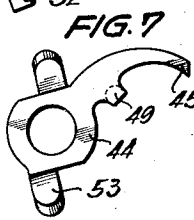
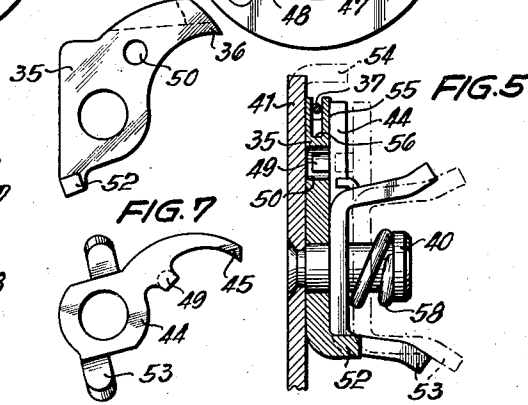
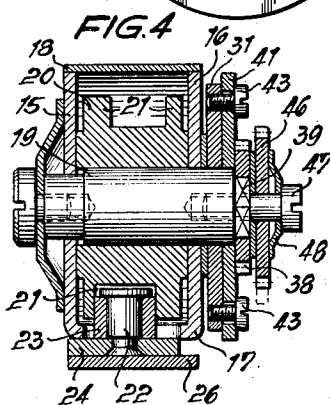
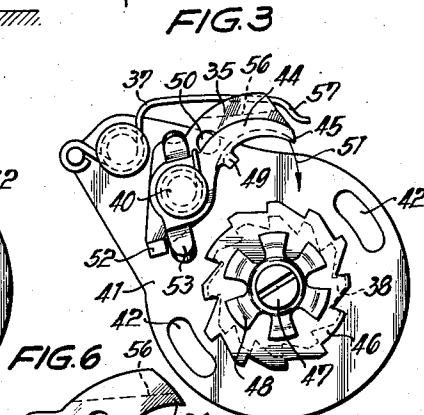
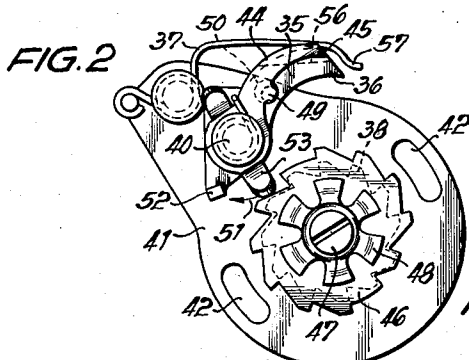
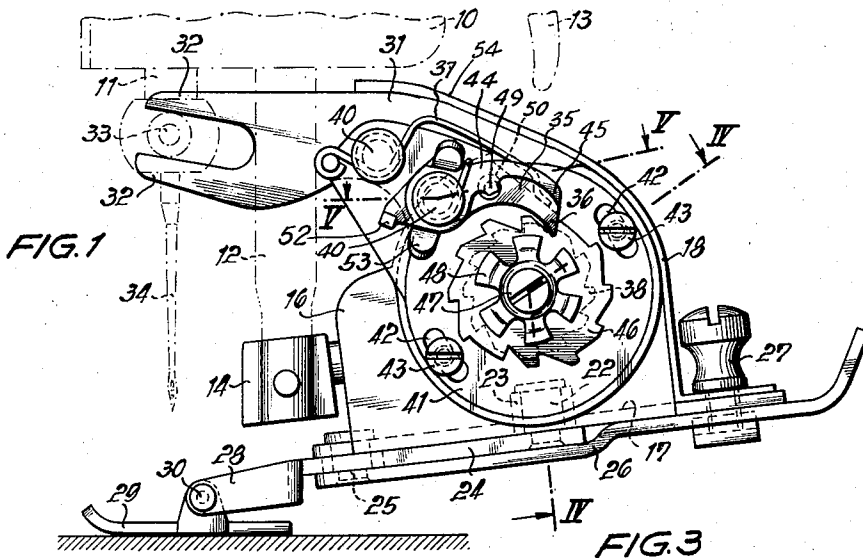


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ADJUSTMENT MEANS FOR ZIG-ZAG ATTACHMENTS
OF SEWING MACHINES
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ADJUSTMENT MEANS FOR ZIG-ZAG ATTACHMENTS OF SEWING MACHINES

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4 Claims. (Cl. 112—160)

The present invention is a continuation-in-part of U. S. patent application Serial No. 283,613, now U. S. Letters Patent No. 2,750,905, and relates to improvements in zig-zag attachments for sewing machines which attachments permit formation of zig-zag seams, button-hole stitches, various ornamental designs embodying zig-zag stitches and like pattern, in addition to formation of straight seams.

