft 24 so that the eccentric actuates the bar 38 and link 37, thus rocking said link upon the upper end of supporting arm 34 and through the pitman rod 39 laterally vibrating the needle carrying frame 11 to produce the well-known zigzag stitch. The lateral vibratory movements of said frame and the length of the stitch may be adjusted or varied in the usual manner by the proper adjustment of the eccentric 30. At the same time as the frame 11 is laterally vibrated, the worm gearing connecting shafts 24 and 21 rotates the pattern cam 42 which by coaction of the roller on the end of arm 35 oscillates the arm 34 to shift the position of the fulcrum 36 of link 37, and thus through said link and the pitman 39 control the field of operation of the frame 11 and needle bar 10 so that the zigzag stitches will be applied to the fabric in accordance with the predetermined design. Such designs may, of course, be varied by providing a series of differently shaped, interchangeable cams 42 for attachment to the shaft 21.

Concurrently with the shifting of the fulcrum 36 to vary the field of operation of the needle bar, the pivoted fillet thread carrying member 46 is correspondingly actuated through the connection of rod 50 with the arm 34 so that the fillet thread will first be positioned on the surface of the fabric and directed beneath the presser foot on lines corresponding with the changed positions of the laterally vibrating needle bar, and in accordance with the selected design. Therefore, the zigzag stitches will be over-laid upon and conceal this fillet thread and will give the design a raised or relief effect. This is indicated in Fig. 5 of the drawings where the zigzag stitches are applied over the fillet thread in a scalloped design as shown at 53. The arrangement of these scallops upon the fabric as shown in the lower part of said figure is produced by properly guiding or directing the fabric material beneath the presser foot of a machine.

In Fig. 6, I have illustrated a series of different designs which may be produced with the use of different forms of pattern cams and without a fillet thread. Also, the design may be varied by operation of the adjusting means 18 for the throw of the feed dogs so as to provide either a close or wide spacing of the zigzag stitches. It will, of course, be understood that when the fillet thread is not to be employed, the parts 45, 46 and 50 may be readily detached from their operative connection with the presser foot bar and the arm 34.

In Fig. 12 of the drawings, I have also shown a different design in which the fillet thread indicated at 54 is laid upon the fabric in a continuously straight line, in which case, said thread

or cord is fed through the opening 56 in the presser foot 55, in advance of the needle slot 57, as shown in Fig. 11. Of course, in this case, the pivoted thread directing member 46 is not used, and the pattern cam is of such form that at spaced intervals the zigzag stitches are applied to the fabric alternately at opposite sides of the fillet thread 54 as indicated at 58, thus leaving spaced portions of said thread visibly exposed. By having the stitch forming thread and the fillet thread of contrasting colors, various ornamental designs may be produced.

In Figs. 7, 8 and 9 of the drawings I have shown a simplified embodiment of the invention. In this case, the attachment includes the shaft 24' transversely mounted in the machine arm 6. This shaft carries the worm gear 59 in mesh with the worm 60 on the main shaft 8 and having a cam groove 61 in one side face thereof. The cover plate 26' in which one end of the shaft 24' is journaled is provided with a suitable bearing 62 for a rock shaft 63. The inner end of said shaft carries a crank arm 64 having a roller 65 thereon engaged in the cam groove 61 of the gear 59. At its other outer end the rock shaft 63 is provided with a downwardly extending curved arm 66 having a longitudinally extending slot 67 adjustably receiving one end of a pivot stud 68 with which one end of the pitman 69 is connected. The other end of this pitman is connected with the needle bar carrying frame 11 by a rod or bolt 70 rotatably connected at one of its ends with said frame and at its other end having a cylindrical eccentric portion 71 engaged in the eye opening in the end of the pitman bar 69. By rotating the bolt 70, it will be seen that the needle bar carrying frame may be adjusted relative to the pitman 69 to initially position the vertically reciprocating needle relative to the seam line 72 of two pieces of fabric to be stitched together as indicated in Fig. 10 of the drawings. The rod or bolt 70 is then fixed in its adjusted position by means of the set screw indicated at 73.

