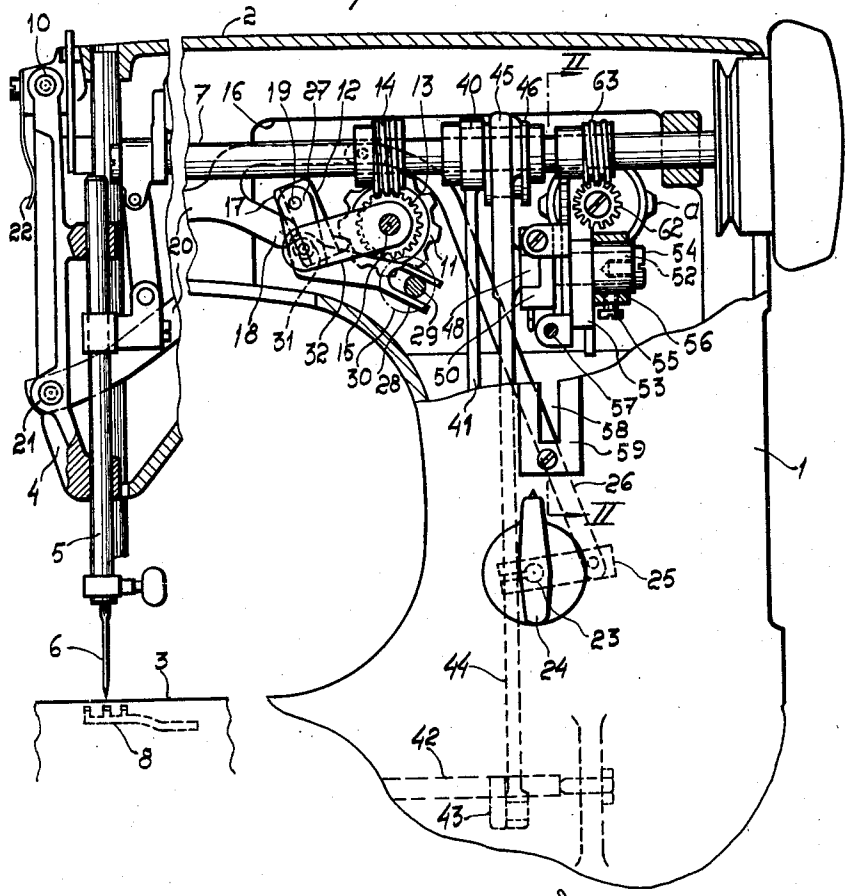
May 30, 1961 A. H. ERIKSSON 2,986,107

ZIGZAG SEWING MACHINES

Filed June 8, 1954 3 Sheets-Sheet 1

Fig. 1



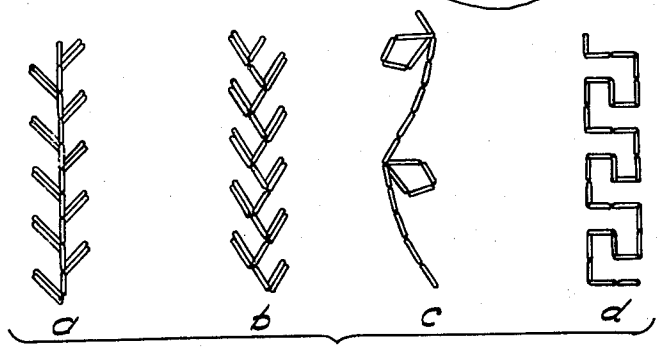


Fig. 13

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ZIGZAG SEWING MACHINES

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Fig. 2

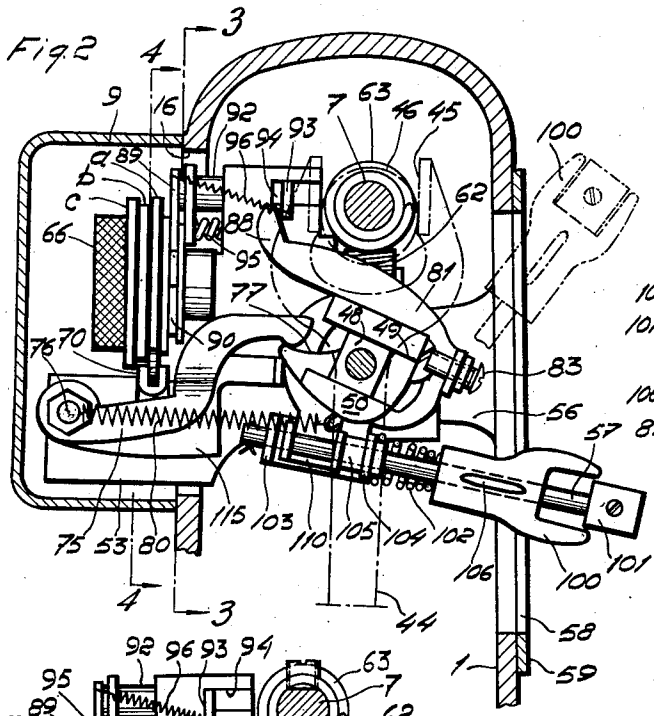
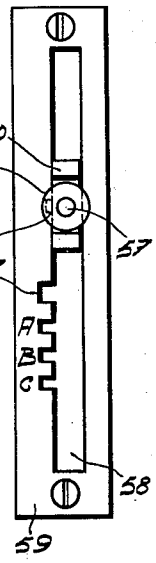


Fig. 8



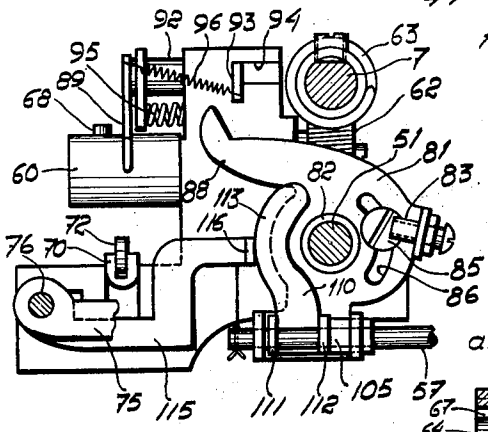


Fig. 5

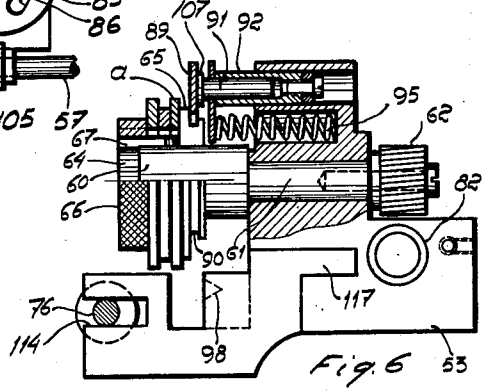


Fig. 6

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ZIGZAG SEWING MACHINES

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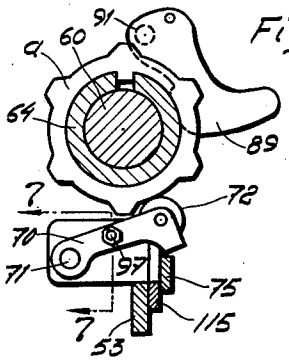