More particularly the invention relates to an attachment of the aforesaid type which is adapted to be driven by the vertically reciprocating needle bar of the sewing machine. Such attachments generally include an actuating lever oscillated in a vertical plane by the needle bar of the sewing machine, which lever by means of a driving pawl and ratchet drive transmits a stepwise rotational motion to a horizontally extending cam shaft. The attachments further include a rocking lever operatively connected with a presser plate which latter is reciprocated in transverse direction to the direction in which the material to be sewn, travels. The presser foot bears against the material, and, consequently, effects a reciprocating displacement of the material in transverse direction to the normal advance thereof.

Means are ordinarily included to actuate the pawl and ratchet assembly and to thereby eliminate the transverse reciprocation of the presser foot and the material when it is desired to produce a conventional straight seam. Further means are included to permit automatic formation of a seam which is composed of straight and zig-zag portions, alternately.

To this end, an auxiliary pawl is provided which is selectively cooperable with the driving pawl of said pawl and ratchet assembly. A cam ratchet wheel of irregular shape is disposed about the horizontally extending cam shaft for cooperation with the auxiliary pawl. Spring means are included to urge the driving pawl and the auxiliary pawl into contact with their respective ratchet wheels, as well as to hold the driving pawl and auxiliary pawl in inoperative position. Moreover, complementary engageable formations are included on the driving pawl and auxiliary pawl, respectively, for coupling same, when desired.

In such prior art devices the spring means, however, were devoid of any positive guidance and therefore were prone to accidental displacement and/or damage. Furthermore, in altering the relative disposition of the driving and auxiliary pawls with respect to each other it was necessary to move the driving pawl by a direct manual contact therewith. Such movement, however, was difficult because of the small and compact nature of the attachment and therefore was oftentimes accompanied by minor injuries and ensnaring of the operator's fingers, in addition to frequent damage to the relatively delicate spring means.

It is therefore an object of the present invention to provide means overcoming these and other heretofore known deficiencies.

More specifically, it is an object of the present inven-

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tion to provide means facilitating the guidance of the aforesaid spring means during cooperation with the driving pawl of a zig-zag attachment.

Another object of the present invention is to provide means ensuring displacement of the driving pawl upon movement of the auxiliary pawl during operation of the sewing machine and without endangering the fingers of the operator.

Still another object of the invention is to provide cooperating surface formations on the driving pawl and on the auxiliary pawl, respectively, to facilitate simultaneous movement of the driving pawl upon manual movement of the auxiliary pawl.

Yet another object of the invention is to provide means contributing to a smooth performance of the attachment and its application to a large variety of zig-zag and other effects, to simplified operation of the attachment and to rapid changeover from one stitching pattern to another even in the course of operation and without interruption thereof.

These and other objects and advantages will become apparent from the following detailed description of the invention taken in conjunction with the accompanying drawings, wherein:

Fig. 1 is a side elevation on a slightly enlarged scale of an attachment produced in accordance with the present invention, showing the driving pawl in actuated position with the auxiliary pawl inoperatively coupled thereto;

Figure 2 is a side elevation of a portion of the attachment of Fig. 1, showing the driving pawl and the auxiliary pawl coupled together and held in inactuated position by the spring means;

Fig. 3 is a view similar to Fig. 2, showing the driving pawl and auxiliary pawl uncoupled from each other but still in inoperative position;

Fig. 4 is a sectional view taken substantially along line 4—4 of Fig. 1;

Fig. 5 is a section of the pawls and controlling ratchets taken substantially along line 5—5 of Fig. 1 on an enlarged scale;

Fig. 6 is a side elevation of the driving pawl; and

Fig. 7 is a side elevation of the auxiliary pawl.

Referring now more particularly to the drawings, the invention will be described with reference to a preferred attachment of which it forms an integral and important part.

In Fig. 1 there is indicated in dot and dash lines the head 10 of a domestic sewing machine carrying the needle bar 11 and the presser bar 12 for vertical reciprocating motion.

