

Jan. 29, 1963

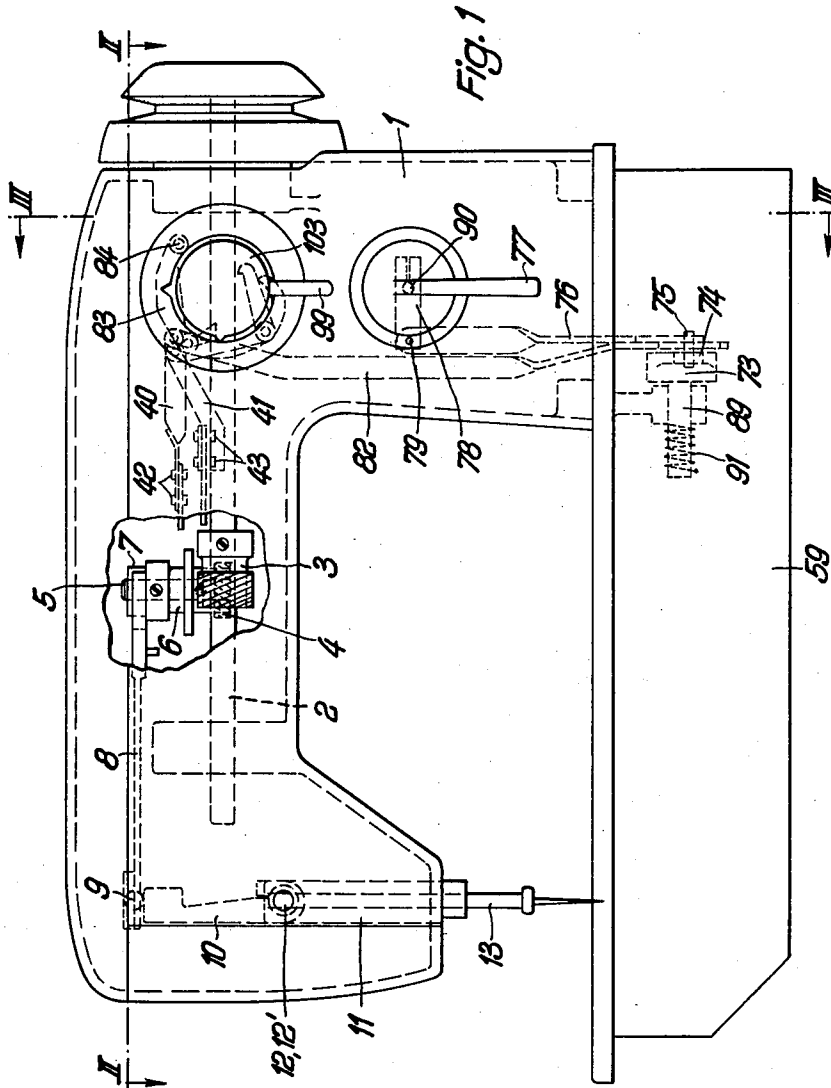
W. ENGEL

3,075,483

ZIG-ZAG SEWING MACHINES

Filed May 6, 1958

5 Sheets-Sheet 1



Inventor:
WOLFGANG ENGEL
BY *Robert H. Jacob*
AGENT

Jan. 29, 1963

W. ENGEL

3,075,483

ZIG-ZAG SEWING MACHINES

Filed May 6, 1958

5 Sheets-Sheet 2

Fig. 2

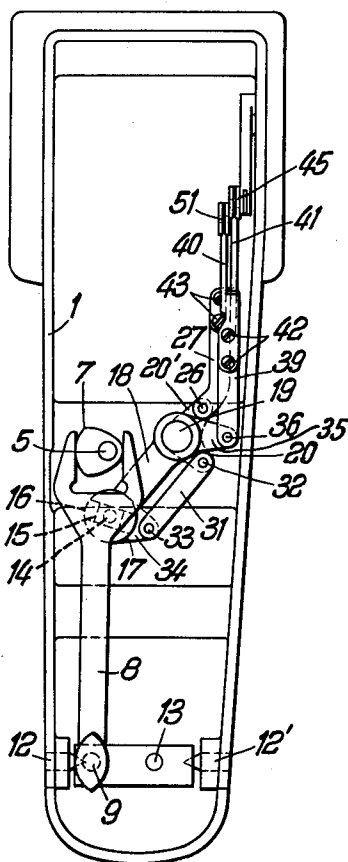
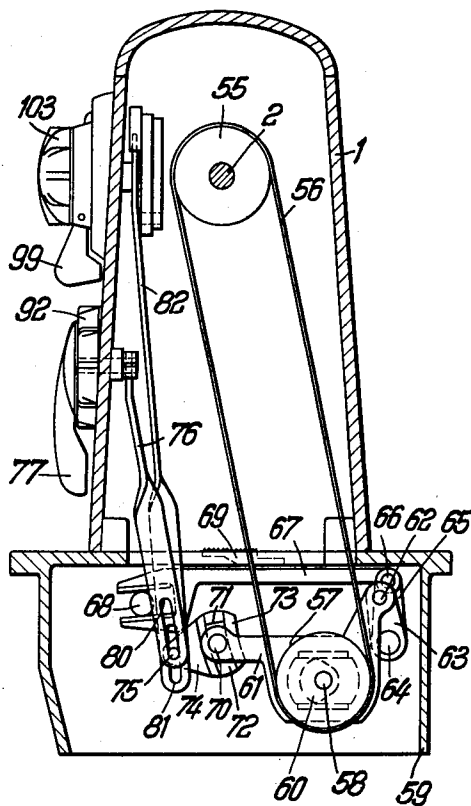


