March 31, 1964 H. GIESSELMANN ETAL 3,126,849

ZIGZAG STITCH SEWING MACHINES

Filed Sept. 13, 1956 3 Sheets-Sheet 1

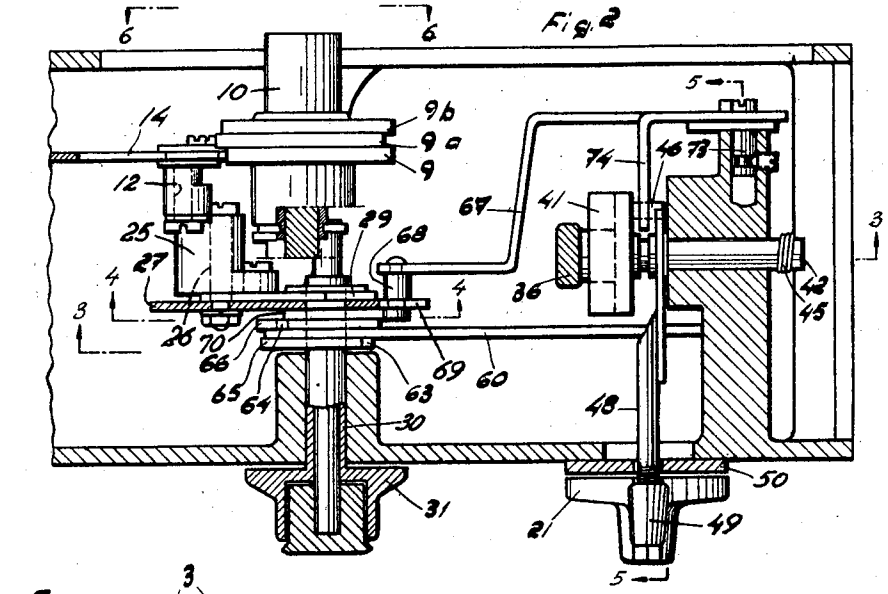


Fig. 2

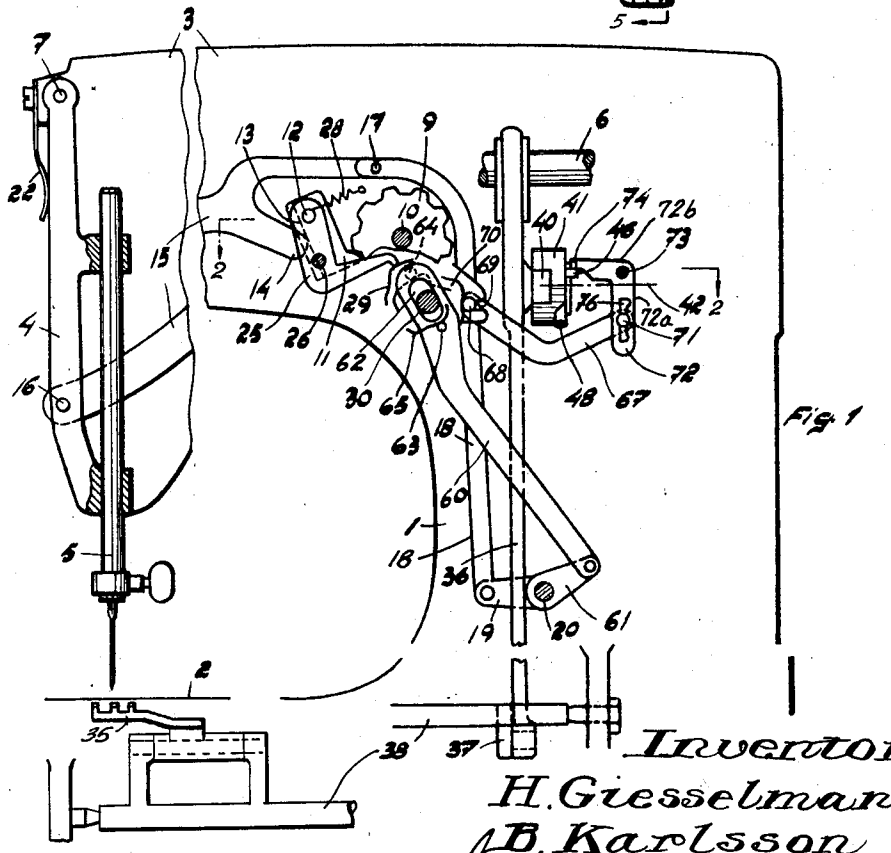


Fig. 1

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ZIGZAG STITCH SEWING MACHINES