The lower end 13 of the conventional lever serves to raise and lower the presser bar 12 selectively, as desired. The attachment embodying the invention is connected to the presser bar 12 by support 14 so that it may be raised or lowered from the material together with the presser bar upon actuation of end 13. The casing of the attachment comprises a piece of sheet metal U-shaped in cross-section and including side walls 15 and 16, and bottom 17. A cover 18, likewise formed of sheet metal is conformed to the contour of side walls 15 and 16. A horizontal shaft 19 is supported approximately centrally of the casing, about which shaft a cylinder cam 20 is arranged interiorly of the casing.

The periphery of the cylinder cam 20 is provided with a groove 21 of wave-like or sinusoidal configuration (Fig. 4), the groove forming a track for a vertical trunnion 22. A friction reducing cam roller 23 is pivotally mounted on the trunnion 22, the latter being fastened to the rearward end (Fig. 1) of a rocking lever 24 which is mounted about pivot 25; thus rotation of cylinder cam 20 causes the rocking lever 24 to oscillate in an approximately horizontal plane.

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The pivot 25 is fixed to a slide 26 which can be adjusted lengthwise of the casing and which is held in place by a screw 27 (Fig. 1). Thus, with the aid of slide 26, the pivot can be adjusted to a greater or smaller distance from the trunnion 22, which allows reduction or increase in the angular movement of the forward end 23 (the left-hand end in Fig. 1) of the lever. This forward end 23 of the lever is forked and carries a presser plate 29 hinged around pin 30.

The shaft 19 of the cylinder cam 20 is rotated stepwise or intermittently by the reciprocation of the needle bar 11 (Fig. 1).

To this end, an actuating lever 31 is pivotally mounted about shaft 19, the free end of the actuating lever being bifurcated and engaging with a sidewise extending projecting pin 33 which latter facilitates the clamping of the needle 34 to the needle bar in a conventional manner. Thus downward movement of the needle bar 11 causes the actuating lever 31 to swing about shaft 19 in counter-clockwise direction, whereas raising of the needle bar causes the actuating lever to swing about the shaft in clockwise direction.

Since the needle bar is reciprocated, actuating lever 31 oscillates about the axis of shaft 19 and the oscillatory motion is transmitted to the shaft 19 by a driving pawl 35 pivotally mounted about a trunnion 40.

The driving pawl 35 includes a humped portion 55 terminating in a projection 36 and provided with a slot or guideway 56 (Figs. 5 and 6). A spring 37 provided with a detent 57 seats in slot 56 of the pawl 35 and urges projection 36 into the gaps between the teeth of a ratchet wheel 38. The ratchet wheel is keyed onto a square extension 39 of the shaft 19, or onto an equivalent non-circular extension of the shaft. Although only one driving pawl 35 is shown in the drawings, a plurality of driving pawls may be provided, if desired.

By the mechanism so far described, reciprocating movement of the needle bar causes stepwise rotation of the shaft 19 and, consequently, a stepwise oscillation of the presser plate and of the fabric frictionally carried therewith. As a result, a zig-zag stitch will be obtained.

The trunnion 40 is mounted on a supporting plate 41 which is adjustably connected to the actuating lever by arcuate slots 42 and screws 43. The connection is made adjustable so that the transverse movements of the rocking lever 24 will occur immediately upon release of the material by needle 34.

The attachment is further provided with an auxiliary pawl 44 also pivotally mounted about trunnion 40 and serving as a control lever for the driving pawl 35.

The auxiliary pawl 44 includes a projection 45 for cooperation with a cam ratchet wheel 46 loosely mounted about the cylindrical portion of a retaining screw 47 extending into the shaft 19. Spring plate 48 holds the cam ratchet wheel 46 against accidental displacement. As can be seen in Figs. 1 to 3, the teeth of the cam ratchet wheel vary in height, all of the teeth being at least equal in height to that of the teeth of the ratchet wheel 38.

The auxiliary pawl further includes a coupling pin or nose 49 which is complementary to and selectively engageable with hole or depression 50 provided in the driving pawl 35.

When the pawl 35 and auxiliary pawl 44 are coupled together by pin 49 and hole 50 under the influence of spring 53 helically disposed about trunnion 40, as shown in full lines in Fig. 5, and pawl 35 is urged by spring 37 into contact with ratchet wheel 38 (Fig. 1), the auxiliary pawl 44 is inoperative and a zig-zag seam is produced as previously indicated.