Fig. 4

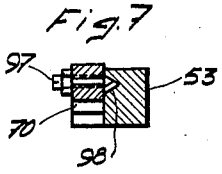

Fig. 7

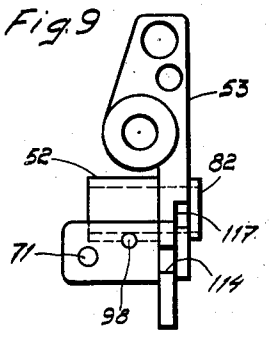

Fig. 9

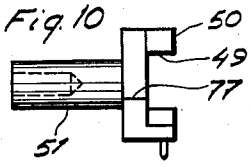

Fig. 10

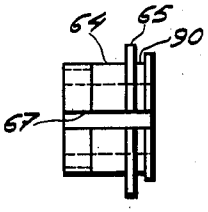

Fig. 11

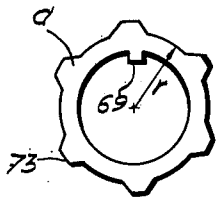

Fig. 12

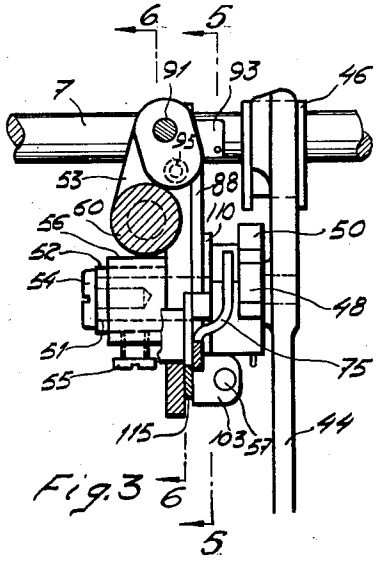

Fig. 3

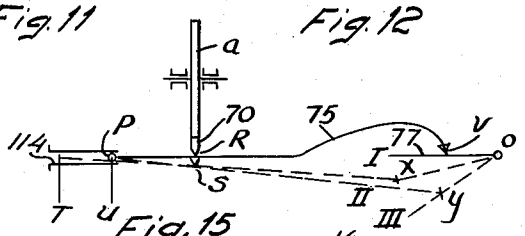

Fig. 15

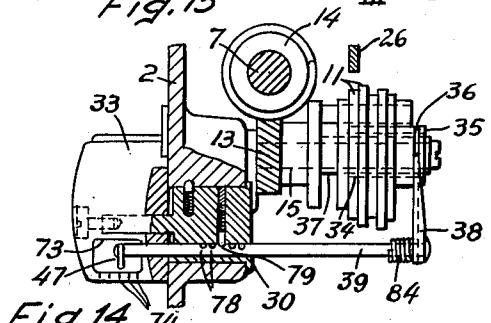

Fig. 14

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2,986,107

ZIGZAG SEWING MACHINES

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Filed June 8, 1954, Ser. No. 435,276

Claims priority, application Sweden Apr. 29, 1954

28 Claims. (Cl. 112—158)

This invention relates to zigzag sewing machines of the type including a reciprocable and laterally movable needle bar means, a reciprocable fabric feeder or feed dog, and manually operable control means for controlling the lateral movement of the needle and the feed movement. By a continuous, manual manipulation of such control means it is possible to produce a variety of embroidery or zigzag patterns. It is, however, difficult or impossible in this way to produce a pattern of satisfactory uniformity. In order to facilitate the production of complicated zigzag patterns the machine may be provided with cam-operated means for automatically regulating the lateral movement of the needle and the feed movement.

It is therefore an object of the invention to provide a zigzag sewing machine which includes manually as well as automatically operable feed control means of great versatility and convenience in use. A further object is to provide a feed control mechanism comprising a plurality of interconnected cams which are readily and selectively connectible with the feed dog to produce different embrodiery patterns. A further object is to provide an improved cam-operable control device including a manually variable motion transmitting connection between the selective cam and the feed dog whereby each cam can be made to produce variations in the magnitude of its basic pattern. A still further object is to provide a relatively simple and compact cam-operable feed control device which may be easily built into the machine, preferably at the location of a solely manually operable feed control mechanism whereby an ordinary zigzag sewing machine may be readily converted to automatic operation.

These and further objects of the invention, as well as the different forms in which the invention can be embodied, will be readily understood by those skilled in the art from the following description of an exemplary construction shown in the appended drawings, in which:

Fig. 1 is a fragmentary front view, partly in section, of a lock stitch sewing machine embodying the invention.

Fig. 2 is a cross section on line 2—2 in Fig. 1.

Figs. 3 and 4 are sections on the lines 3—3 and 4—4, respectively, in Fig. 2.

Figs. 5 and 6 are sections on the lines 5—5 and 6—6, respectively, in Fig. 3.

Fig. 7 is a section on line 7—7 in Fig. 4.

Fig. 8 is a front view of external parts of the device shown in Fig. 2.

Fig. 9 is a rear elevation of a separate frame part carrying the cams and parts associated therewith.

Fig. 10 is a rear elevation of a control member.

Fig. 11 is a side view of a hub sleeve for the cams.

Fig. 12 shows one of the cams.

Fig. 13 shows by way of example some zigzag sewings which the machine can produce.

Fig. 14 is a fragmentary view partly in vertical section and partly in elevation illustrating a plurality of needle-bar controlling cams.

Fig. 15 is a view diagrammatically illustrating the variable leverage connection between the control member and the cam follower.

The machine shown in Fig. 1 is primarily designed for domestic use. Its hollow frame or casing 1 comprises an upper, overhanging arm 2 and a work support 3 which, if desired, may be a cantilevered arm. The upper arm carries a movable bearing or element 4 actuating a substantially vertical needle bar 5 that is movable longitudinally of the bearing 4 and carries a sewing needle 6. The needle bar is connected with a rotary drive shaft 7 extending longitudinally of the arm 2 by a crank mechanism which may be known per se and which imparts longitudinal, reciprocating movement to the needle bar at each revolution of the drive shaft. The latter is journalled in the frame and may be the main drive shaft of the machine, also driving a loop taker in the work support 3 and a reciprocating feed-dog 8 also mounted in the work support and adapted to feed the fabric stepwise in the transverse direction of the arm 2 (substantially perpendicularly to the plane of the sheet in Fig. 1).

For producing zigzag seams the needle bar is also reciprocable laterally. To this end the bearing or element 4 is swingably mounted at its upper end on a horizontal pivot 10 extending perpendicular to the drive shaft. However, if desired the bearing 4 could be mounted so as to be swingable about a vertical axis. The driving means for imparting lateral movement to the needle comprises a cam 11 cooperating with a cam follower 12 and connected to the drive shaft 7 by a worm gear 13, 14. In the embodiment shown the cam is rotatably mounted on a horizontal, cantilevered stub shaft 15 extending perpendicular to the drive shaft 7 and fixedly mounted in the frame opposite an opening 16 in its rear wall through which the cam may be taken out, the opening being provided with a cover 9. The driving means also includes a manually adjustable movement transmission between the cam follower 12 and the bearing 4, preferably a pivotally mounted guide 17 and a guide follower 18 manually displaceable along the same. In the embodiment shown the guide is a groove formed on the rear side of the cam follower 12 which is swingable vertically about a pivot 19. The guide follower is formed on one end of a rod 20 which is movable in a vertical plane and which, at its opposite end, is articulated to the bearing 4 by means of a pin 21. The guide follower engages the guide groove under the pressure of a spring, preferably a leaf spring 22 engaging the bearing 4, and is preferably also guided laterally by the guide groove. The guide follower 12 may be manually displaceable along the guide groove by means of a handle 24 on a shaft 23 journalled in the frame and also carrying an arm 25, connected with the rod 20 by means of a link 26.