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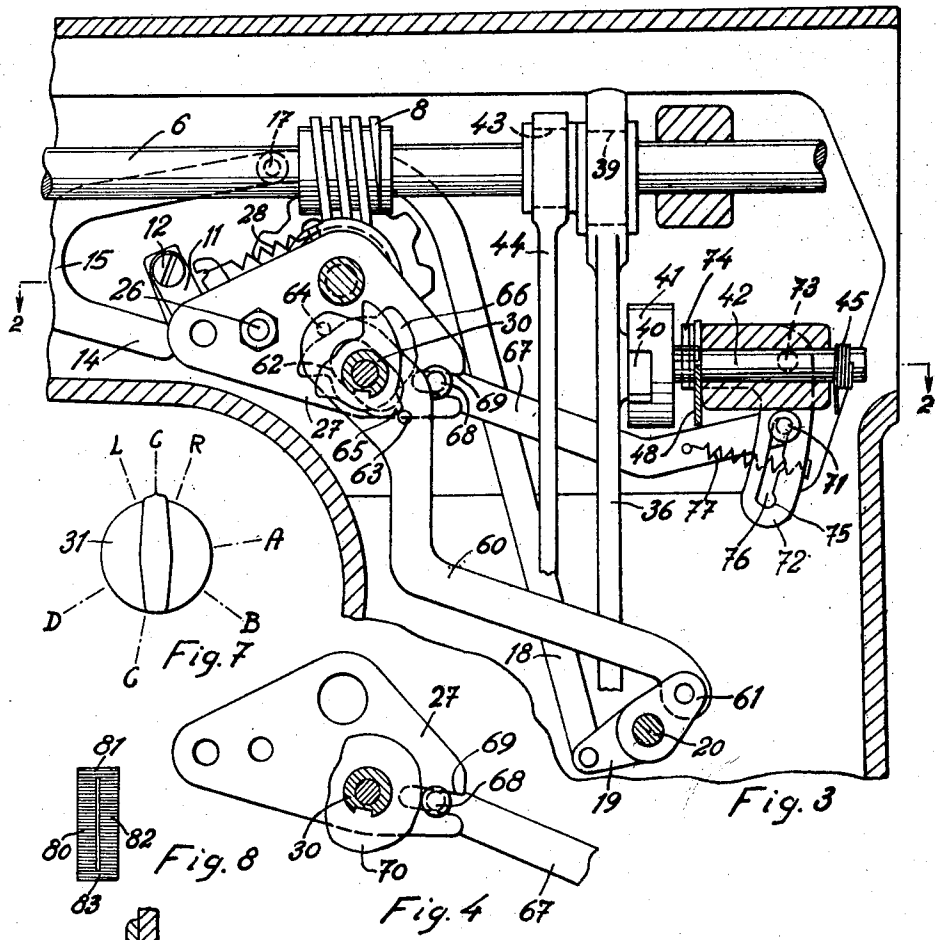


Fig. 7

Fig. 3

Fig. 8

Fig. 4

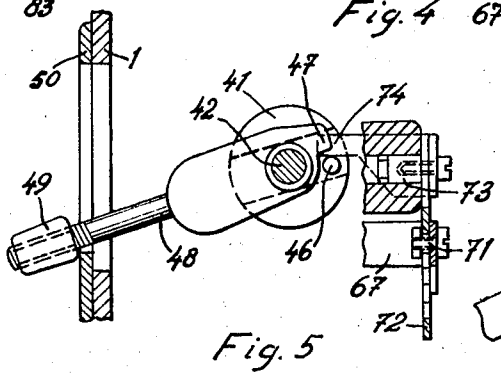


Fig. 5

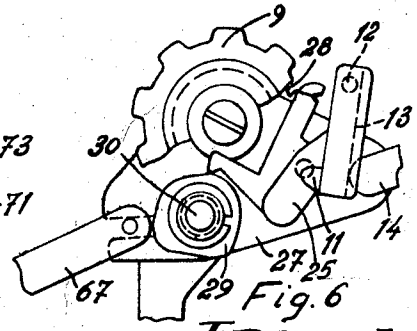


Fig. 6

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ZIGZAG STITCH SEWING MACHINES

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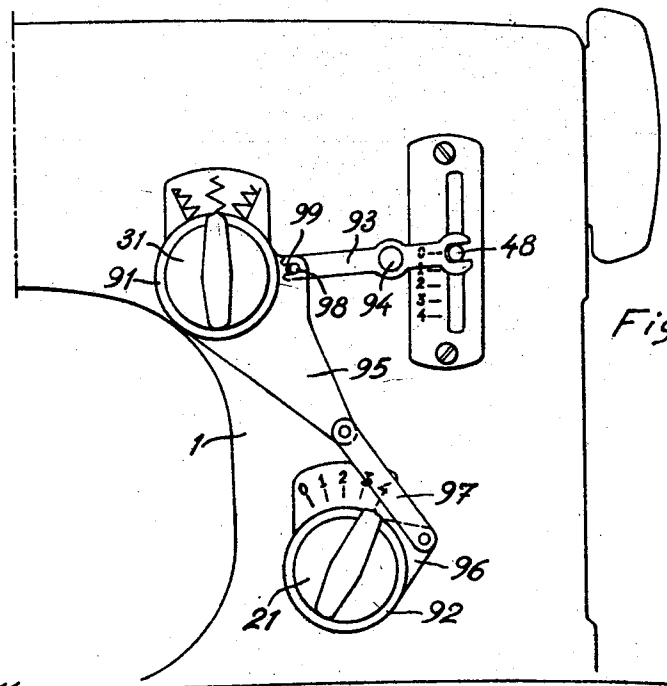


Fig. 13

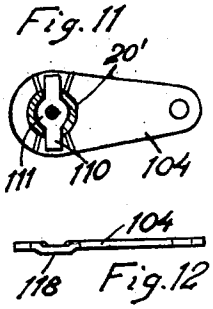


Fig. 11 Fig. 12

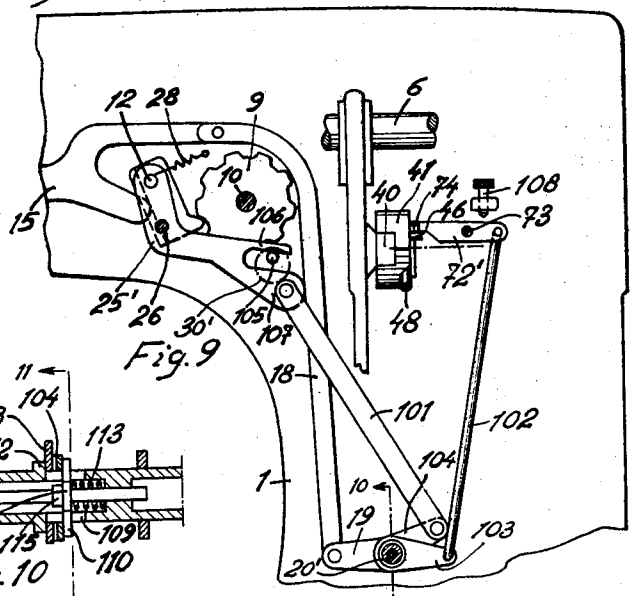


Fig. 9

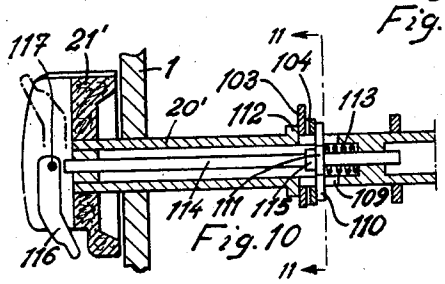


Fig. 10

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3,126,849

ZIGZAG STITCH SEWING MACHINES

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Filed Sept. 13, 1956, Ser. No. 609,769
Claims priority, application Sweden Sept. 14, 1955
12 Claims. (Cl. 112—158)