Fig. 3



Inventor:
WOLFGANG ENGEL
BY *Robert H. Jacob*
AGENT

Jan. 29, 1963

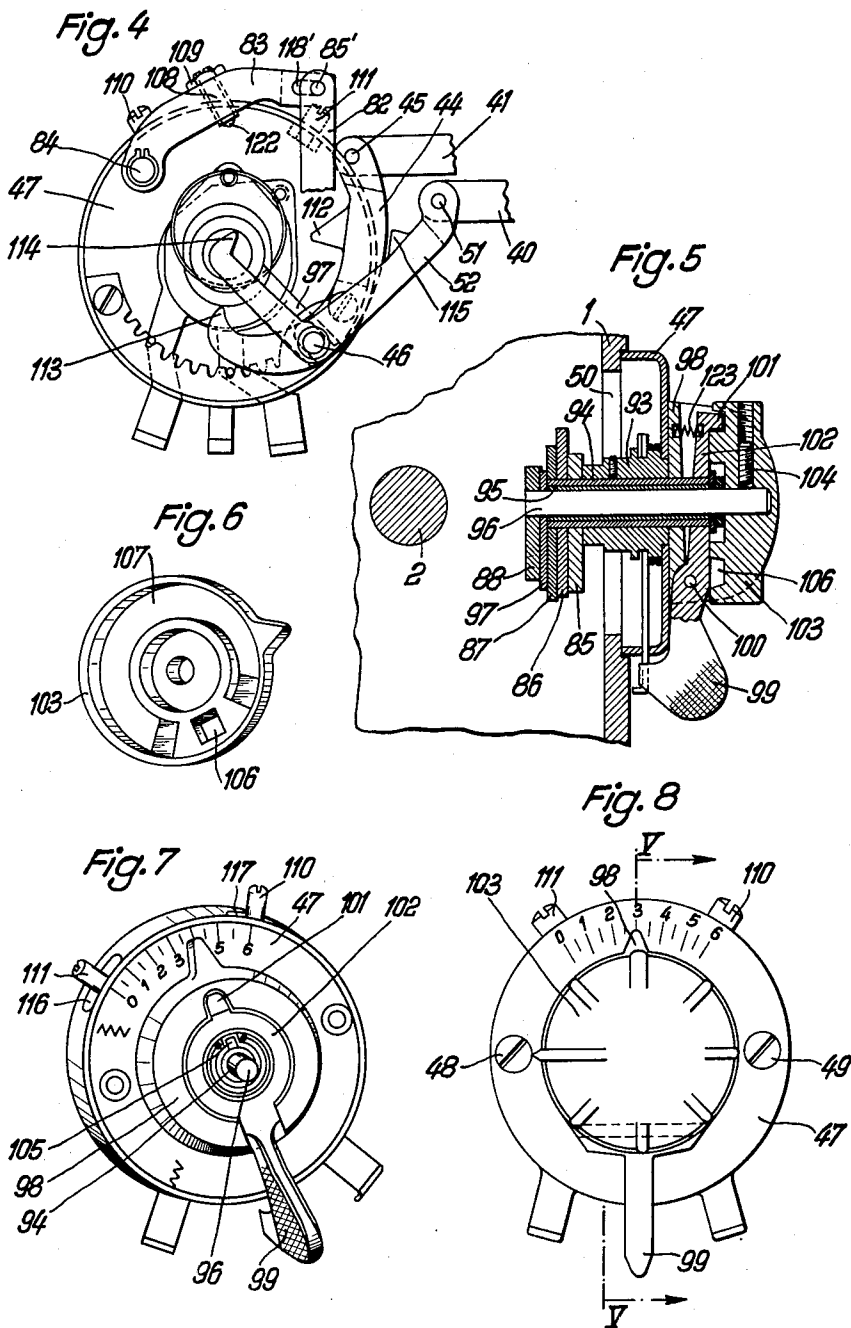
W. ENGEL

3,075,483

ZIG-ZAG SEWING MACHINES

Filed May 6, 1958

5 Sheets-Sheet 3



Inventor:
WOLFGANG ENGEL
BY Robert H. Jacob
AGENT

Jan. 29, 1963

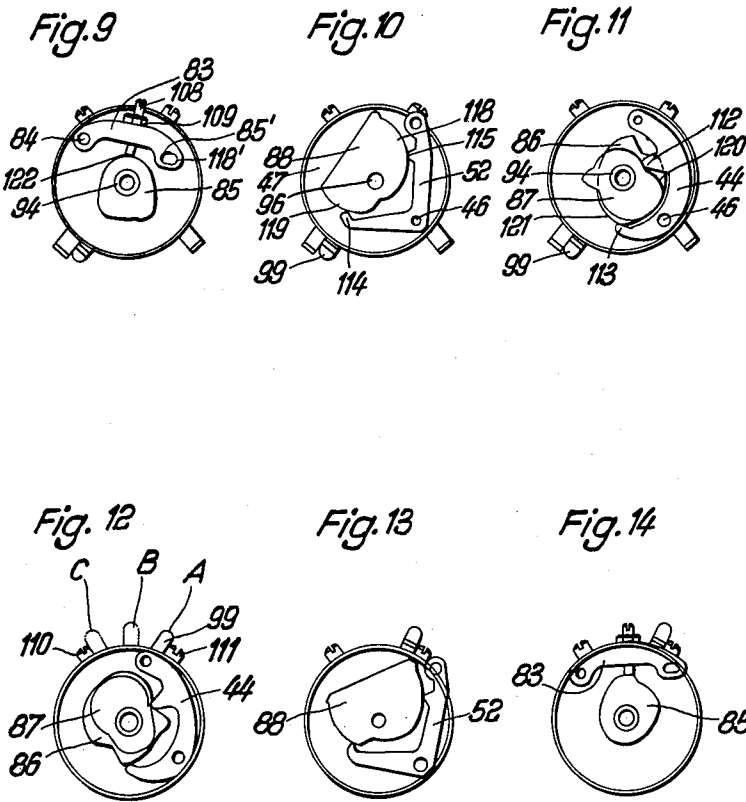
W. ENGEL

3,075,483

ZIG-ZAG SEWING MACHINES

Filed May 6, 1958

5 Sheets-Sheet 4



Inventor:
WOLFGANG ENGEL
BY *Robert H. Jacob*
AGENT

Jan. 29, 1963

W. ENGEL

3,075,483

ZIG-ZAG SEWING MACHINES

Filed May 6, 1958

5 Sheets-Sheet 5

Fig. 16

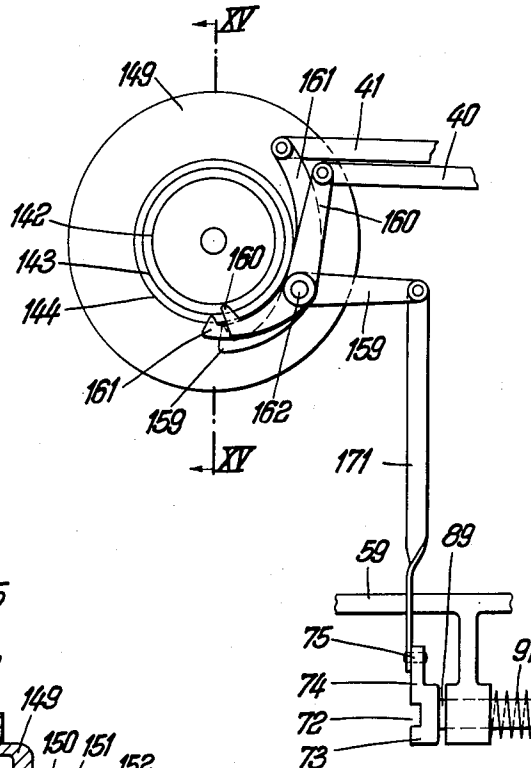
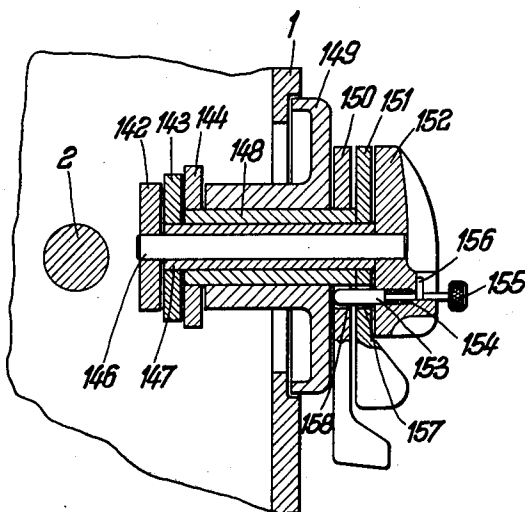


Fig. 15



Inventor:
WOLFGANG ENGEL

BY Robert H. Jacob.
AGENT.

1

3,075,483

ZIG-ZAG SEWING MACHINES

Wolfgang Engel, Bielefeld, Germany, assignor to Anker-Phoenix Nähmaschinen Aktiengesellschaft, Bielefeld, Germany

Filed May 6, 1958, Ser. No. 733,368

Claims priority, application Germany May 11, 1957

7 Claims. (Cl. 112—158)

The present invention relates to zig-zag sewing machines and is particularly concerned with control and switching mechanism adapting such machines for ordinary sewing operations as well as for automatic or semi-automatic operation, for example, to produce button holes or the like.

Zig-zag sewing machines are normally constructed in a manner that they have special manipulating means which are independent of one another by means of which the stitch width or cross-over, the stitch position and the material feed operation are adjustable. It is possible to produce a large number of different ornamental stitches with such a zig-zag sewing machine. It is even possible to sew a button hole with these individual setting means, but this requires especially competent operation which cannot be generally expected of the normal seamstress. On the other hand, so-called automatic sewing machines are known which are provided with a nest of guiding or control cams. This cam nest can be arranged in such a manner that by properly adjusting the cams the sewing of a button hole takes place automatically or semi-automatically, depending on whether or not the control cam nest is driven by the shaft of the sewing machine.

It is an object of the invention to construct a zig-zag sewing machine in such a manner that it is made possible without manipulating devices in addition to the conventional devices for such sewing machines, to sew a button hole or perform other fancy stitches semi-automatically.