For the purpose of shifting the needle position the pivot 19 is preferably manually adjustable substantially in the longitudinal direction of the rod 20. In the embodiment shown this pivot is thus mounted on one arm 27 of a two-armed lever, the other arm 28 of which is forked and actuated by an eccentric pin 29 on a shaft 30 journalled in the frame and provided with a handle 33, Fig. 14, on the front side of the frame. The lever is mounted on a fixed pivot pin 31 carried, for instance, by an arm 32 rigidly connected with the stub shaft 15.

The ratio of the worm gear means 13, 14 should be such that the cam makes one revolution during a relatively great number of revolutions of the shaft 7, said number being a multiple of 2 and, preferably, also 3, say 12, 18, 24 or greater number. If the cam follower 12 follows a regularly toothed cam 11 with half as many teeth, all of the same height, the needle receives a lateral swinging motion in such timed relation to its longitudinal movements that an ordinary zigzag seam is obtained. Other,

complicated zigzag seams may be produced with other cams. The amplitude of the swinging motion (the width of the seams) decreases with the distance between the point of contact of guide follower **18** with the guide groove and the swinging center on pivot **19** of the guide. If the guide follower is set opposite the pivot **19** by means of the handle **24**, no movement is transmitted to the bearing and, consequently, an ordinary, straight seam is obtained upon rotation of shaft **7**. The cam **11** is preferably one of a plurality of coaxial and interconnected cams of different shapes mounted side by side in the casing, the cams being axially displaceable relative to the cam follower and thereby selectively connectible with the needle bar. Such devices form the subject of a separate patent application Serial No. 435,275.

As shown in Fig. 14, five needle-bar controlling cams **11** are mounted on a hub sleeve **34** by means of a nut **35** having a peripheral groove **36** therein. The hub sleeve **34** is slidable but non-rotatably mounted on a hollow shaft **37** which in turn is rotatably mounted on a stub shaft **15**, and secured to the gear wheel **13**. The sleeve **34** is axially displaceable by manipulation of a finger **38**, the free end of which is engaging in the groove **36** and the opposite end of which is secured to one end of a rod **39** mounted to slide within shaft **30**. A handle **47** having the shape of a transversely extending plate is rigidly connected with the outer end of rod **39** and arranged to extend in an opening **73** in the handle **33**. The rod **39** is capable of being set axially in different positions indicated by indexes **74** on the handle **33** and corresponding to the operative positions of the different cams **11**. For fixing the handle **47** in these selective positions, the rod **39** is provided with axially spaced incisions or notches **78** which in a known manner receive a spring-pressed latch **79** mounted in a transverse bore in the shaft **30**. The finger **38** is swingably mounted on the rod **39** and its outer end engages in groove **36** under the action of spring **84**. When the sewing machine is at a standstill and cam follower **12** is in an inoperative position, the cams can, by means of handle **47**, be displaced one or more steps against the yielding action of latch **79**.

By an arrangement according to the present invention it is possible, rapidly and conveniently to pass over to the production of more complicated seams. The invention may be applied to advantage in machines wherein the feed-dog **8** is operatively connected with a rock shaft **42** journalled in the frame and, in its turn, connected with a variable eccentric-drive for producing the reciprocating motion of the feed-dog, which drive may be of a kind known per se. In the embodiment shown said drive thus comprises a forked rod **44** which at its lower end is hingedly connected to an arm **43** on the rock shaft and with its upper, forked part **45** embraces an eccentric **46** fixed to the drive shaft **7**. Another eccentric **40** on this shaft may, by means of an eccentric rod **41**, be connected to another rock shaft, not shown, for producing the vertical motion of the feed-dog. In order to obtain a variable longitudinal movement the forked rod may be hingedly connected to a link, in known manner swingable in a plane perpendicular to the shaft **7** about a pivot which is displaceable along an arc situated in said plane. This known type of drive for a feed dog is shown in Figures 12 and 13 of U.S. Patent 897,553 to Pälsson. In the embodiment shown, however, the forked rod **44** is provided with a pivoted die **48** engaged within a guide-slot **49** in a swingable control member **50** journalled by means of a pin **51** extending parallel to the shaft **7**, in a lug **52** on a separate frame part **53**. Control members of this shape are known in the art as evidenced by the disclosure of U.S. Patent 2,235,552 to Gilbertson. The control member is secured axially to this frame part by means of a screw **54** mounted in the pin **51** and engaging the lug **52** with its head. In its turn the lug is fixedly mounted by means of a screw **55**, in an ear **56** provided in the frame. The control member may be turned by a manually movable setting means, comprising a swingable setting rod **57** extending through a vertical slit **58** in a plate **59** secured to the front side of the frame. If the rod is set in a position wherein the slot **49** is perpendicular to the longitudinal direction of the forked rod **44**, no movement is transmitted from the drive shaft **7** to the rock shaft **42** and, consequently, the feed will be zero. If the setting rod is set in a lower or higher angular position, the fabric will be fed forwardly and backwardly, respectively, one step per revolution of shaft **7** the length of which in known manner depends upon the angle between the longitudinal directions of the slot **49** and the forked rod **44**.

According to the invention the angular position of control member **50** is altetrnatively adjustable also by means of any of a plurality of cams mounted side by side on a common shaft and adapted to rotate in unison. In the embodiment shown three such cams *a, b, c* are arranged on a cantilevered part **60** of an auxiliary shaft **61**, see Figure 6, extending parallel to the shaft **15** and journalled in the frame part **53**. This shaft **61** is operably coupled to the drive shaft **7** by means of a worm gear means **62**, **63**. The ratio of said gear means is preferably the same as that of the gear means **13**, **14** but it might also be higher or lower, for instance 1:12 or 1:24, if the ratio of gear means **13**, **14** is 1:18. The cams, one of which is separately shown in Fig. 12, are preferably detachably interconnected to form a unit and adapted to operate the control member by means of a common cam follower. The cam unit and cam follower being axially displaceable relative to each other for cam selecting purposes. In the embodiment shown the cams are annular and are mounted on a hub sleeve **64** having a collar **65**, the cams being held against said collar by means of a ring-nut **66** screwed on to the sleeve. The sleeve is slidable on the shaft part **60** and provided with an axial slit **67** engaged by driving pin **68** projecting outwardly from the shaft and also by an internal tongue **69** on the cams, whereby the latter are turned in unison with the rotation of the shaft. In Fig. 5 the cams and the hub sleeve are omitted. The cam follower see Fig. 4, comprises an arm **70** pivotally mounted on a pin **71** which extends parallel to shaft **61** and is mounted on the frame part **53**. The cam follower is adapted to engage the circumference of the cams, preferably by means of a follower roll **72**.

The movement transmitting connection between the cam follower and the control member is shown in Fig. 2 and comprises a lever **75** which at one end is journalled on a pin **76**, mounted in the frame part **53** and extending parallel to the shaft **51** of the control member, and having its free end engaging the upper surface of a substantially radially extending arm or projection **77** of the control member. The lever **75** engages the under surface of cam follower **70** between its ends. The control member **50** is operated by a spring or the like, such as a tension spring **80** connected between the control member and the pin **76** and tending to turn the control member in the direction corresponding to an increased forward feed, that is, in the clockwise direction in Fig. 2. When the cam follower is opposite one of the rotating cams *a, b, c*, it engages the cam in question under the pressure of the spring **80**, the control member receiving a turning motion corresponding to the shape of the cam. In order that the manual setting means shall not have to partake in this motion, the same may comprise a driving member which is capable of being set about the same axis as the control member and which, during manual setting of the control member, limits the movement of the latter under the action of spring **80**. In the embodiment shown, Figs. 2 and 5, this driving member comprises a plate **81** which carries the setting rod **57** and which is journalled on a collar **82** provided on the frame part **53** and surrounding the pin **51**. Said plate is provided with an abutment for the control member, preferably in the form of a set screw **83**. During manual adjustment of the control member by manipulation of the setting rod

57 the control member engages the screw 83 under the action of spring 80, the cams having been brought to the left in Fig. 2 so that none of them is opposite the cam follower. The setting device is preferably provided with a friction brake, for instance in the form of a headed screw 85 adjustably secured in the frame part 53 and situated in an arcuate slit 86 in the plate 81. By friction between the latter and the under side of the screw head, which may be provided with some suitable lining, the setting device is kept in any selected position of adjustment.