The present invention relates broadly to the art of sewing.

More particularly, this invention relates to improvements in zigzag stitch sewing machines.

Specifically, the invention relates to an improved control arrangement for various regulating and control members affecting the operation of a zigzag stitch sewing machine.

The invention is therefore particularly related to a zigzag stitch sewing machine especially for domestic use, which includes a longitudinally and transversely movable needle-bar means, a reciprocating work-feeder means and means for regulating the width of stitch, the magnitude and direction of feed and the starting position of a zigzag seam.

Accordingly, it is an object of the present invention to provide a zigzag stitch sewing machine capable of readily and easily producing complicated zigzag seams, particularly buttonhole seams.

It is a further object of the invention to provide a zigzag stitch sewing machine including a longitudinally, reciprocable and transversely movable needle-bar means, drive means for effecting the movement of the needle-bar means including a regulating or control member for regulating the width or amplitude of transverse movement of the needle-bar means, a regulating member for regulating the starting position of the needle-bar means when effecting transverse movement, a reciprocable work-feeder, drive means for the work-feeder including a control member therefor determining the magnitude and direction of feed, manually manipulatable means for actuating said regulating and control members including an operating handle for each and motion transmitting means between said regulating and control members for transmitting regulating movements from one of said manually manipulatable means to the other two including coupling components disengageable at least in certain positions of said one manually manipulatable means whereby while the sewing machine is running said regulating and control members are jointly actuable and are capable of individual actuation.

As a further object of the invention, the motion transmitting means between the respective regulating and control members may be such that manipulation of the sewing machine for producing an ordinary buttonhole seam essentially only comprises successive actuation of the operating-handle and which handle may be one of those that individually adjusts the respective regulating and control members.

Further and more specific objects will be apparent from the following description taken in connection with the accompanying drawings in which:

FIGURE 1 is a diagrammatic front view with parts removed of an embodiment of the invention,

FIGURE 2 is an enlarged sectional view taken substantially along line 2—2 in FIGURES 1 and 3,

FIGURE 3 is a vertical sectional view taken along lines 3—3 in FIGURE 2,

FIGURES 4 and 5 are sectional views taken along lines 4—4 and 5—5 respectively in FIGURE 2,

FIGURE 6 is a fragmentary end elevation viewed from the position of section lines 6—6 in FIGURE 2,

FIGURE 7 is a front elevational view of the operating-handle for regulating the starting position of the zigzag seam,

FIGURE 8 illustrates a buttonhole seam produced by the invention,

FIGURE 9 is a diagrammatic front view of a modified form of the invention applied to the major operating components of the machine shown in FIGURES 1 to 7,

FIGURE 10 is a sectional view on an enlarged scale taken along lines 10—10 in FIGURE 9 and illustrating the operating-handle on the exterior of the machine casing,

FIGURE 11 is a sectional view taken along lines 11—11 of FIGURE 10,

FIGURE 12 is an end elevational view of one of the components illustrated in FIGURES 9 to 11, and

FIGURE 13 is a fragmentary front view of a sewing machine illustrating another modified form of the invention.

The sewing machine illustrated in FIGURES 1 to 7 includes a hollow casing 1 constructed to provide a work-support 2 and an overhanging sewing arm 3. At the free end of this arm is mounted a needle guide or bearing 4 that accommodates a substantially vertically disposed needle-bar 5 for longitudinal movement in the guide or bearing 4. The longitudinal reciprocation of the needle-bar is transmitted from the main drive shaft 6 that extends longitudinally of the sewing arm 3 by means of a crank mechanism, not shown, which may be of known construction. For example, this crank mechanism may be of the type embodied in prior filed application Serial No. 435,275 filed June 8, 1954, now Patent No. 2,969,756, in the name of A. H. Eriksson and entitled "Sewing Machines." The needle-bar guide and thus the needle-bar is also movable transversely or laterally about a horizontal pivot 7. For imparting such transverse or lateral movement to the needle-bar, the drive shaft 6 is operatively connected by a worm gear, such as, 8, FIGURE 3, with a transversely extending stub shaft 10 fixedly mounted within the sewing arm and carrying cam disc 9. Engaging the periphery of the cam disc is a cam follower means 11 mounted to swing about horizontal pivot 12. The back side of the follower 11 is provided with a guide groove 13 accommodating a finger 14 at one end of a link 15. The other end of this link is hingedly connected as at 16 to the needle-bar bearing or guide 4. The said one end of link 15 is bifurcated and includes another finger or arm portion pivotally connected as at 17 to one end of the link 18. The other end of link 18 is pivotally connected to an arm 19 carried by a shaft 20 that is journalled for rotation within the casing 1 and provided with an operating-handle 21 exteriorly of the casing and also with a friction brake means, not shown. The needle-bar bearing or guide 4 is normally spring urged to the right, FIGURE 1, by a spring 22. The pressure of this spring maintains finger 14 engaged in the guide groove 13 of the cam follower 11 and presses the latter against the periphery of cam disc 9. The shape of the cam 9 is such that, upon rotation of shaft 6, there is obtained an ordinary zigzag seam of a width, herein termed the stitch width, which depends upon the distance between the center of pivot 12 and the point of contact of finger 14 with guide groove 13. This distance is variable by turning shaft 20 thus actuating the aforedescribed linkage to shift finger 14 along groove 13 so that shaft 20 can be termed a regulating member for controlling the stitch width.