This represents a considerable step forward, particularly, if in order to construct the zig-zag sewing machine as intended in accordance with the invention, any considerable additional structural expenditure is unnecessary. Moreover, inasmuch as the machine has only the three customary setting devices the operation of the machine is simplified considerably, for example, also for sewing the button hole. For this purpose the insertion of a special nest of guiding cams is not necessary.

In order to achieve these objects the invention utilizes a known zig-zag sewing machine having setting cams for the stitch width and the stitch position arranged axially and independently of one another and having associated manipulating means. In this arrangement the cam disks are on the inside of a cover plate which closes an aperture in the machine housing and the associated manipulating devices are on the outside of said plate.

The invention, in the first place, provides that in such a zig-zag sewing machine which is known per se the control arrangement is provided with an additional control cam disk for the material feed and manipulating means therefor. The three handles for the stitch width, the stitch position and the material feed can be coupled with one another. By operating only a single manipulating device after coupling has been effected, it is possible to shift the adjusting cam disks as a unit into such a position that, for example, the sewing of a button hole can be effected.

The arrangement is preferably made in such a manner that the cam disks are formed along a part of their circumferences in a manner to make the machine useable as a normal zig-zag machine, while the curves along the other part of the circumferences of these cam disks are constructed for semi-automatic button hole production. By shifting the entire control arrangement with a manipulating device which assumes the coupling position the cam

2

followers which act on the needle bar movement and on the material feed are placed in operative position for the button hole cam disk setting. The cam disks for the over-stitch width, the stitch position or location and for the material feed thus serve along one part of their circumferences to permit use of the sewing machine as a true zig-zag sewing machine, while another part of the circumferences of the same setting cam disks is used, for example, for the semi-automatic sewing of a button hole.

Further objects, details and features of the invention will become apparent from the description of the embodiments of the invention illustrated in the accompanying drawings in which

FIG. 1 is a front view of a sewing machine with parts broken away,

FIG. 2 is a top view of the machine with the cover removed taken along line II—II in accordance with FIG. 1,

FIG. 3 is a section taken along the line III—III of FIG. 1,

FIG. 4 is a rear view of the setting mechanism,

FIG. 5 is a section through the setting mechanism along line V—V of FIG. 8 in the direction of the arrows, FIG. 6 is a perspective view of the setting knob,

FIG. 7 is a perspective illustration of the setting mechanism with the knob removed,

FIG. 8 is a front view of the setting mechanism shown in FIGS. 4 to 7,

FIGS. 9, 10 and 11 are rear views of the control disks in the position for sewing straight or zig-zag seams,

FIGS. 12, 13 and 14 are rear views of the cam disks in the position for sewing the left bead of a button hole for lingerie,

FIG. 15 is a section through a further embodiment of a setting mechanism taken along line XV—XV and looking in the direction of the arrows in FIG. 16, and

FIG. 16 is a rear view of the setting mechanism with the guiding cam disks in accordance with FIG. 15.

The arm 1 of housing 1, 59 of the sewing machine supports the main shaft 2 which by way of the pair of worm wheels 3, 4, drives the cam shaft 5 journaled in bearing 6. At its upper end, the cam shaft 5 supports the cam 7. The cam is engaged by the jaws of claw lever 8 (see FIG. 2) which is linked at its free end at 9 to the operating lever 10 of the needle bar oscillator 11. The operating lever 10 is secured to the needle bar oscillator which oscillates about pintles 12, 12' journaled in the housing and it supports the needle bar 13 in a known manner for reciprocating motion. As shown in FIG. 2 the claw lever 8 is provided with a pin 14 which supports the slide member 15, which slidably engages a slot 16 of slotted member 17 which has a cylindrical stud (not shown) by means of which it is rotatably supported endwise of the shifting lever 18. The shifting lever 18 is rockable about a pin 19 which is secured in the arm 1. If the slot 16 in member 17 is disposed at right angles with respect to the imaginary connecting line between 9 and pin 14 the claw lever 8 is caused to rock back and forth as the cam 7 rotates about pivot 9, without the claw lever 8 or the pivot pin 9 being shifted longitudinally of the axis of the claw lever. The needle bar oscillator 11 and therefore needle bar 13 does not move laterally transversely of the material feed direction so that in this position of slot 16, the sewing machine makes straight stitches. If the setting of the slot 16 is moved about the pivot of member 17 then the claw lever 8 moves back and forth along its longitudinal axis in addition to moving about pivot pin 9. In this manner the needle bar oscillator 11 or needle bar 13 will produce lateral deflections of more or less magnitude transversely of the direction of material feed and thus produce zig-zag stitches.

To permit setting of the position of slot 16 a lever arm 34 is provided on slotted member 17 which carries a pin

33. A link 31 is connected with lever arm 34 by means of this pin 33 and is also connected by means of pin 32 with lever arm 20 of angular lever 20, 20'. The angular lever 20, 20' is journaled upon a stud 19 secured to arm 1. The shifting lever 18, lever arm 34 and link 31, as well as the lever arm 20 of angular lever 20, 20' define a parallelogram. At the end of lever arm 20' a pin 26 is provided to which is linked one end of a connecting bar 27 while the other end is threadedly connected by means of screws 43 to the connecting bar 41. In the region of screws 43 the connecting bar 41 is provided with a longitudinal slot for setting the longitudinal distance, while the free end of the connecting bar 41 is linked by means of bolt 45 to angular lever 44 (see FIG. 4), which in turn is supported on a bolt 46 secured in the carrier 47 which, in turn, is threadedly mounted by means of screws 48 and 49 on the housing 1 and thus covers the aperture 50 of the housing (see FIGS. 5 and 8).