When the control member is to be set automatically, the selected cam is slid into a position opposite the cam follower, and the setting device is set in an end position indicated, for instance, by a notch 87 in the plate 59 and wherein the set-screw 83 does not impede the movement of the control member under the action of the cam in question. To bring about said displacement a device may be provided which is separate from the setting device and is provided with a handle, for instance on the front side of the casing or on top of the lid 9. Said displacement may, however, be performed to advantage by setting the setting device in one of a number of consecutive end positions, inoperative relatively to the control member and corresponding to engagement between the various cams and the cam follower. In the embodiment shown, see Figs. 2, 3 and 6, the plate 81 is provided with a finger 88 for actuating a displacement means for shifting the cams when the setting rod 57 is set opposite any of three notches at A, B, C in one edge of the slit 58. This displacement means comprises a tongue 89 carried by a pin 91 and engaged within a peripheral groove 90 formed on the collar 65. The pin 91 extends parallel to the shaft 61 and is slidably disposed within a cylinder 92. The cylinder 92 is slidably mounted in the frame part 53 and includes a laterally extending lug 93 projecting through and movable along an axial slot 94 formed in frame part 53. The lug 93 is disposed in the path of movement of the finger 88 so as to be engaged thereby when the driving member or plate 81 is turned. A compression spring 95 tends to keep the lug 93 against the bottom or left-hand end of the slot 94. A weaker spring 96 extended between the lug and the tongue 89 tends to move the tongue to the right in Fig. 2 and to keep it in engagement with the groove 90. The movement of the cam follower towards the shaft 60 under the action of spring 80 should be limited, for instance by a stop-screw 97 mounted in the arm 70 and engaging a hole 98 in the frame part 53.

The rod 57 is preferably provided with a member slidably and adjustably mounted thereon and cooperating with the edges of the slit 58 for limiting the swinging motion of the setting device when setting the control member manually, and for locking the setting device in its positions A, B, C for the various cams *a, b* and *c*, respectively. In the embodiment shown this locking member consists of a sliding member 100 which, during manual setting is withdrawn and held so that its forked outer end is disposed over and abuts against a head 101 on the rod. The rod 57 is journalled in a pair of ears 103, 104 projecting outwardly from the portion of plate 81 that is below the turning axis of this plate. One of the ears, 104, being threaded internally and in mesh with an externally threaded portion 105 of the rod 57. Consequently the rod 57 is manually adjustable longitudinally of its axis. The sliding member 100 is provided with a rib 106 extending along one side thereof in the longitudinal direction of the rod. The rib 106 is of such thickness that it is capable of being slid through the notch 87 but not through the notches A, B, C. Moreover, as shown in Fig. 2, the opposite ends of the rib 106 are tapered so that after the member 100 is pushed inwardly against the action of spring 102 with the rib passing through notch 87 and the member 57 moved downwards, the outer end of the rib can snap into the selected one of notches A, B, C, when released.

During manual adjustment of the control member 50 with member 100 withdrawn the rib 106 is disposed outside the plate 59 and the rod 57 is vertically swingable between two end positions wherein the rib abuts against the outside of the plate with its inner end. The lower one of said positions corresponds to a certain forward feed and the upper position to a backward feed of the same magnitude. By adjusting the rod in its longitudinal direction the sliding member 100 is displaced and the length of feed in said end positions may, consequently, be varied. In Fig. 2 the sliding member is indicated by dotted lines in the end position corresponding to the largest obtainable backward feed. In order to switch over to automatic actuation of the control member 50 the rod 57 is unscrewed so far that it may be set opposite the notch 87, and the sliding member is slid inwardly, as set forth above, so that the rib 106 passes through this notch and is disposed inside the plate 59. Thereafter, the rod 57 is set, for instance, in the position A with the outer end of the rib 106 snapping into the corresponding notch. At this setting of the rod 57 the cam follower 70 and, consequently, also the control member 50 is first arrested by the stop-screw 97, the control member losing its contact with the abutment 83. Thereupon the lug 93 is engaged by the finger 88 which moves the cylinder 92 one step to the right, into the position shown in Figs. 2 and 6. The roll 72 of the cam follower is situated at a distance from the axis of the cams which is determined by the stop-screw 97 and which is substantially equal to the smallest radius *r* of the cams, Fig. 12. Should a raised portion 73 of the cam *a* temporarily be situated laterally of the roll 72, the cams and the pin 91 will remain in the axial position shown in Fig. 6 until the raised portion 73 has moved past the roll 72. Then the spring 96 moves the pin 91 and consequently also the cams, to the right into the position shown in Fig. 2 until a shoulder 107 on the pin 91 (Fig. 6) abuts axially against the outer end of cylinder 92 and the roll 72 follows the periphery of the cam *a*. When the roll is in contact with a peripheral part of the least radius *r*, the control member is held by the lever 75 in a position corresponding to a certain forward feed. A raised portion 73 may, depending upon its height, correspond to a less forward feed, no feed or a backward feed. The cam shown in Fig. 12 alternately produces two steps of forward feed and one step backward feed, all steps of the same length. By means of the same an ornamental seam according to Fig. 13*a* may automatically be produced. With the same feed cam but with another cam 11 imparting lateral motion to the needle a seam according to Fig. 13*b* may be obtained. Figs. 13*c* and *d* show examples of other fancy seams which may be obtained with other feed cams. At least a part of the circumference of cams *b* and *c* have the same radius as the cam *a*, and thus they may be set in operative position in a corresponding manner. A return from automatic to manual adjustment of the control member takes place in the opposite order. The cams *a, b, c* may be readily replaced by other cams. After the lid or cover 9 has been removed or opened, the tongue 89 is swung laterally out of engagement with the groove 90, whereupon the hub sleeve 64 with the cams can be withdrawn from the shaft 60. Upon removal of the nut 66 the cams may be replaced by others of different shape, whereupon the nut is replaced and the hub sleeve is reinserted in the machine.

The versatility of the machine may be greatly improved by providing a manually variable leverage between the cams and the control member. This leverage is, preferably, variable continuously and while the machine is running. Such leverage may vary widely in construction, i.e. with the kind of movement transmission between the cams and the control member. The

same preferably comprises a part operated by the cams and adapted to operate the control member at variable distances from its turning axis by means of a guide part of the setting device which is capable of being set at such variable distances from said axis from outside the casing. In the embodiment shown, Figs. 2 and 5, such a guide part **110** includes two mutually spaced and outwardly projecting ears **111, 112**, mounted on the rod **57** and a guide portion **113** which extends substantially concentric to the pin **51** (Fig. 5). The pin **76** is slidably mounted within a horizontal slot **114** provided in the frame part **53** and connected with one end of a flat, rod-shaped slide **115**, the opposite, out-turned end portion **116** of which engages the guide **113** under the pressure of the spring **80**. The end portion **116** of the slide **115** is mounted in a lateral recess **117** in the frame part **53**.