The pivot 12 or swinging center for the cam follower 11 is carried by one arm of a double-arm or bent lever 25 in turn mounted to swing about a pivot 26 carried by a plate 27 fixedly mounted within the casing, FIGURES 2 and 3. A spring 28 urges the other arm of lever 25

into engagement with the periphery of a cam 29 mounted on shaft 30 which is journaled within the casing and provided with an operating handle 31 on the exterior of the casing, FIGURE 2. By turning this handle and thus shaft 30, cam 29 acting on lever 25 causes the latter to swing about its pivot 26 to displace cam follower pivot 12 in the longitudinal direction of link 15 whereby the starting position of the zigzag seam (the stitch-field position) can be varied. Therefore, lever 25 through actuation of handle 31 constitutes a regulating member for the starting position of the seam. The shape of cam 29 is such that the starting position is to the right, in the center and to the left when handle 31, controlling shaft 30 and thus cam 29 is in the positions R, C and L respectively in FIGURE 7.

The sewing machine further includes a work-feeder or feed dog 35 driven from shaft 6 by motion transmitting means of known construction including a forked rod 36 hinged or pivoted at its lower end to an arm 37 on a rock shaft 38 which is connected to feed dog 35 and embracing with its forked upper end an eccentric 39 on shaft 6. A die 40 is mounted on one face of rod 36 for turning about an axis parallel to shaft 6. This die 40 is slidably disposed in the groove of a guide or control member 41 carried on the end of shaft 42 which is journalled within the casing. The eccentric 39 imparts a swinging motion to rod 36 and a simultaneous longitudinal motion depending on the angular position of the guide or control member 41 whereby the work-feeder or feed dog 35 is horizontally reciprocated. The vertical motion of the feed dog is effected by an eccentric 43 also on shaft 6 connected by means of an eccentric connecting rod 44 to a rock shaft not shown in turn and in known manner operatively connected to the feed dog.

The guide or control member 41 is normally urged by a spring 45, FIGURE 3, to turn in the counter-clockwise direction. A pin 46 projects from the face of guide or control member 41 that is opposite die 40 and this pin under the action of spring 45 normally engages a nose 47 provided on one end of a lever 48 that is swingably mounted about shaft 42. The lever 48 has an outer end disposed through a slit or opening in the front wall of the casing. On this outer end is a nut 49 engaged with threads on the lever for manual adjustment longitudinally of the lever. The nut can thus be engaged with a plate 50 that is secured to the casing to limit the turning movement of the lever 48. When the lever 48 and thus control member 41 is in a middle position, the groove in the control member being horizontal, the horizontal movement of feed dog 35 and thus the stitch length is zero. When lever 48 has been swung into its lowermost position, variable by manipulating the nut 49, the work is fed forward in steps having a length (stitch length) which depends on the turning angle of control member 41. When the lever 48 is set in its upper position, there is a backward feed by equal amounts. The guide or control member 41 thus constitutes a regulating member for controlling the magnitude and direction of feed.

In accordance with the invention, the three regulating members, stitch width regulating means 20, stitch field position regulating means 25, and fabric feed regulating means 41 are manually adjustable in unison. To effect such movement, a motion imparting or transmitting mechanism is provided including a link 60 pivotally connected at one end to an arm 61 provided on shaft 20 and at its other end link 60 has a longitudinally extending slot 62 disposed over shaft 30. The slot 62 is substantially longer than the diameter of this shaft and the said other end of the link 60 has pins 63 and 64 projecting out of the respective opposite faces of the link for cooperation with cams 65 and 66 fixedly mounted on shaft 30 on opposite sides of link 60. An additional link 67 carries at one end, the left end in FIGURES 1 and 3, pin 68 slidably disposed in a slot or notch 69 in the stationary plate 27.

The pin 68 is adapted to cooperate with a cam 70 provided on shaft 30 adjacent cam 66, the slot 69 extending substantially longitudinally of link 67. The opposite end of link 67, which is offset, is hingedly connected by means of a pin 71 to one arm of a double-arm lever 72 that is swingable vertically on pivot 73 mounted in the casing. The other arm of lever 72 is provided with a laterally offset finger 74, FIGURES 2 and 5, for cooperation with pin 46 carried by control member 41. Means for preferably provided for readily adjusting the distance between pin 71 and pivot 73. Thus, pin 71 is disposed in a slot 76 formed in the lower arm of lever 72. This slot has a plurality of laterally extending, notches 75 therein and the pin 71 is retained in any one of these notches by a tension spring 77 extending between the lower arm of lever 72 and link 77. The pin 71 can be manually displaced against the tension of this spring 77 for manipulation into any one of the notches 75.

Those parts of the periphery of cams 65 and 66 which are opposite pins 63 and 64, respectively, when the handle 31 for shaft 30 occupies either of positions R and L or any position between the same, have such small radius that the cams do not actuate link 60 whenever handle 31 is turned between positions R and L. Additionally, the shape of cam 70 is such that this cam does not actuate link 67 whenever handle 31 is turned between positions R and L. Thus the regulating members are individually, manually adjustable when handle 31 is in its field of motion (R–L) between the positions R and L.