Shifting the position of slot 16 of member 17 causes the machine to produce zig-zag stitches which are symmetrical with respect to center position. If it is desired to produce zig-zag seams or straight seams along the right or left side with respect to the center position, it is necessary to move the shifting lever 18 about bolt 19. For this purpose the shifting lever 18 has a lever arm 35 at its end which carries the pin 36 (see FIG. 2). This pin 36 supports at the same time one end of the connecting bar 39. At its other end the connecting bar has two screws 42 by means of which the connecting bar 40 is threadedly linked to the connecting bar 39. This bar 40 is provided in the region of the two screws 42 with a longitudinal slot (not shown) for controlling the spacing, while the other end of the connecting bar 40 is linked by means of bolt 51 to the follower lever 52 (FIG. 4) which is journaled upon the bolt 46. The manner in which the setting means 99 and 103 operate the control mechanism of the sewing machine is described hereinafter in a subsequent part of the specification.

A belt pulley 55 is secured to the main shaft 2 (FIG. 3) and a pulley 57 is secured to the looper drive shaft 58 journaled in the material carrier plate 59. The looper drive shaft 58 is driven at a ratio of 1:1 by means of belt 56 mounted on the two pulleys 55 and 57. A cam 60 is provided upon the looper drive shaft which is engaged by the jaws of claw lever 61. One end of the claw lever 61 is linked by means of bolts 62 to an arm 63 of the feed shaft 64 while the other end of the claw lever carries a bolt 70 on which a sliding member 71 is supported. This member slides in a slot 72 of guide block 73 which is rotatably journaled by means of its cylindrical stud 89 (see FIG. 1) in the material carrier plate 59. If the slot 72 of guide block 73 is disposed at right angles with respect to the imaginary connecting line between bolts 70 and 62 the claw lever 61 is rocked about the bolt 62 while arm 63 is at rest. However, if the position of slot 72 of member 73 is shifted the arm 63, and thus the feed shaft 64, are rocked back and forth. The feed shaft 64 extends parallel to the looper drive shaft 58 longitudinally of the machine into the area of the sewing components as known per se. At this end of the feed shaft 64 lever arm 65 is provided to which the feed bar 67 is linked by means of bolt 66. One end of feed bar 67 has a pair of jaws engaging the lifting member 68. For the purpose of feeding the material a toothed head or feed dog 69 is secured to the feed bar 67. Thus the pivotal movement of the feed shaft 64 is transferred by way of arm 63, feed bar 67 and feed dog 69, and in this manner the advancing movement of the material is obtained. In order to enable shifting of slot 72 of member 73 about the axis of the stud 89 an arm 74 is provided on member 73 which carries the pin 75. Due to the pressure of spring 91 this pin 75 engages the lower edge of the slot 80 of the connecting bar 76. At its upper end the connecting bar 76 is linked by means of bolt 79 to lever arm 78 (FIGS. 1 and 3). This lever arm 78 is

secured inside the arm upon a bolt 90 supported in the arm to the projecting end of which the lever 77 is secured.

The hub 93 in which is journaled hollow shaft 94 is secured to support 47 as seen in FIG. 5. At the end of the shaft extending into housing 1 the cams 85, 86 and 87 are secured, while at the end projecting from housing 1 the disk 98 is secured which carries the lever arm or grip 99 for controlling the stitch width. An intermediate sleeve 95 is supported in the bore of hollow shaft 94 which carries the lever arm 97 (FIGS. 4 and 5) which engages the bolt 46 with its jaws. In the bore of the intermediate sleeve 95 a bolt or shaft 96 is mounted having an end projecting into housing 1 to which the cam 88 is secured, while the knob 103 for shifting the center position for the seam is secured by means of screw 104 to the end of bolt 96 which projects from the housing. The cam portion 88 is engaged by the follower lever 52 (FIGS. 4 and 10) which cooperates therewith.

If the position of the seam has been set to center by means of knob 103, the end 115 of the follower 52 is approximately in the center of the cam portion 118 and likewise the point 114 is approximately in the center of the cam portion 119 (see FIG. 10). The follower lever 44 (FIGS. 4 and 11) cooperates with the cam portions 86 and 87. The point 112 (FIG. 11) of this follower lever 44 rests against the cam 87, and the point 113 against the cam 86. In the position illustrated in FIG. 11 for the setting member 99 which controls the magnitude of the zig-zag stitches the sewing machine produces straight stitches. If the knob is turned to the right, the follower lever 44 is shifted by means of the cam portions 120, 121 and thus the magnitude of the zig-zag stitches is changed.

For sewing any desired straight and zig-zag stitches the cam portion 85 (FIG. 9) is not utilized. Consequently the follower point 122 of the screw 108 provided in the follower lever 83 rests against a concentric part of the cam 85. The connecting bar 82 is linked to the pin 85' adjustably mounted in longitudinal slot 118' of follower lever 83 (FIG. 4) and is provided at its lower end with a longitudinal slot 81 which receives the pin 75 of the arm of slide member 74 (FIG. 3).