The guide part **110** is swingable together with the driving member or plate **81** and with its ear **112** abuts against the threaded part **105** of the rod **57** under the pressure of spring **80** which is transmitted by the slide **115**. By longitudinally adjusting rod **57**, the guide **113** is, consequently, set at a variable distance from the tuning axis of the control member. Thus by displacing guide **110** to the right in Figs. 2 and 5, the slide **115** and the lever **75** are also moved to the right so that the distance between the cam follower **70** and the pin **76**, and the distance between the free end of the lever **75** and the turning axis of the control member are reduced. Therefore, during automatic operation of the control member, the selected cam imparts to the control member a greater oscillating motion than before, resulting in an increased stitch length. By the aforedescribed variable leverage one and the same cam can produce similar patterns of different size variable continuously while the machine is running. Such a variable leverage may also be used to advantage in machines having a single feed cam, such as the machine ilustrated in an instance when only one cam is mounted on the shaft **60**.

The operation of the aforedescribed leverage connection is diagrammatically illustrated in Fig. 15. In order to simplify the explanation, it is assumed that the turning axis of the control member **50** and the axis of pin **51** indicated at zero is located in the plane of movement of the turning axis P of lever **75**, which would be the axis of pin **76**. Further, for explanation purposes, the working surface of arm **77** is diagrammatically shown as planar, and is also located in the plane containing axes O and P when the feed is zero, this position of arm **77** being indicated at I in Fig. 15. Further, the cam follower **70** engages a rectilinear edge of lever **75**, also situated in said plane when the feed is zero. Additionally, it is assumed that the shape of cam *a* is such that the point of contact between the follower **70** and lever **75**, is disposed at point R in said plane in a first angular position of the cam and at a lower point S in a second angular position of the cam. In the first-mentioned position, lever **75** will hold arm **77** in position I, independently of the distance from O to the free end V of lever **75**. If the axis P is in the position shown at T, that is to the left in slot **14**, rotation of cam A into its second position results in depressing the free end V of lever **75** into a position shown at X, thereby swinging arm **77** into position II corresponding to a certain stitch length, with the straight line TX through S being equal in length to the length PV of lever **75**. If the axis P is in a position U, as shown, and thus to the right in slot **114**, the rotation of cam *a* moves lever end V into position Y and thus swings arm **77** down further into position III with the straight line UY through S also being equal in length to the distince PV. A displacement of lever **75** to the right thus results in the cam imparting a greater oscillation to control member **50** than before, with the distances or lever arm lengths VO and PR both being reduced by such displacement. Obviously, by suitably modifying the shape of the parts **75** and **77**, a similar variable leverage action can also be obtained in instances where the turning axis O is not situated in the plane of movement of lever axis P.

In the embodiment shown the setting device, the control member, the cams and elements interconnecting these parts are mounted on a common, separate frame part **53** which facilitates the assembly of said mechanism parts. In lieu of the frame part **53**, a solely manually adjustable control member having a slot therein for the die **48** may be mounted in the ear **56**. The machine can thus be readily converted from one having only a manually adjustable feed into one which also includes an automatically variable feed and vice versa.

The invention, therefore, discloses in an ornamental stitch sewing machine of the type comprising a hollow frame which includes a hollow sewing arm and a needle bar means mounted for longitudinal reciprocation and lateral swinging movement, a feed controlling mechanism having a movable control member within the frame that is interposed in the variable motion transmitting means between the drive shaft and the feed dog and which member can be actuated either manually or under cam control. In addition, the arrangement includes means interposed between the cam follower and the control member operable by adjustment to vary the motion imparted to the control member by the cam. This last-mentioned means is adjustable exteriorly of the frame. Specifically, the invention incorporates within the frame manually operable means so related with the control member, the cam and follower mechanism, and the motion imparting means between the follower and the control member that the three functions of manual control of feed, patterned control of feed, and variation in such patterned control can be readily accomplished by manipulation of suitable handle means extending within the frame and operably connected with said manually operable means.

In the drawings, Figure 2 illustrates the parts in the positions they occupy when the movement of the control member is in accordance with the contour of cam *a*. Thus, the rib **106** on the slidable member **100** that is carried by rod **57** is engaged within notch A on plate **59**. The angular relation of the rod **57** relative to set screw **83** is such that the control member **50** can be turned sufficiently counterclockwise without the periphery of the control member engaging set screw **83**. Control member **50** is moved counterclockwise by the engagement of the nose on the end of lever **75** with the upper surface of the substantially radially extending arm or projection **77** of the control member. Cam *a* in its rotation, moves the follower lever **70** downwards within the limits of the hole **98** in frame part **53**, the lever **70** moving lever **75** downwards so as to turn the control member. When the follower roller **72** passes off of a high point on the periphery of cam *a*, the control member **50** is turned clockwise under the influence of spring **80** so as to elevate lever **75** and thus follower lever **70**. This spring **80**, therefore, constitutes spring means for maintaining the follower in engagement with the periphery of a selected cam. To change the patterned controlled movement of the feed dog, slidable member **100** is pushed inwardly along rod **57** against the action of spring **102** until the outer end of rib **106** is disengaged from notch A, whereupon the operator, while still holding slidable member **100**, swings rod **57** downwards until the rib **106** enters notch B. Since the rod **57** is carried by bosses or ears **103, 104**, that in turn are mounted on plate **81**, the downward swinging movement of rod **57** turns plate **81** clockwise. The nose **88** on the projection of plate **81** bears against lug **93** so that in this downward movement of rod **57** the cooperation between nose **88** and lug **93** shifts this lug to the right, Fig. 2, and in this shifting movement, cylinder **92** is shifted to the right, further compressing spring **95**. The cam unit does not necessarily shift simultaneously with the shift-

ing movement of cylinder 92. If the part of cam *b* which is in coincidence with the part on cam *a* engaged by roller 72 when lug 93 is moved, is not higher than that part of cam *a*, the cam unit will move to the right as lug 93 moves, because spring 96 interconnects lug 93 with tongue 89 carried on pin 91 that is disposed in cylinder 92. The spring 96, however, constitutes a lost motion connection, so that if, when lug 93 is moved to the right while a high point on the periphery of cam *b* is alongside the follower roller, the cam unit will not shift to the right until the cams are rotated to a position where the point of contact between roller 72 and the periphery of cam *a* is at least at the same distance from the cam axis as the adjacent surface of cam *b*, whereupon spring 96 will draw the cam unit to the right to a position determined by the position of lug 93. In any event, the structure shown provides for moving the cam unit in accordance with manipulation of the same handle means that is used for manual setting movements of the control member 50. Similar movements imparted to slidable member 100 and rod 57 can effect the positioning of cam *c* for cooperation with the follower. The invention further provides means whereby the patterned controlled movements of the feed dog can be varied within certain limits so that one and the same cam is capable of producing different feed movements as to length of the various feed steps. To accomplish this, the pivot 76 for lever 75 is supported for movement along slot 114 in the frame part 53. The positioning of the pivot pin relative to slot 114 determines the point of engagement between the nose on the end of lever 75 and the projection 77 on the control member. Thus, that point of engagement can be shifted toward and away from the axis of the control member so as to vary the effective lever arm length of projection 77, and thus the amount of turning motion imparted to control member 50 by a particular cam. To effect displacement of the pivot 76 in slot 114, the structure includes the slide body 115 that carries the pivot pin 76. This slide body has an extension 116 that is directed substantially radially of the turning axis of the control member. The guide part 110 carries apertured ears 111, 112, within which is disposed rod 57. This guide part 110 has an arcuate outer surface 113 adapted to cooperate with the end of nose 116. Since the portion 105 of rod 57 is externally threaded and one of the ears, 104, is internally threaded, turning of rod 57 about its axis by manipulation of knob 101 will move the rod axially relative to ear 104, the externally threaded part or portion 105 moving within ear 104. Since the ear 112 of guide part 110 is kept in engagement with part 105 by the action of spring 80, any movement of rod 57 and thus, part 105 to the right, Figures 2 or 5, will result in a shifting movement of the surface 113 on the guide part 110 toward the axis of the control member, and consequently, slide 115 will also move to the right displacing the axis 76 of lever 75 and shifting the point of engagement between the nose of lever 75 and surface 77. The reverse turning movement of knob 101 will effect the opposite shifting movement of the axis of lever 75.