For the purpose of obtaining a buttonhole seam as shown in FIGURE 8, the shape of the other peripheral portions of the above mentioned cams is such that the regulating members are jointly actuated as follows:

Handle 31 is first turned to the right into position A, FIGURE 7, which actuates stitch field position controlling member 25 to the position corresponding to the left starting position (the same as obtained when handle 31 is at position L). The turning motion imparted to cams 65 and 66 has through pins 63 and 64 imparted movement to link 60 to such an extent that shaft 20 has been turned into a position in which link 18 has moved finger 14 to a position such that half the maximum stitch width is obtained. Simultaneously, cam 70 has moved link 67 to the right in FIGURES 1 and 3 so that lever 72 has been rocked about pivot 73 and thus arm 74 in engagement with pin 46 turns control or regulating member 41 into an angular position determining backward feed and small stitch length. With the handle 31 in position A, the cooperation between feed dog 35 and needle-bar 5 produces the straight zigzag seam portion 80. After this portion has obtained the desired length, handle 31 is turned further into position B. This position determines the central starting position. During the turning motion from positions A to B, cam 66 has produced and cam 65 has permitted an upward displacement of link 60 so that shaft 20 is turned to a position corresponding to full or maximum stitch width. Simultaneously, the surface of cam 70 permits link 67 to move to the left under the action of spring 45 turning guide 41 to a position corresponding to zero stitch length. Therefore, with handle 31 in position B, a barring portion 81 is provided at the end of the buttonhole. After the bar 81 has obtained the desired thickness, handle 31 is turned into position C giving the right starting position (as does position R). During this turning movement from B to C, cam 65 has effected and cam 66 permitted a return motion of link 60 and the turning of shaft 20 into the position providing the same stitch width as did position A. Simultaneously, cam 70 has permitted a turning of the guide or control member 41 under the action of spring 45 into a position determining the same stitch length as position A, but a position which corresponds to forward feed. With the handle 31 in position C, the operation of the machine, during forward feeding, produces a zigzag seam portion

82 similar to but opposite the seam portion 80. When seam portion 82 has reached the same length as seam portion 80, handle 3 is turned into position D so as to determine the central starting position for the needle. During turning of the handle from position C to D cam 66 has actuated link 60 to turn shaft 20 again into the position for full stitch width and cam 70 has by actuation of link 67 and lever 72 effected a turning of guide or control member 41 against the action of spring 45 into the position determining zero stitch length. With the handle 31 in position D the mechanism produces a barring portion 83 corresponding to the bar 81, but at the opposite end of the buttonhole. Thus the successive manipulation of handle 31 through positions A to D completes the formation of a buttonhole seam. By continued turning of handle 31 into the field R–L, the regulating members 20, 25 and 41 again become separately and individually adjustable. Thus, straight stay stitches may be produced, preferably in position R, with a slight forward or backward feed. Preferably, however, the shape of the cams is such that a straight seam of stay stitches can be produced while the regulating members are still movable in unison and handle 31 is in a position between positions D and L. The stitch length of the seams 80 and 82 may be adapted, for example, to the thread thickness, by manually displacing pin 71 from one notch 75 to another along slot 76, before the buttonhole seam operation is commenced. During this latter operation, lever 48 should be in the position determining maximum forward stitch length.

FIGURES 9 to 12 relate to a modification in which the starting position and feed are adjusted or varied by turning shaft 20′ by actuating the handle determining stitch width. In this form of the invention, component parts 29 and 60 to 71 shown in FIGURES 1 to 7 are omitted. Instead, levers 25′ and 72′ are respectively connected by links 101, 102 to arms 104 and 103 on shaft 20′. The inner end of shaft 30′ has a pin 105 mounted eccentrically thereon for disposition between two prongs 106, 107 on lever 25′. The movement of lever 72′ in the counter-clockwise direction in FIGURE 9 is limited by an adjustable stop preferably in the form of a set screw 108. Arms 103 and 104 are turnably mounted on shaft 20′, but are capable of being coupled for rotation therewith by manually operable friction clutch means, FIGURES 10 to 12. Thus, shaft 20′ is a hollow shaft and has two longitudinally extending, diametrically opposed slots 109 along a portion of its length for accommodating two wings 110 on clutch member 111. The arms or levers 103 and 104 are mounted between a stop ring 112 fastened to or formed on shaft 20′ and the clutch member 111. This clutch member 111 is mounted on a rod 114 in turn slidably mounted for movement longitudinally of shaft 20′. A helical compression spring 113 is biased between clutch member 111 and a bearing surface within shaft 20′ to urge clutch member 111 toward arms 103, 104. The rod 114 has an abutment 115 thereon which cooperates with clutch member 111. The outer end of rod 114 is engageable by a clutch control arm 116 swingably mounted on a pivot 117 carried by handle 21′ of shaft 20′. The control arm 116 may be manually swung between the connecting position shown in FIGURE 10 in which spring 113 has clutched or coupled the arms 103, 104 to the shaft 20′ and a disconnecting position indicated in dotted lines in FIGURE 10 in which control arm 116 has cammed rod 114 and thus through abutment 115 the clutch member 111 to the right whereby arms 103 and 104 are swingable on shaft 20′. When the wings 110 of clutch member 111 engage the adjacent arm 104 under the pressure of spring 113, these arms are connected to the shaft 20′ by frictional engagement between ring 112, the respective arms, and clutch member 111. As indicated above, swinging of control arm 116 into the dotted line position releases the above described frictional engagement and the arms 103 and 104 are released. The arm 104 on the side thereof directed toward clutch member 111 is provided with two plane sector-shaped and diametrically opposed elevations 118 having sloping sides. The axial position of abutment 115 on rod 114 should be such that control arm 116 in its connecting position also maintains rod 114 in such a position that the movement of clutch member 111 under the action of spring 113 causes the clutch member to engage abutment 115 and not the arm 104 when wings 110 are not opposite the elevations 118.