When the pawl and auxiliary pawl are held in the coupled (Fig. 2) or uncoupled (Fig. 3) inoperative positions by detent 57 of spring 37, a conventional straight stitching pattern or seam is produced. If the uncoupled pawls are rotated in clockwise direction about trunnion

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40, as shown by arrow 51 in Fig. 3, auxiliary pawl 44 will engage cam ratchet wheel 46 while the driving pawl 35 will engage ratchet wheel 38 only when the teeth of ratchet wheel 38 and cam ratchet wheel 46 are in alignment.

As a result, shaft 19 will be rotated only when these teeth are in alignment whereas, when they are out of alignment as shown in Fig. 3, the cam ratchet wheel 46 will be rotated freely without effect upon shaft 19. Consequently, a stitched pattern will be produced composed of alternate zig-zag and straight portions.

To effect the uncoupling and coupling of the driving pawl and auxiliary pawl as well as to move these pawls between operative and inoperative positions, auxiliary pawl 44 is further provided with a pair of projecting portions 53 serving as handles by which it may be displaced along trunnion 40 against the action of spring 58, as shown in dot-and-dash lines in Fig. 5.

Even were auxiliary pawl 44 rotated as indicated in Fig. 3, however, it can be seen that without further provision the driving pawl 35 would remain stationary and would have to be rotated by manual application of force on spring 37 or on projection 36. Because of the compactness of the device this arrangement has occasionally led to minor inconvenient injuries to the operator and more often to injury to the delicate spring 37.

In order to avoid the necessity for direct manipulation of driving pawl 35, the latter is provided with a projecting portion or abutment 52 cooperable with the auxiliary pawl during movement thereof. Preferably this abutment 52 is disposed in the arcuate path traversed by handle 53 during movement of the auxiliary pawl.

In this manner, clockwise movement of the handle 53 of the auxiliary pawl will cause similar movement of the driving pawl when the handle 53 contacts abutment 52. Counter-clockwise movement of the handle 53 will also carry the driving pawl therewith until detent 57 of spring 37 moves beyond slot 56 of the driving pawl to retain the driving pawl. In this latter position abutment 52 further serves to prevent the auxiliary pawl from being accidentally rotated in clockwise direction when the pawls are uncoupled as in Fig. 3.

The attachment may be further provided with a rim or roof 54, shown attached to plate 41 in Fig. 5, in order to prevent the pawls and spring 37 from being reached from above. This is, of course, permissible only because the pawls may be manipulated from the side by means of handle 53 and therefore serves as an additional safeguard against injury to the attachment or to the operator.

The above disclosure indicates one of the most effective, space saving and rapidly working means for coupling and adjusting the zig-zag attachment in accordance with various desirable stitch patterns.

It is well understood that instead of the handle formation as shown other means such as push buttons acting on cam surfaces may be employed to bring about the desired result for displacing and coupling the hereinabove mentioned pawls.

It can thus be seen that there has been provided according to the invention a zig-zag attachment for sewing machines having shaft means for supporting plate means, ratchet wheel means and cam ratchet wheel means, respectively, and trunnion means disposed on said plate means and spaced from said shaft means, driving pawl means pivotally carried on said trunnion means adjacent said plate means for selective engagement with said ratchet wheel means, said driving pawl means being provided with a depression and with abutment means, auxiliary pawl means pivotally carried on said trunnion means remote from said plate means for selective engagement with said cam ratchet wheel means, said auxiliary pawl means being provided with handle means engageable with said abutment means of said driving pawl means upon pivotal movement of said auxiliary pawl means in one direction, said auxiliary pawl means being

further provided with nose means engageable with said depression of said driving pawl means upon pivotal movement of said auxiliary pawl means in opposite direction, whereby the relative disposition of said driving pawl means and said auxiliary pawl means may be varied by said handle means, the latter thereafter serving to entrain said driving pawl means for movement together with said auxiliary pawl means, and spring means urging said driving pawl means into operative and inoperative positions, respectively.

Various changes and modifications may be made without departing from the spirit and scope of the present invention and it is intended that such obvious changes and modifications be embraced by the annexed claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patents, is:

1. In a zig-zag attachment for sewing machines having shaft means for supporting plate means, ratchet wheel means and cam ratchet wheel means, respectively, and trunnion means disposed on said plate means and spaced from said shaft means; driving pawl means pivotally carried on said trunnion means adjacent said plate means for selective engagement with said ratchet wheel means, said driving pawl means being provided with a depression and with abutment means, auxiliary pawl means pivotally carried on said trunnion means remote from said plate means for selective engagement with said cam ratchet wheel means, said auxiliary pawl means being provided with handle means engageable with said abutment means of said driving pawl means upon pivotal movement of said auxiliary pawl means in one direction, said auxiliary pawl means being further provided with nose means engageable with said depression of said driving pawl means upon pivotal movement of said auxiliary pawl means in opposite direction, whereby the relative disposition of said driving pawl means and said auxiliary pawl means may be varied by said handle means, the latter thereafter serving to entrain said driving pawl means for movement together with said auxiliary pawl means, and spring means urging said driving pawl means into operative and inoperative positions, respectively.