In order to change over from cam controlled motion of the control member to manual movement thereof and starting from the position shown in Figure 2, slidable member 100 is pushed inwardly until the rib 106 clears slot A, whereupon rod 57 is swung upwardly. When rib 106 comes in line with slot 87, spring 102 moves slidable member 100 outwards of rod 57 because the rib can pass through notch 87. This disposes the lefthand or inner end of the rib on the outside of plate 59. Shortly after the rod has been moved upwards, beyond the limits of notch 87, set screw 83 engages the periphery of the control member, so that further swinging movement of lever 57 will impart movement to the control member to another position. The rod 57 is maintained in a selected position of manual adjustment by a combination of braking means including the screw 85 bearing on plate 81 as a friction brake and also by the engagement of the inner end of rib 106 with the outer surface of plate 59. Thus, moving rod 57 determines the amplitude and direction of feed by turning control member 50, the effect of which on the drive for the feed dog is well known in the art. Furthermore, by turning knob 101 during manual adjustment, the effective arc of movement of lever 57 can be varied between upper and lower limits determined by the engagement between the inner end of rib 106 and the outer surface of the plate 59. With this relationship, the amount of forward feed in the lower position of rod 57 is precisely the same as the amount of backward feed in the upper position of rod 57, because the arc of movement of the rod on opposite sides of a neutral point is the same. It is further to be noted that when rod 57 is swung upwardly to turn plate 81, nose 88 on this plate passes out of engagement with lug 93 and spring 95 moves the cam unit to the left. The follower roller is limited in its upward movement by the hole 98 in frame 53. Consequently, when the cam unit is shifted to the left of the follower, Fig. 2, the position where the follower roller is approximately opposite groove 90, is an inactive position and even though the cams may still be rotating, they have no effect on the control member. The reverse manipulation of the handle means effects disengagement of set screw 83 relative to the control member and by cooperation between nose 88 and lug 93, with the rib 106 positioned through slot or notch 87 and moving along the rear face of plate 59 displaces the cam unit to the right to select any one of the cams.

I claim:

1. In a zig-zag stitch sewing machine of the type comprising a hollow frame including a hollow sewing arm and a needle means mounted for longitudinal reciprocation and lateral swinging movement relative to said arm, the improvements comprising drive means within the arm for reciprocating the needle means, motion imparting means operably connected between said drive means and the needle means for imparting lateral swinging movement to the needle means, a movable feed dog for cooperation with the needle means during sewing, feed motion transmission means within the frame and operably connected between said drive means and feed dog for imparting feed movements to the feed dog, a movable control member mounted within the frame and operably interconnected with said feed motion transmission means for varying the amplitude and direction of the feed movements of the feed dog during sewing, manually actuated means within the frame, manipulatable exteriorly of the arm and operably connected with said control member for actuating the same to manually vary the amplitude and direction of feed movements of the feed dog during sewing, at least one feed controlling cam within the frame and operably connected with said drive means to make one revolution during a plurality of consecutive longitudinal reciprocations of the needle means, a follower means within the frame and mounted for cooperation with said cam, motion transmitting means operably arranged within the frame between said follower means and said control member for mechanically and automatically imparting movement to the control member so as to mechanically and automatically vary the amplitude and direction of feed movements of the feed dog during sewing in accordance with the pattern of said cam, means for effecting engagement and disengagement between said cam and said follower, and adjustable means within the frame, operably related with said last-mentioned motion transmitting means and adjustable exteriorly of the frame for adjusting said last-mentioned motion transmitting means to vary the motion imparted to the control member by said last-mentioned motion transmitting means so as to vary the cam controlled movement thereof to vary the length

of feed movement imparted to said feed dog responsive to said cam.

2. In a zig-zag stitch sewing machine as claimed in claim 1 and said control member comprising a member turnable about a fixed axis, said manually actuated means including a member turnable about the same axis, means normally urging the control member to turn in a direction corresponding to an increased forward feed, the turnable member of the manually actuated means including a portion engageable with the control member in certain positions of the turnable member to impart turning movement to the control member in an opposite direction, said control member having an arm extending substantially radially thereof, the motion transmitting means between the follower and control member comprising a lever having one end engaging said arm, pivot means mounting the opposite end of the lever, said pivot means extending parallel to said axis, said follower including a lever disposed above and engageable by said first-mentioned lever, pivot means mounting said second lever for swinging motion responsive to said cam about an axis transverse with respect to said first-mentioned axis and means for shifting the pivot for said first lever toward and away from said first mentioned axis to vary the point of engagement between said first lever and said arm.

3. In a zig-zag stitch sewing machine of the type comprising a hollow frame including a hollow sewing arm and a needle means mounted on said arm for longitudinal reciprocation and lateral swinging movement, the improvements comprising drive means within the arm for reciprocating the needle means, motion imparting means operably connected between said drive means and the needle means for imparting lateral swinging movement to the needle means, a movable feed dog for cooperation with the needle means during sewing, motion transmission means operably connected within the frame between said drive means and said feed dog for imparting horizontal feed movements to the feed dog, a control member mounted within the frame and operably interconnected with said feed motion transmission means for varying the amplitude and direction of the feed movements of the feed dog during sewing, manually actuated means mounted within the frame, manipulatable exteriorly of the arm and operably related with said control member for actuating the same to manually vary the amplitude and direction of feed movements of the feed dog during sewing, at least one feed controlling cam within the frame and operably connected with said drive means to make one revolution during a plurality of consecutive longitudinal reciprocations of the needle means, a follower means within the frame for cooperation with said cam, means mounting said cam and follower for relative axial shifting movement, movable means engaged with said control member and actuated by said follower means for mechanically and automatically imparting movement to the control member for mechanically and automatically varying the amplitude and direction of feed movements of the feed dog during sewing in accordance with the pattern of said cam, said manually actuated means also including means for effecting relative axial shifting movement between said cam and follower means to selectively engage and disengage said cam and follower, and adjustable means within the frame, operably related with said movable means and adjustable exteriorly of the frame for adjusting the position of said movable means at least relative to said control member to vary the cam controlled movement thereof so as to vary the length of feed movements of the feed dog imparted by said cam.