When the clutch arm 116 is in its disconnecting position, shaft 20′, lever 25′ and control or guide member 41 are individually manually adjustable and the upper prong 106 on lever 25′ is spring pressed against pin 105 carried by shaft 30. By turning this shaft, it is possible to vary the height position of this pin, consequently, the starting position of the seam. In order to sew a buttonhole seam such as in FIGURE 8, shafts 20′, 30′ and lever 48 are first set in positions respectively corresponding to zero stitch width, the right starting position, and forward feed with a small stitch length. The lever 72′ is kept in contact with pin 46 on control member 41 by a weak spring not shown. Set screw 108 is placed in a position such that lever 72′ can turn in the counter-clockwise direction, FIGURE 9, only to a position corresponding to backward feed with the same stitch length. With the parts so adjusted, arm 116 is tipped or swung down into its connecting position whereby wings 110 on clutch member 111 are pressed by spring 113 into contact with the elevations 118 on arm 104 so that the latter presses arm 103 against stop ring 112 to couple the arms to shaft 20′. Then shaft 20′ is turned counter-clockwise in FIGURE 9 into a second position corresponding to half the maximum stitch width whereby lever 72′ is brought into contact with set screw 108 and prong 107 is raised into contact with pin 105 so that control member 41 and lever 25′ are turned to provide small backward feed and the left starting position, respectively, the distance between the facing surface of prongs 106 and 107 is such that the left starting position is obtained when prong 106 engages pin 105 when this pin is in its upper position and also when prong 107 engages pin 105 when this pin is in its lower position. With the parts adjusted as indicated, the commencing of sewing produces seam portion 80, FIGURE 8, under backward feed. When the desired length of feed has been obtained, shaft 20′ is again turned counter-clockwise into a third position providing full stitch width. Arms 103 and 104 are prevented from partaking in this turning motion of shaft 20′ by the respective engagement between pin 105 and prong 107 and lever 72′ and set screw 108. Therefore, the wings 110 turning with shaft 20′ slide off of the elevations 118 on arm 104 so that the arms are disconnected from shaft 20′ so that lever 25′ and control member 41, under the action of springs 28 and 45, respectively, are again set into positions determining the right starting position and a small forward feed. This third position of shaft 20′ produces the barring stitch portion 81. When that is completed, shaft 20′ is then turned back into its second intermediate position, the arms 103 and 104 are still disconnected from shaft 20′ and lever 25′ and guide member 41 remain in their previous positions. The shaft 20′, lever 25′ and control member 41 in these positions of the same produce seam portion 82. The shaft 20′ is again turned into its third position determining full stitch width. The arms 103 and 104 remain disconnected from shaft 20′ and lever 25′ and control member 41 remain in their previous positions. With the component parts 20′, 25′ and 41 in these mutual positions, the barring portion 83 is produced. Finally, shaft 20′ is turned back into its first position determining zero stitch width, lever 25′ and arm 104 being positioned by pin 105 so that the wings 110 will slide up onto the elevation 118 and the arms 103 and 104 will again be coupled to shaft 20′ in positions corresponding to a slight forward feed and right

starting positions, respectively. With the shaft 20', lever 25' and control member 41 in such mutual relationship wherein they initially become interconnected, a few stay stitches are produced whereupon the individual adjustability of these parts may be restored by swinging up control arm 116, or if desired, a new buttonhole seam may immediately be commenced.

In the form of invention shown in FIGURES 9 to 12, the elevations 118 may be omitted and arm 104 may be planar in the path of movement of wings 110. When sewing a buttonhole seam according to FIGURE 8, shaft 20' may in this instance be manipulated as set forth above, but after the first turning of this shaft into the position determining full stitch width, the arms 103 and 104, by friction applied by clutch member 111, will remain in positions corresponding to backward feed and left starting position, respectively, and thus bar portion 81 will be produced under backward feed and will be partly covered by the seam portion 82. The subsequent turning movement of the shaft 20' will result in forward feed in the right starting position, seam 82, backward feed and left starting position (bar 83), and forward feed and right starting position (stay stitches), respectively.

FIGURE 13 illustrates a further form of the invention as applied to a sewing machine, which apart from the motion transmitting means provided between the three regulating members, is substantially similar to the machine described previously, although lever 48 may in this instance, as usual, be fixed to the grooved control guide member 41 which need not be spring actuated. The motion transmitting means in this form of the invention comprises two sleeves or rings 91 and 92 which are either of elastic material or provided with a lining of elastic material, such as rubber, so that they can be respectively slid onto handles 31 and 21 and frictionally engaged therewith for adjusting the starting position of the zigzag seam and the stitch width, respectively. These rings carry radially directed arms 95 and 96 which are interconnected by a link means 97. Arm 95 on ring 91 has an offset portion carrying a pin 98 spaced from the periphery of the ring 91. This pin is engaged in a slot 99 at one end of a double-arm lever 93 swingably mounted on pivot 94 projecting from the casing 1. The opposite end of this lever 93 is forked and embraces the lever 48, the position of which determines the magnitude and direction of feed. FIGURE 13 illustrates lever 48 and handles 21 and 31 as set in positions corresponding to zero feed, full stitch width and central starting position and with the link 97 extending radially from the turning center of handle 31.

In order to produce the buttonhole seam shown in FIGURE 8, handle 31 is first turned to the right into the position denoting right starting position. Sleeve or ring 91 is moved with handle 31 and consequently through arm 95 and link 97 turns handle 21 into the position providing about half maximum stitch width and the lever 93 swings lever 48 into position determining small backward feed. With the parts so adjusted, the seam portion 82 is produced. When this seam portion has obtained the desired length, handle 31 is returned to the position illustrated and this turning movement restores handle 21 and lever 48 into the illustrated positions which determine full stitch width and no feed. In this position of the parts, the barring portion 81 is produced. Thereupon handle 31 is turned to the left to determine the left starting position and link 97 again sets handle 21 into the position determining half stitch width and lever 93 swings lever 48 into the position determining small forward feed. The machine then sews seam portion 80. When this seam portion has almost reached the starting point of seam portion 82, handle 31 is returned to the central position shown whereupon handle 21 and lever 48 are also returned to the illustrated positions so as to produce the finishing bar 83. The described manipulation and displacement of handle 31 can be readily performed while the machine is in operation and thus during sewing so that at all times the operator's attention may be directed to the seam being produced. The individual mobility of the regulating members, handles 21, 31 and levers 48 may be restored by pulling rings 91 and 92 from off the handles, arms 95 and 96 and link 97 accompanying the same. Lever 93 may then be removed from its pivot 94.