2. A zigzag attachment for a sewing machine having a reciprocable needle bar and a presser bar; comprising a casing, shaft means journaled in said casing, supporting plate means connected to said shaft means and operatively connected to said needle bar to impart to said plate means reciprocatory oscillating movements, ratchet wheel means, cam ratchet wheel means, said ratchet wheel means and said cam ratchet wheel means being mounted on said shaft means, respectively, trunnion means on said supporting plate means and spaced from said shaft means, driving pawl means and auxiliary pawl means each pivotally carried by and disposed in superposed relation to each other on said trunnion means, said driving pawl means being positioned to cooperate with said ratchet wheel means, said auxiliary pawl means being located for cooperation with said cam ratchet wheel means, first and second engageable formations, respectively, provided on said driving pawl means and on said auxiliary pawl means, to couple the same for simultaneous rotation about said trunnion means to bring about one predetermined sewing operation by said coupled pawl means, handle means on said auxiliary pawl means, and abutment means on said driving pawl means, whereby during a rotational movement of said auxiliary pawl means relative to said driving pawl means and upon disengagement of said formations therefrom said handle means comes to strike said abutment of said driving pawl means to thereby attain the positioning of said attachment for another predetermined sewing operation, and spring means mounted on said supporting plate means and provided with a detent, said detent being adapted to engage and retain said driving pawl means in inoperative position during said other predetermined sewing operation.

3. In a zigzag attachment for a sewing machine having a reciprocably moving needle bar and a presser plate; said attachment having a casing, shaft means journaled in said casing, supporting plate means mounted for swinging movement about said shaft means and operatively connected to said needle bar, ratchet wheel means, cam ratchet wheel means, said ratchet wheel means and said cam ratchet wheel means fixedly mounted on said shaft means, respectively, trunnion means disposed on said supporting plate means and spaced from said shaft means, driving pawl means and auxiliary pawl means each pivotally carried by and disposed in superposed relation to each other on said trunnion means, said driving pawl means being positioned opposite said ratchet wheel means for cooperation therewith, said auxiliary pawl means being located for cooperation with said cam ratchet wheel means, whereby said pawl means will transmit said reciprocable movement of said needle bar to said ratchet wheel means for moving said shaft means, means connected with said presser plate and for conveying said movements of said shaft means to said presser plate, first and second engageable formations, respectively, provided on said driving pawl means and on said auxiliary pawl means for coupling and disengaging said driving pawl means and said auxiliary pawl means for rotation about said trunnion means to thereby bring about one predetermined sewing operation, handle means on said auxiliary pawl means, and abutment means on said driving pawl means, whereby during a rotational movement of said auxiliary pawl means relative to said driving pawl means after disengagement of said formations from each other said handle means strikes said abutment of said driving pawl means to thereby initiate another predetermined sewing operation, and spring means mounted on said supporting plate means and provided with a detent, said detent being adapted to engage said driving pawl means during said other predetermined sewing operation.

4. In an attachment for a sewing machine having a reciprocable needle bar and a presser plate; means receiving reciprocable movements from said needle bar, and second means for transmitting said movements to said presser plate, said second means including first ratchet wheel means, second ratchet wheel means, driving pawl means positioned to cooperate with said first ratchet wheel means, auxiliary pawl means located for cooperation with said second ratchet wheel means, first and second engageable formations, respectively, provided on said driving pawl means and on said auxiliary pawl means to couple the same for simultaneous rotation and actuation of one of said ratchet wheel means to bring about one predetermined sewing operation by said coupled pawl means, handle means on said auxiliary pawl means, and abutment means on said driving pawl means, whereby upon movement of said auxiliary pawl means relative to said driving pawl means and upon disengagement of said formations therefrom said handle means comes to strike said abutment of said driving pawl means thereby attaining another predetermined sewing operation, and spring means mounted on said supporting plate means and provided with a detent, said detent being adapted to engage and retain said driving pawl means in position during said other predetermined sewing operation.

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