4. In a zig-zag stitch sewing machine of the type comprising a hollow frame including a hollow sewing arm and a needle means mounted for longitudinal reciprocation and lateral swinging movement relative to said arm, the improvements comprising drive means within the arm for reciprocating the needle means, motion imparting means operably connected between said drive means and the needle means for imparting lateral swinging movement to the needle means, a movable feed dog below said arm for cooperation with the needle means during sewing, motion transmission means within the frame and operably connected between said drive means and feed dog for imparting horizontal feed movements to the feed dog, a control member mounted within the frame and operably interconnected with said motion transmission means for varying the amplitude and direction of the feed movements of the feed dog during sewing, manually actuated means within the frame, manipulatable exteriorly of the arm and operably connected with said control member for actuating the same to manually vary the amplitude and direction of feed movements of the feed dog during sewing, an auxiliary shaft within the frame and operably connected with said drive means to make one revolution during a plurality of consecutive longitudinal reciprocations of the needle means, a plurality of cams mounted side by side as a unit on said shaft and rotatable in unison therewith, a common follower for cooperation with said cams, means mounting said cam unit and follower for shifting movement of one relative to the other for cam selection, shiftable motion transmitting means engaged with said control member and actuated by said follower for mechanically and automatically governing movements of the control member for mechanically and automatically varying the amplitude and direction of feed movements of the feed dog during sewing in accordance with the pattern of a selected cam, said manually actuated means including means for effecting relative axial shifting movements between said cam unit and follower to selectively position none or any one of said cams for cooperation with said follower, and the adjustable means operably related with said last mentioned transmitting means comprising means for shifting said shiftable motion transmitting means relative to said follower and said control means to vary the cam controlled movement thereof so as to vary the length of feed movements imparted to said feed dog by any one of said cam means.

5. In a zig-zag stitch sewing machine as claimed in claim 4 and the motion imparting means operably connected between said drive means and the needle means includes at least one rotary cam, a follower selectively engageable therewith, and disengageable therefrom, a variable ratio transmission means interconnected between said follower and said needle means so that the amplitude of the lateral movements of the needle means can be mechanically and automatically varied when the follower is engaged and manually manipulatable means for actuating said variable ratio transmission means when the follower is disengaged to manually vary the amplitude of lateral movement of the needle means.

6. In a zig-zag sewing machine as claimed in claim 4 and said control member comprising a member turnable about a fixed axis, said manually actuated means including a member turnable about the same axis, means normally urging the control member to turn in a direction corresponding to an increased forward feed, the turnable member of the manually actuated means including a portion engageable with the control member in certain positions of the turnable member to impart turning movement to the control member in an opposite direction, said control member having an arm extending substantially radially thereof, the motion transmitting means between the follower and control member comprising a lever having one end engaging said arm, pivot means mounting the opposite end of the lever, said pivot means extending parallel to said axis, said follower including a lever disposed above and engageable by said first-mentioned lever, pivot means mounting said second lever for swinging motion responsive to said cam about an axis transverse with respect to said first-mentioned axis and the adjustable means operably related with said last-mentioned motion transmitting means comprising means for shift-

ing the pivot for said first lever toward and away from said first mentioned axis to vary the point of engagement between said first lever and said arm.

7. A sewing machine as claimed in claim 4 and the motion imparting means for imparting lateral swinging movement to the needle means including a cam unit comprising a plurality of cams mounted in side by side relation, a follower means for cooperation with said last mentioned cam unit, means for effecting relative movement between said follower means and said last mentioned cam unit, a shaft carrying said last mentioned cam unit and said last mentioned shaft and said auxiliary shaft being mounted to extend in the same direction.

8. A zig-zag stitch sewing machine comprising a hollow frame, needle bar means supported by said frame for longitudinal reciprocation and lateral swinging movement, a drive shaft within said frame, motion imparting means operably connected between said drive shaft and said needle bar means for imparting longitudinal reciprocation thereto, an element mounted for reciprocation in a direction transversely of said needle bar means in timed relation to the longitudinal movement thereof, motion transmission means operably connected within the frame between said drive shaft and said element for moving the same, a movable control member within said frame, and operably interconnected with said transmission means for varying the amplitude of movement of the element during sewing, manually actuated means within the frame, manipulatable exteriorly of the frame for manually moving said control member and including a movable component within the frame engageable with and disengageable from said control member, at least one cam, means mounting the cam within the frame for rotation at a speed of one revolution for a plurality of consecutive longitudinal reciprocations of the needle bar means, and engageable and disengageable means operably associated between the cam and said control member for imparting mechanical and automatic movements to the control member when engaged to mechanically and automatically vary the amplitude of movement of said element during sewing and including a variable leverage connection, and means for manually varying said leverage whereby the movements imparted to said control member by said cam can be varied.

9. A sewing machine as claimed in claim 8 wherein said control member comprises a member turnable about a fixed axis within the frame, an arm extending substantially radially of said member, said variable leverage connection comprising a cam actuated lever engageable with said arm and the means for manually varying said leverage connection comprising a settable member manipulatable exteriorly of the frame and operatively connected with said lever for shifting the same relative to said axis to vary the point of engagement between said lever and said arm relative to said axis.

10. In a sewing machine, a hollow frame including a hollow sewing arm, a rotatable drive shaft, a reciprocable work feeder mounted beneath said sewing arm, motion imparting means operably connected between said drive shaft and said work feeder for reciprocating the same and including a movable control member mounted within the frame for varying the amplitude and direction of movement of the work feeder during sewing, a manually manipulatable setting member operable exteriorly of the arm and engageable with said control member for moving the same, a second shaft within the frame, means operably connecting said second shaft to said drive shaft to impart a predetermined rotation of said second shaft, a plurality of cam means interconnected as a unit in side by side relationship and mounted on said second shaft for rotation therewith, motion governing means within the frame and including a follower means cooperable with said cam unit and means engaged with said control member for mechanically and automatically governing movement of said control member to mechanically and automatically vary the amplitude and direction of movement of the work feeder during sewing, means mounting said cam unit and follower means for relative shifting movement and means for effecting such relative shifting movement between said follower means and said cam unit as to selectively engage none or any one of said cams with said follower means.

11. A sewing machine as claimed in claim 10 and said rotatable drive shaft extending longitudinally of said sewing arm, said arm having an opening therein, said second shaft comprising a cantilevered shaft supported within said arm and extending transversely of the axis of said drive shaft and disposed opposite said opening and means detachably mounting said cam unit on said cantilevered shaft.

12. A sewing machine as claimed in claim 10 and a separate frame member mounted within the sewing arm and carrying said control member, actuating member, the cams, and the motion imparting means cooperable with the cam unit and control member.

13. A sewing machine as claimed in claim 10 and said cams being detachably interconnected as a unit and means detachably mounting said unit within said arm.

14. A sewing machine as claimed in claim 10 and said cam unit and follower means being mounted for relative axial displacement.

15. In a sewing machine, a hollow frame including a hollow sewing arm, a rotatable drive shaft within said sewing arm, a reciprocable work feeder mounted beneath said sewing arm, a rock shaft extending parallel to said drive shaft and operably connected with said work feeder, a variable eccentric driving means operably interconnecting said shafts and including a movable control member mounted within the frame and operable upon movement to vary the amplitude and direction of movement of the work feeder during sewing, a manually manipulatable setting member mounted within the frame, operable exteriorly of the arm and operatively associated with said control member for moving the same, a third shaft within the frame, means operably connecting said third shaft to said drive shaft to impart a predetermined rotation to said third shaft, a plurality of cams interconnected as a unit in side by side relationship and mounted on said third shaft for rotation therewith, motion imparting means within the frame and including a follower means cooperable with said cam unit and means engaged with said control member for mechanically and automatically moving said control member to mechanically and automatically vary the amplitude and direction of movement of the work feeder during sewing, means mounting said cam unit and follower means for relative shifting movement and means for effecting relative shifting movement between said follower means and said cam unit to selectively engage none or any one of said cams with said follower means.