In the aforedescribed modification, the motion transmitting means between the regulating members include components connectible with the regulating members by axial movement relative thereto and carried exteriorly of the casing or frame 1. If desired, a similar motion transmitting mechanism may be permanently mounted within the casing and disengageable from the respective handles by axial displacement of one or more of the same.

Additional embodiments of the invention are contemplated within the scope of the appended claims. Thus, the motion transmitting mechanism may be actuated by a fourth and special handle instead of by one of the handles for the regulating members. In embodiments of the invention having a number of cams, such as, 29, 65, 66 and 70 mounted on a turnable shaft, other complicated seams may be produced with other cam shapes and the cams are mounted so as to be readily exchangeable. The invention is also applicable for use in sewing machines wherein the feed regulating member is manually and separately adjustable by manipulating a turnable handle instead of a swingable lever. The invention may also be applied to sewing machines wherein the stitch width, the starting position and/or the fabric feed can be controlled manually as well as automatically. In the embodiment according to FIGURES 1 to 7, cam follower 11 may thus be selectively connectible with either cam disc 9 or any one of a plurality of differently shaped cam discs, 9*a*, 9*b*, which are rotatable with and axially displaceable with cam 9 as a unit, such as in the aforementioned Eriksson application Serial Number 435,275.

What is claimed is:

1. A zigzag stitch sewing machine comprising a work support, a hollow frame including an overhanging sewing arm disposed above the work support, a reciprocable work feeder operatively associated with said work support, a transversely movable needle bar guide carried by said sewing arm, a longitudinally reciprocable needle bar operatively associated with said guide, a drive shaft within said frame, adjustable motion transmitting means operatively inter-connected between said drive shaft and said needle bar guide for imparting lateral movement to said guide and thus to said needle bar, control means for adjusting said motion transmitting means, including a first regulating member movable to setting positions for adjusting the motion transmitting means to vary the amplitude of transverse movement of the guide so as to regulate the width of stitch and a second regulating member for adjusting the motion transmitting means to vary the starting position of the transverse movement of the guide to determine the starting position of a zigzag seam, additional adjustable motion transmitting means operatively inter-connected between said shaft and said work feeder for imparting feed movements to the work feeder, control means for said additional adjustable motion transmitting means operative to vary the amplitude and direction of feed of the work feeder, said last named control means including a third regulating member, separate manually actuated means for imparting individual adjusting movement to each of said regulating members and additional adjusting movement imparting means operable by one of said separate manually actuated means and mechanically connected to the regulating members operated by the other manually actuated means, whereby upon operation of said one manually actuated means to at least certain positions thereof, adjusting movements will be imparted simultaneously to all of said regulating members.

2. In a sewing machine, a hollow frame, a longitudinally reciprocable and transversely movable needle bar means carried by the frame, a reciprocable work feeder mounted for cooperation with said needle bar means, drive means within the frame and connected to the needle bar means and work feeder for imparting sewing movements to the needle bar means and feeding movements to the work feeder, respectively, for producing zigzag stitches, said drive means including adjustable motion imparting means operatively related with the needle bar means and work feeder to respectively adjust the amplitude of the transverse movement of the needle bar means to vary the width of stitch, to adjust the amplitude and direction of reciprocation of the work feeder and to adjust the needle bar transverse movement to the left or right of a center line to vary the starting position of a zigzag seam, settable control members for each of said adjustable motion imparting means, individual manually actuated means for imparting setting movement to each of the control members during sewing, an operating handle carried by the frame exteriorly thereof and movable through a plurality of positions, and setting movement transmitting means operatively connected between said handle and said control members and effective upon movement to certain positions of said handle to impart setting movements to one of said control members only and upon movement to other positions to impart joint setting movements to all of said control members.

3. A zigzag stitch sewing machine comprising a work support, a hollow frame including an overhanging sewing arm disposed above the work support, a reciprocable work feeder operatively associated with said work support, a transversely movable needle bar guide carried by said sewing arm, a longitudinally reciprocable needle bar operatively associated with said guide, a drive shaft within said frame, adjustable motion transmitting means operatively inter-connected between said drive shaft and said needle bar guide for imparting lateral movement to said guide and thus to said needle bar, control means for adjusting said motion transmitting means, including a first regulating member movable to setting position for adjusting the motion transmitting means to vary the amplitude of transverse movement of the guide so as to regulate the width of stitch and a second regulating member for adjusting said motion transmitting means to vary the starting position of the transverse movement of the guide to determine the starting position of a zigzag seam, additional adjustable motion transmitting means permanently mounted in said hollow frame operatively interconnected between said shaft and said work feeder for imparting feed movement to the work feeder, control means for said additional adjustable motion transmitting means operative to vary the magnitude and direction of feed of the work feeder, said last named control means including a third regulating member, separate manually actuated means for imparting individual adjusting movement to each of said first and third regulating members, a handle means permanently mounted on the frame and capable of being set in a plurality of positions, and additional adjusting movement imparting means operable by said handle means and mechanically connectable to said three regulating members, said additional adjusting movement imparting means being effective upon movement to certain positions of the handle means to successively set said regulating members in correlated positions corresponding to different parts of a buttonhole seam comprising a straight zigzag seam at each side of the buttonhole and barring stitches at each end thereof, said handle means being disconnected from two of said regulating members upon movement to another position, wherein said additional adjusting movement imparting means are inoperative to interconnect said three regulating members.