If it is desired to shift the machine from optional straight or zig-zag stitching to button hole sewing the adjusting lever arm 99 is turned against the tension of spring 123 about the pin 100 which is mounted in the disk 98 whereupon the lever arm is rotated about the axis of hollow shaft 94 by an angle of approximately 180°. The adjusting lever or grip 99 extends beyond its pivot axis 100 and encircles hollow shaft 94 in the manner of a ring. At the upper end of the ring shaped extension the lever presents a nose 101 which normally projects under the pressure of spring 123 into the annular groove 107 of the stitch shifting knob 103 (see FIGS. 6 and 5). The adjusting lever 99 is turned about axis 94 until the nose 101 engages the recess 106 in the shifting knob 103. In this manner the cams 85, 86, 87 and 88 are coupled to constitute a unitary cam nest and for this position of the knob 99 and of the associated disks 85, 86, 87 and 88 the follower points 112, 113, 114, 115 and 122 are disposed opposite of cam portions which by correspondingly moving the cam nest 85, 86, 87 and 88 by means of the lever arm control the setting mechanism of the over-stitch width, the stitch location, the stitch length and the stitch direction in such a manner that a button hole is formed merely by turning of the lever arm 99. In this connection the shifting of the lever arm 99 takes place in sequence into angular positions which correspond to the positions A, B, C illustrated in dotted lines in FIG. 12. In the position A the lever arm or grip 99 rests against the abutment 111 (FIG. 12). For switching the sewing machine from optional sewing to sewing of button holes, it is only necessary to operate the lever arm 99. After the machine has been shifted by means of lever arm

5

99 to the position for sewing button holes the lever arm 99 is moved until it rests against the abutment 111. In this position the cams 86, 87, 88 and 85 as well as the corresponding follower levers 44, 52 and 83 are in the positions illustrated in FIGS. 12, 13 and 14, and the sewing machine sews the left bead of the button hole in backward stitches. In this position of the cam 85 the follower lever 83 is raised so far that the pin 75 engages the lower end of the longitudinal slot 81 under the pressure of spring 91 while it freely slides in longitudinal slot 80 (FIG. 3). If the desired length of bead is obtained, the lever arm 99 is shifted during sewing into the center position B. The shifting lever 18 (FIG. 2) is in center position and thus also the lateral setting of the needle.

This position is indicated in a known manner by a notch, not indicated. The seamstress thus readily finds the center position. The cams 85, 86, 87 and 88 have moved the followers 83, 44 and 52 into such a position that the seamstress produces bar stitches in the forward direction. The cam disk 85 is formed in such a manner that the bar stitches are more closely together than the bead stitches. After a desired number of bar stitches the lever arm 99 is moved during sewing into position C of FIG. 12 against the abutment 110. This changes the cams 85, 86, 87 and 88 to cause the followers 83, 44 and 52 to move in a manner to sew the right bead in the forward direction of the material feed. This is followed by sewing the second bar, by moving the lever arm 99 into the center position B. The cams 85, 86, 87 and 88 assume the same position as during the sewing of the first bar seam, and thus the sewing machine sews the second bar seam with the material feed moving in forward direction. In order to prevent the knot of the last bar stitches from coming undone, the lever arm 99 is moved during sewing against the abutment 111 (position A) as shown in FIGS. 12, 13 and 14, so that a few bead stitches can be sewn while the material feed moves backwardly. In this manner the button hole is completed.

It is desired to shift over to sewing any desired straight stitches or zig-zag stitches, the lever arm or grip 99 is shifted about the bolt 100 in order to remove the nose 101 from the region of the recess 106, and subsequently the lever arm 99 is swung about the axis of hollow shaft 94 by approximately 180°. Thus the sewing machine is again shifted back to optional straight or zig-zag stitches (see FIGS. 9, 10, 11).

The follower lever 83 (see FIG. 4) has a screw 108 provided with a follower point 122. When this follower point rests against the cam 85 it is possible by adjusting the screw 108 to shift or adjust the groove 72 of the slide block 73 in such a manner that on shifting the cam 85 from forward stitching to backward stitching, or vice-versa, the stitch length of both beads becomes the same. The nut 109 serves for locking the adjusted position thus found. While it is possible to adjust the equal stitch length with forward and backward stitches by means of the screw 108, the setting of the stitch length is provided for by shifting the pin 85' in the longitudinal slot 118' of the follower lever 83. In the desired position the pin 85' is securely held in position. If the cams 86 and 87 are formed in such a manner that the follower points 112 and 113 of the lever 44 have not yet reached the lowest or highest point of the cam during sewing of the beads (see FIG. 12), it is possible by adjusting the abutments 110, 111 in the longitudinal slots 117, 116, respectively to change the width of the bead and the distance of the two beads from one another (FIG. 7).

In the arrangement described the cams 86, 87 for the over stitch width and the cam 85 for the stitch length are shifted together by about 180° during shifting from optional sewing to button hole sewing, while the cam 88 retains its position for the stitch location because the cam sections 118, 119 of cam 88 are used for the random setting of the stitch location (see FIG. 10) as well as for the sewing of button holes.

6

The two FIGS. 15 and 16 show an embodiment in which the cam 142 for setting the stitch location, the cam 143 for setting the over stitch width and cam 144 for setting the stitch length and direction are movable independently of one another by means of the associated manipulating means 150, 151, 152 during sewing of optional straight or zig-zag seams.