From the above description it will be understood that as the fabric piece or pieces are fed beneath the presser foot of the machine, there is a reciprocating vertical movement of the needle without lateral vibration of the carrying frame 11 so that an ordinary instead of a zigzag stitch will be produced. However, as the cam track 61 in the worm gear 59 coacts with the roller on the end of arm 64, the shaft 63 is rocked to transmit lateral movement through the pitman 69 to the frame 11 and the needle bar which thereby controls the field of vertical reciprocating motion of the needle to produce the scalloped stitched design as indicated at 75 in Fig. 10 of the drawings. The throw of the lower end of the frame 11 and therefore the depth of the scallops, may be regulated by the adjustment of the pivot 68 of the pitman 69 towards and from a neutral position where said pivot coincides with the axis of the rock shaft 63. This alternative form of the device may obviously be readily substituted for that first described and applied to the standard sewing machine arm, it being only necessary to use the special form of cover plate 26' in which rock shaft 63 is mounted, instead of the usual cover or closure plate with which the machine is equipped as shown in Fig. 1 of the drawings.

From the foregoing description considered in connection with the accompanying drawings, the several described embodiments of the invention will be readily understood. It will be seen that

I have devised a very simple and inexpensive attachment for sewing machines of standard manufacture which are designed for operation at high speeds, and whereby garments or other fabric materials may be provided with various ornamental embroidery stitched designs. The several parts of the mechanism are compactly mounted and arranged within a housing of relatively small dimensions which may be easily and quickly mounted in applied position upon the sewing machine arm without requiring the use of other or additional attaching bolts or elements than those with which the machine is provided. It will also be noted that the mechanism for transmitting lateral vibratory motion to the needle bar carrying frame and also for variably positioning this frame to control the field of operation of the vertically reciprocating needle, consists of a minimum number of simply constructed parts which will not easily get out of order and are positive and reliable in their functional operation.

While I have herein shown several practical embodiments of the invention which have been thoroughly tested with excellent results, it is nevertheless possible that certain of the mechanical features which I have above described in detail may be employed in alternative structural forms as might be found advisable in the adaptation of the invention to the various different standard makes of sewing machines. It is, therefore, to be understood, that in the further development of the present invention, I reserve the privilege of embodying the essential features thereof in such other modified structural forms and arrangements as may fairly be comprehended within the spirit and scope of the appended claims.

I claim:

1. In a sewing machine, in combination with stitch forming mechanism including a vertically reciprocating needle bar and needle carried thereby and a carrying frame for said needle bar; means for imparting lateral vibratory motion to said frame and for concurrently laterally shifting the position of said frame with respect to the feed path of the material to control the field of vibratory motion in accordance with a predetermined design, said means including independently operable members for transmitting vibratory motion and for laterally shifting the position of the frame respectively, means operatively connected with the latter member for movement in correspondence with the lateral shifting of said frame to position a fillet thread in advance of the needle, and a common actuating means connecting said members with each other and with said needle bar carrying frame.

2. In a sewing machine, in combination with stitch forming mechanism including a vertically reciprocating needle bar and needle carried thereby, a needle bar carrying frame and a driving shaft for the needle bar; means for imparting lateral vibratory motion to said frame and for laterally shifting the position of the frame with respect to the feed path of the material to control the field of vibratory motion in accordance with a predetermined design, said means including power transmission mechanism connected with said driving shaft and comprising a continuously rotatable pattern cam, an oscillatable arm continuously operated thereby, an eccentric, a member actuated by said eccentric, and a common means for laterally shifting said needle bar carrying frame and for vibrating the same directly

connecting said eccentric actuated member and the cam operated arm with each other.

3. In a sewing machine, in combination with stitch forming mechanism including a vertically reciprocating needle bar and needle carried thereby, a needle bar carrying frame and a driving shaft for the needle bar; means for imparting lateral vibratory motion to said frame and for laterally shifting the position of the frame with respect to the feed path of the material to control the field of vibratory motion in accordance with a predetermined design, said means including power transmission mechanism connected with said driving shaft and comprising a pattern cam, an oscillatable arm operated thereby, an eccentric, a member actuated by said eccentric, a laterally oscillatable fillet thread positioning member mounted adjacent to the needle bar to position the fillet thread in advance of the needle, means operatively connecting said oscillatable arm with said member to laterally move the latter in correspondence with the lateral shifting of the needle bar carrying frame, and a common means for laterally shifting said needle bar carrying frame and for vibrating the same operatively connected with said eccentric actuated member and the cam operated arm.