16. In a sewing machine, a hollow frame, a horizontally reciprocable fabric feeder, within said frame a rotary drive shaft, a variable movement and reversible motion transmitting mechanism operably interconnecting said drive shaft and said feeder and including a spring actuated control member swingably mounted about a fixed axis within said frame and adapted by its angular position to vary the amplitude and direction of movement of the fabric feeder during sewing, a turnable actuating member mounted to swing about said axis, means manipulatable exteriorly of the frame for manually turning said actuating member into a plurality of positions including an inoperative position, means including a plurality of rotatable and coaxially mounted cams selectively operatively engageable with and disengageable from said control member for mechanically and automatically varying the amplitude and direction of movement of the fabric feeder during sewing in accordance with the pattern of selected cam, means carried by said actuating member adapted to limit the movement of said control member

under the action of the spring during manual actuation of the control member and the selected cam limiting the movement of said control member during mechanical and automatic actuation of the same when said turnable actuating member is set in said inoperative position.

17. A sewing machine as claimed in claim 16, in which the means for mechanically and automatically varying the amplitude and direction of movement of the fabric feeder also includes a cam follower common to said cams, means mounting the cams for axial displacement relative to said follower, said follower being interposed between the cams and said control member and said cams being axially movable into selective engagement with said follower responsive to turning movement of said actuating member.

18. A sewing machine as claimed in claim 16 and including an auxiliary shaft extending transversely of said axis, said cams being mounted on said auxiliary shaft for axial movement therealong, a common cam follower for cooperation between none or any one of said cams and said control member, a displacement mechanism operably associated with said cams for imparting axial movement to the same and means carried by said actuating member and cooperable with said displacement mechanism for moving said cams into operative relation with said follower.

19. A sewing machine as claimed in claim 18 and said displacement mechanism including two parts mounted for movement in a direction parallel to the axis of the cams, means connecting one of said parts to said cams, spring means normally holding said parts in engagement with each other and additional spring means holding the other part in contact with said actuating member when the latter is set in an inoperative position relative to said control member.

20. A sewing machine as claimed in claim 16 and including an auxiliary shaft extending transversely of said axis, said cams being mounted on said auxiliary shaft for axial movement therealong, a common cam follower for cooperation between none or any one of said cams and said control member, a displacement mechanism operably associated with said cams for imparting axial movement to the same, means carried by said actuating member and cooperable with said displacement mechanism for moving said cams into operative relation with said follower, said hollow frame housing said drive shaft, auxiliary shaft, control member and actuating member, said frame having a slit therein, a setting rod mounted on said actuating member to swing in unison therewith, said rod extending through said slit, and locking means slidably and adjustably mounted on said rod and adapted to cooperate with an edge of said slit for limiting the swinging movement of the actuating member during manual operation thereof, and for locking the actuating member in any cam selecting position.

21. In the ornamental stitch sewing machine, a hollow frame, a rotatable drive shaft within the frame, a movable feed dog, variable motion transmitting means mounted within the frame between the drive shaft and the feed dog and including a movable control member within the frame, the position of which determines the amplitude and direction of the feed dog, at least one rotatable cam mounted within the frame, means operably connected between said drive shaft and cam for imparting a predetermined rotation to said cam, a follower means within the frame for cooperation with said cam, means whereby said cam and follower means are relatively engageable and disengageable, variable leverage means within the frame and interposed between said follower means and said control member, first manually operable means within the frame and operably connected with said variable leverage means for adjusting the same while the machine is running to at any time vary the amount of motion imparted to the control member by said cam to vary the feed movement imparted to the feed dog, second manually operable means within the frame and operably related with said control member for manually moving the control member when the cam and follower are relatively disengaged to alter the position of the control member so as to manually control the amplitude and direction of feed movement of the feed dog independently of its cam controlled movement, and handle means connected within the frame with said first and second manually operable means and extending outside the confines of said frame for operating said two manually operable means.

22. An ornamental stitch sewing machine according to claim 21, and a plurality of patterned cam means mounted side by side as a unit for simultaneous rotation within said frame, said follower means including a single cam-engaging head for cooperation with none or any one of said cams, and means mounting said head and cam unit for relative axial shifting movement for cam selection purposes.

23. An ornamental stitch sewing machine as claimed in claim 22 and third manually operable means within the frame and operably related with said cam unit and follower means for relatively axially shifting said unit and follower means to a plurality of positions comprising a relative idle position where the single cam-engaging head is displaced axially beyond the end cam at one end of the unit and relative operative positions wherein said head is displaced for selective cooperation with any one of said cams.

24. An ornamental stitch sewing machine as claimed in claim 23 and said handle means being also connected within the frame with said third manually operable means.

25. An ornamental stitch sewing machine as defined in claim 21, in which said handle means comprises a single handle means operably connected within the frame with both of said manually operable means for operating said first and second means when the cam and follower are relatively engaged and dis-engaged, respectively.

26. In a sewing machine, a hollow frame, a needle carried by said frame and mounted for endwise reciprocation and for lateral swinging movements, a rotary drive shaft within said frame for reciprocating said needle, means for rotating said drive shaft, an element within the frame to be moved in a to and fro path of movement in response to rotation of said drive shaft, a cam shaft within said frame, means within the frame and connected between said drive shaft and said cam shaft for turning the latter through a fraction of a revolution for each complete needle reciprocation, at least one cam on said cam shaft, means within the frame interconnecting said element with said cam including a movable cam follower having a single cam-engaging head for responding to the contour of the cam to impart to and fro movement to said element, means mounting said cam follower within said frame for movement radially of the axis of said cam shaft, spring means normally urging said head into engagement with said cam, said cam and follower being relatively shiftable lengthwise of the cam shaft between an active position where said head is in tracking relation with said cam and an inactive position displaced axially from said cam, abutment means within the frame and cooperably related with said follower means to limit the movement of said head toward the axis of said cam, manually operable means within the frame for effecting relative lengthwise shifting movement of said cam and follower between said positions, movable handle means connected within the frame with said manually operable means and extending outside the confines of said frame and movable between at least two positions for operating said manually operable means to effect such relative lengthwise shifting movement, and means for releasably holding said handle means in positions corresponding to said active and inactive positions of said head relative to said cam.

27. A sewing machine as defined in claim 26, in which said abutment means is manually adjustable to adjustably limit the movement of the follower head toward the cam axis.

28. A control mechanism for an ornamental stitch sewing machine having a frame and at least one member within the frame to be controlled by the mechanism, said mechanism comprising a plurality of control discs mounted for at least turning movement about an axis fixed by said frame, means for turning each disc, a follower means having a single disc-engaging head, means mounting said follower means within the frame for swinging movement radially of said discs and for cooperation therewith, means including a lever connected between said member and said follower for transmitting movement to said member, said lever being engaged by the side of the follower opposite said head, said discs and follower being relatively shiftable lengthwise of said axis for disc selection purposes, manually actuated means within the frame for effecting such relative shifting movement, said frame having a front wall having a vertical slot therein, handle means connected within the frame with said manually operable means and including a portion extending through said slot, said handle means being vertically swingable within said slot, said handle means including a sliding member mounted for shifting movement in a direction substantially transverse to said front wall, a member fixed to the frame and having a series of vertically spaced lateral notches which correspond to selective relative axial positions of said head and discs, said sliding member having a lateral projection associated therewith for releasable locking engagement within a selected one of said notches, and spring means normally biasing said sliding member to an outward position wherein said lateral projection is maintained within a selected notch so that the sliding member must be pushed inwardly to remove said projection from a selected notch before said handle means can be swung vertically for disc selection purposes.

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