The support 149 is secured in the housing 1 by journaling therein the sleeve 148 which at its end which extends into the housing supports the cam 144 while the adjusting handle 150 for the stitch length and stitch direction is secured to the outwardly extending end of the sleeve. A further sleeve 147 is mounted inside the sleeve 148 and carries at its end extending into the housing the cam 143 and its outwardly extending end the adjusting handle 151. Inside this sleeve 147 in turn there is mounted the shaft 146 which carries at its inwardly extending end the cam 142 and its end outside the housing the setting knob 152. The follower lever 160 is mounted upon pin 162 secured in the support 149 and engages the cam 142 and is connected at its free end to the connecting bar 40. The follower lever 161 which cooperates with cam 143 is likewise mounted upon the shaft 162 and the connecting bar 41 is pivotally connected to its free end. Furthermore, the follower lever 159 which cooperates with the cam 144 is mounted upon the shaft 162. The connecting bar 171 is linked at its end to the follower lever 159 while it presents at its other end a bore which is engaged by the pin 75 which is secured to the arm 74 of the slide member 73. The follower lever 159 rests against the cam 144 under the pressure of spring 91. The follower levers 161 and 160 engage their corresponding cams 142, 143 under the pressure of a spring not shown. The setting knob 152 carries the coupling pin 153 which is provided at its end with a knurled knob 155, as well as the arresting pin 156 which is movable in a groove longitudinally of the axis of the coupling pin.

In the position of the coupling pin 153 illustrated in FIG. 15 it has entered the bore 157 of the handle 151 under the pressure of the spring 154 and also into the bore 158 of the setting handle 150. In this manner the operating members 150, 151, 152 as well as cams 142, 143 and 144 are coupled with one another. By rotating the handle 150 through an arc of approximately 180° the follower levers 159, 160 and 161 are placed opposite the curved portions of cams 142, 143 and 144 with the aid of which it is possible by moving the handle 150 to corresponding angular positions as described in connection with FIG. 12, to produce a button hole seam. The different positions of the setting handle 150 for the production of the individual seams of the button hole conformation can be predetermined by the markings or notches, not illustrated. In this embodiment a further cam adjustment can be provided in which the follower levers 159, 160, 161 are turned in such a manner that upon terminating the button hole seam straight stitches are performed to safeguard against releasing of the knot of the last locking stitch.

The shifting of the sewing machine from button hole sewing to sewing optional straight or zig-zag stitches is effected in such a manner that the handle 150 is turned about 180°, whereupon the coupling pin 153 is pulled by means of knurled head 155 out of bores 157 and 158 against the spring 154, and then the member 155 is turned through an arc of approximately 90° so that the arresting pin 156 engages the front surface of knob 152. The adjusting members 150, 151 and 152 are now adjustable independently of one another.

Having now described the invention with reference to the embodiments illustrated in the drawings, I do not wish to be limited thereto, but what I desire to protect by Letters Patent is set forth in the appended claims.

I claim:

1. Control means for a zig-zag sewing machine com-

prising a needle bar oscillating mechanism, a first cam linked to said mechanism for setting up the stitch width, control mechanism including a second cam linked to said oscillating mechanism for setting the stitch location, and material feed control mechanism including manually movable feed control means, said cams being maintained in fixed relative positions during machine operation and being coaxially mounted inside the housing of the machine, each said first and second cams being supported for independent shifting about a common axis on individual outwardly extending, angularly movable first and second shaft elements, each said shaft element supporting a manual control member externally of the machine housing, and coupling means operative to connect said shaft elements and said manual control members as a unit operative to move said mechanisms in unison to predetermined positions to effect predetermined stitching operations.

2. In a zig-zag sewing machine comprising a machine base including material feed mechanism and supporting a housing including a needle bar oscillating mechanism, control means comprising stitch width control means including a first cam and follower means linked to said oscillating mechanism, stitch location control means including a second cam and follower means linked to said oscillating mechanism for setting the stitch location, coaxial first and second shafts respectively supporting said first and second cams inside said housing in fixed relative positions during machine operation, each said shaft supporting a manual control member externally of said housing, a mounting plate secured to said housing and supporting said shafts with said cams and said manual control members, a material feed control device carried by said mounting plate and linked to said material feed mechanism, and coupling means operative to connect said cams, said shafts and said manual control members as a unit operative to effect predetermined stitching operations.

3. In a zig-zag sewing machine comprising a machine base including material feed mechanism and supporting a housing including a needle bar oscillating mechanism, control means comprising stitch width control means including a first cam and follower means linked to said oscillating mechanism, stitch location control means including a second cam and follower means linked to said oscillating mechanism for setting the stitch location, coaxial first and second shafts respectively supporting said first and second cams inside said housing in fixed relative positions during machine operation, each said shaft supporting a manual control member externally of said housing, a mounting plate secured to said housing and supporting said shafts with said cams and said manual control members, a material feed control device carried by said mounting plate and linked to said material feed mechanism, said feed control device including a third cam mounted coaxially with said first and second cams inside said housing and operatively connected to said manual control member for said first shaft for rotation therewith and coupling means operative to connect said cams, said shafts and said manual control members as a unit operative to effect predetermined stitching operations, and each of said cams having a conformation along a portion of the circumference thereof adapting the machine for general zig-zag operation and a conformation along another portion adapting the machine in the operative condition of said coupling means for semi-automatic button hole stitching operations.