4. In a sewing machine, in combination with stitch forming mechanism including a vertically reciprocating needle bar and needle carried thereby and a carrying frame for said needle bar, a driving shaft for the needle bar; means for imparting lateral vibratory motion to said frame and for laterally shifting the position of the frame with respect to the feed path of the material to control the field of vibratory motion in accordance with a predetermined design, said means comprising a shaft having a driving connection with said needle bar driving shaft, a vibration transmitting member operatively connected at one end with the latter shaft, a pattern cam drive connected with and continuously operated by said latter shaft, an oscillatory arm actuated by said pattern cam, a floating link connection between said vibration transmitting member and said arm, and a single operating connection between said link and the needle bar carrying frame to concurrently impart lateral shifting motion and lateral vibratory motion to said frame.

5. In combination with a sewing machine arm and a needle carrying bar mounted on one end thereof for vertical reciprocation and lateral vibratory motion and a driving shaft for the needle bar mounted in said arm; an attachment unit for laterally shifting the position of the needle bar with respect to the feed path of the material and for laterally vibrating the same, said unit comprising a housing secured to one side of the sewing machine arm, a transversely positioned shaft mounted in the arm below said driving shaft and having driving connection with the latter shaft, a vibration transmitting member operatively connected with said transverse shaft, a pattern cam shaft mounted in said housing and drive connected with one end of said transverse shaft, a pattern cam on said cam shaft, an oscillatable member mounted on the housing and continu-

ously actuated by said pattern cam, and a common actuating means for laterally shifting and laterally vibrating the needle bar operatively connected with said oscillatable member and the vibration transmitting member.

6. In combination with a sewing machine arm and a needle carrying bar mounted on one end thereof for vertical reciprocation and lateral vibratory motion and a driving shaft for the needle bar mounted in said arm; an attachment unit for laterally shifting the position of the needle bar with respect to the feed path of the material and for laterally vibrating the same, said unit comprising a housing secured to one side of the sewing machine arm, vibration transmitting means mounted in the arm and drive connected with said driving shaft, said means including a transverse shaft having one end extending into said housing, means mounted in the housing and operatively connected with said end of the transverse shaft for continuously transmitting an independent lateral shifting motion to the needle bar, and a single means operatively connecting a part of said last named means and a part of the vibration transmitting means with the needle bar.

7. In combination with stitch forming mechanism including a needle bar mounted for vertical reciprocation and lateral vibrating motion and an operating shaft for said needle bar; a shaft positioned transversely of said operating shaft and having driving connection therewith, a vibration transmitting member operatively connected with said transverse shaft, a pattern cam shaft mounted in parallel relation to said operating shaft and drive connected with said transverse shaft, a pattern cam on said cam shaft, an arm oscillatable about an axis disposed at right angles to said cam shaft and actuated by the pattern cam, means interconnecting the oscillatable arm and vibration transmitting member with each other, and a single connecting member between the latter means and the needle bar to concurrently vibrate the needle bar and laterally shift the position thereof relative to the line of feed of the material.

8. In combination with a sewing machine having a vertically reciprocating and laterally movable needle and a drive shaft for reciprocating said needle; a unitary embroidery stitch forming attachment for said machine comprising a member for transmitting lateral vibratory motion to said needle, an actuating eccentric therefor, an oscillatable arm, a link element directly fulcrumed at spaced points upon said arm and said eccentric actuated member, means controlling the oscillatory motions of said arm in accordance with a predetermined embroidery design, means for operating the last named means and said eccentric from said drive shaft, and means operatively connecting said link element with the needle, whereby said needle is laterally vibrated and the field of such vibratory motion concurrently shifted with respect to the line of feed of the material to produce said predetermined design in the vertical reciprocation of the needle.

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