4. A zigzag stitch sewing machine comprising a work support, a hollow frame including an overhanging sewing arm disposed above the work support, a reciprocable work feeder operatively associated with said work support, a transversely movable needle bar guide carried by said sewing arm, a longitudinally reciprocable needle bar operatively associated with said guide, a drive shaft within said frame, adjustable motion transmitting means operatively inter-connected between said drive shaft and said needle bar guide for imparting lateral movement to said guide and thus to said needle bar, control means for adjusting said motion transmitting means, including a first regulating member movable to setting positions for adjusting the motion transmitting means to vary the amplitude of transverse movement of the guide so as to regulate the width of stitch and a second regulating member for adjusting the motion transmitting means to vary the starting position of the transverse movement of the guide to determine the starting position of a zigzag seam, additional adjustable motion transmitting means operatively inter-connected between said shaft and said work feeder for imparting feed movements to the work feeder, control means for said additional adjustable motion transmitting means operative to vary the magnitude and direction of feed of the work feeder, said last-named control means including a third regulating member, separate manually actuated means for imparting individual adjusting movement to each of said first and third regulating members, and setting movement imparting means mechanically connected to said three regulating members and comprising a set of manually and jointly turnable cams mounted in the frame, the shape of said cams being such that by turning them jointly in one and the same direction, the regulating members are successively set in correlated position corresponding to different parts of a buttonhole seam comprising a straight zigzag seam at each side of the buttonhole and barring stitches at each end thereof, and in which the shape of the cams is such that in one angular position thereof the regulating members are set in positions providing a straight seam at one side of the buttonhole, said setting movement imparting means comprising a manually variable leverage connection between one of said cams and said third regulating member.

5. A zigzag stitch sewing machine as defined in claim 4 in which said cams may be disconnected from at least two of the regulating members by turning said cams to a further angular position.

6. In a zigzag sewing machine having a needle bar, needle bar oscillator means for guiding said needle bar and a material feed dog including operating mechanism therefore, operation setting means for setting up different operating conditions including a first mechanism operatively connected to said needle bar oscillator means comprising primary elements adjustable to control the stitch width of the machine and secondary elements operatively associated with said primary elements to adjust the stitch location of said needle bar, and a second mechanism associated with the feed dog operating mechanism to vary the magnitude and the direction of the material feed of the machine, first manual means operatively connected with said primary elements for setting the stitch width, second manual means operaitvely connected with said secondary elements to adjust said secondary elements and thereby said primary elements for setting the stitch location and third manual means operatively associated with said second mechanism for setting the magnitude and the direction of the material feed, and intermediate means operatively connecting said first mechanism and said second mechanism, said intermediate means being operatively associated with said first, said second and said third manual means and being movable by manipulation of one of said manual means directly connected to said intermediate means to simultaneously move the other said manual means and said first and second mechanisms to establish different operating conditions.

7. In a zigzag sewing machine having a needle bar, needle bar oscillator means for guiding said needle bar

and a material feed dog including operating mechanism therefor, operation setting means for setting up different operating conditions, including first mechanism operatively connected to said needle bar oscillator means comprising primary elements adjustable to control the stitch width of the machine and secondary elements operatively associated with said primary elements to adjust the stitch location of said needle bar, and a second mechanism associated with the feed dog operating mechanism to vary the magnitude and the direction of the material feed of the machine, first manual means operatively connected with said primary element for setting the stitch width, second manual means operatively connected with said secondary elements to adjust said secondary elements and thereby said primary elements for setting the stitch location and third manual means operatively associated with said second mechanism for setting the magnitude and the direction of the material feed, and intermediate means operatively connecting said first mechanism and said second mechanism, said intermediate means being operatively associated with said first, said second and said third manual means and being movable by manipulation of one of said manual means directly connected to said intermediate means to simultaneously move the other said manual means and said first and second mechanisms to establish different operating conditions, said operation setting means including a further manual means disposed in operative relationship with said intermediate means to interrupt the operative association with one of said manual means.

8. A sewing machine as defined in claim 1, in which said one manually actuated means includes a manipulating member disposed exteriorly of said frame, and means for selectively coupling said manipulating member to all of said regulating members for joint movement thereof by operation of said manipulating member and for disconnecting said manipulating member from certain of said regulating members to permit individual operation thereof.

9. In a sewing machine as defined in claim 1, a turnable handle-shaft mounted in said frame, exterior handle means mounted on said handle-shaft and constituting said one manually actuated means and a clutch provided on said handle-shaft for releasably connecting said handle-shaft to said additional adjusting movement imparting means and operative to disconnect the latter from said handle-shaft by operation of said handle means.

10. A sewing machine as defined in claim 1, in which said additional adjusting movement imparting means comprises two actuating members associated with said one manually actuated means and two operating members operatively connected to the regulating members operated by the other manually actuated means, one of said operating members having a portion disposed in the path of movement of one actuating member and in sliding engagement therewith and the other of said operating members have a portion disposed in the path of movement of the other actuating member and in sliding engagement therewith.

11. A sewing machine as defined in claim 3, in which the movement imparting means connectable to the third regulating member comprise manually adjustable means to adjust those positions of said third regulating member which correspond to said zigzag seams at each side of the buttonhole, whereby the stitch length in said seams is adjustable to suit the thread size and type of fabric.

12. A sewing machine as defined in claim 3, in which said third regulating member is movable back and forth between two positions, manually adjustable abutments for determining said two positions, spring means for actuating said third regulating member in one direction, said movement imparting means connectable to said third regulating member including yieldable means allowing said movement imparting means, upon movement of said handle means to one of said certain positions, to move said third regulating member to the position determined by one of said manually adjustable abutments.

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