4. In a zig-zag sewing machine comprising a machine base including material feed mechanism and supporting a housing including a needle bar oscillating mechanism, control means comprising stitch width control means including a first cam and follower means linked to said oscillating mechanism, stitch location control means including a second cam and follower means linked to said oscillating mechanism for setting the stitch location, coaxial first and second shafts respectively supporting said

first and second cams inside said housing in fixed relative positions during machine operation, each said shaft supporting a manual control member externally of said housing, a mounting plate secured to said housing and supporting said shafts with said cams and said manual control members, a material feed control device carried by said mounting plate and linked to said material feed mechanism, said feed control device including a third cam mounted coaxially with said first and second cams inside said housing and operatively connected to said manual control member for said first shaft for rotation therewith and coupling means operative to connect said cams, said shafts and said manual control members as a unit operative to effect predetermined stitching operations, and each of said cams having a conformation along a portion of the circumference thereof adapting the machine for general zig-zag operation and a conformation along another portion adapting the machine in the operative condition of said coupling means for semi-automatic button hole stitching operations, said coupling means comprising a coupling pin or the like associated with said manual control members.

5. In a zig-zag sewing machine comprising a machine base including material feed mechanism and supporting a housing including a needle bar oscillating mechanism, control means comprising stitch width control means including a first cam and follower means linked to said oscillating mechanism, stitch location control means including a second cam and follower means linked to said oscillating mechanism for setting the stitch location, coaxial first and second shafts respectively supporting said first and second cams inside said housing in fixed relative positions during machine operation, each said shaft supporting a manual control member externally of said housing, a mounting plate secured to said housing and supporting said shafts with said cams and said manual control members, a material feed control device carried by said mounting plate and linked to said material feed mechanism, said feed control device including a third cam mounted coaxially with said first and second cams inside said housing and operatively connected to said manual control member for said first shaft for rotation therewith and coupling means operative to connect said cams, said shafts and said manual control members as a unit operative to effect predetermined stitching operations, and each of said cams having a conformation along a portion of the circumference thereof adapting the machine for general zig-zag operation and a conformation along another portion adapting the machine in the operative condition of said coupling means for semi-automatic button hole stitching operations, said coupling means comprising a conformation on one of said manual control members and movable therewith and a cooperating conformation on an adjacent manual control member adapted to be engaged by said conformation on said one manual control member.

6. In a zig-zag sewing machine comprising a machine base including material feed mechanism and supporting a housing including a needle bar oscillating mechanism, control means comprising stitch width control means including a first cam and follower means linked to said oscillating mechanism, stitch location control means including a second cam and follower means linked to said oscillating mechanism for setting the stitch location, coaxial first and second shafts respectively supporting said first and second cams inside said housing in fixed relative positions during machine operation, each said shaft supporting a manual control member externally of said housing, a mounting plate secured to said housing and supporting said shafts with said cams and said manual control members, a material feed control device carried by said mounting plate and linked to said material feed mechanism, said feed control device including a third cam mounted coaxially with said first and second cams inside said housing and operatively connected to said

manual control member for said first shaft for rotation therewith and coupling means operative to connect said cams, said shafts and said manual control members as a unit operative to effect predetermined stitching operations, said coupling means comprising a projection on one of said manual control members and a recess in an adjacent one of said manual control members, said member having said projection being mounted on a pivot pin in a manner permitting rocking movement of said member in a direction axially of said shafts of said cams and engagement of said projection with said recess.

7. In a zig-zag sewing machine comprising a machine base including material feed mechanism and supporting a housing including a needle bar oscillating mechanism, control means comprising stitch width control means including a first cam and follower means linked to said oscillating mechanism, stitch location control means including a second cam and follower means linked to said oscillating mechanism for setting the stitch location, coaxial first and second shafts respectively supporting said first and second cams inside said housing in fixed relative positions during machine operation, each said shaft supporting a manual control member externally of said housing, a mounting plate secured to said housing and supporting said shafts with said cams and said manual control members, a material feed control device carried by said mounting plate and linked to said material feed mechanism, said feed control device including a third cam mounted coaxially with said first and second cams inside said housing and operatively connected to said manual control member for said first shaft for rotation therewith and coupling means operative to connect said cams, said shafts and said manual control members as a

unit operative to effect predetermined stitching operations, and each of said cams having a conformation along a portion of the circumference thereof adapting the machine for general zig-zag operation and a conformation along another portion adapting the machine in the operative condition of said coupling means for semi-automatic button hole stitching operations, said coupling means comprising a projection on one of said manual control members and a recess in an adjacent one of said manual control members, said member having said projection being mounted on a pivot pin in manner permitting rocking movement of said member in a direction axially of said shafts of said cams and engagement of said projection with said recess.

References Cited in the file of this patent

UNITED STATES PATENTS

1,247,799	Du Pont	Nov. 27, 1917
1,611,372	Rader	Dec. 21, 1926
1,675,508	Muller	July 3, 1928
2,623,487	Marasco	Dec. 30, 1952
2,653,557	Casas-Robert et al.	Sept. 29, 1953
2,713,838	Johnson et al.	July 26, 1955
2,757,626	Fujita	Aug. 7, 1956
2,764,895	Bono	Oct. 2, 1956
2,905,119	Bono	Sept. 22, 1959

FOREIGN PATENTS

300,900	Switzerland	Nov. 1, 1954
535,025	Italy	Oct. 31, 1955
549,548	Italy	Oct. 15, 1956
209,242	Australia	Nov. 22, 1956
552,428	Italy	Dec. 3, 1956