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C. R. ODERMANN  
ORNAMENTAL STITCH SEWING MACHINES  
AND CAM MECHANISMS THEREFOR

2,862,404

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3 Sheets-Sheet 1

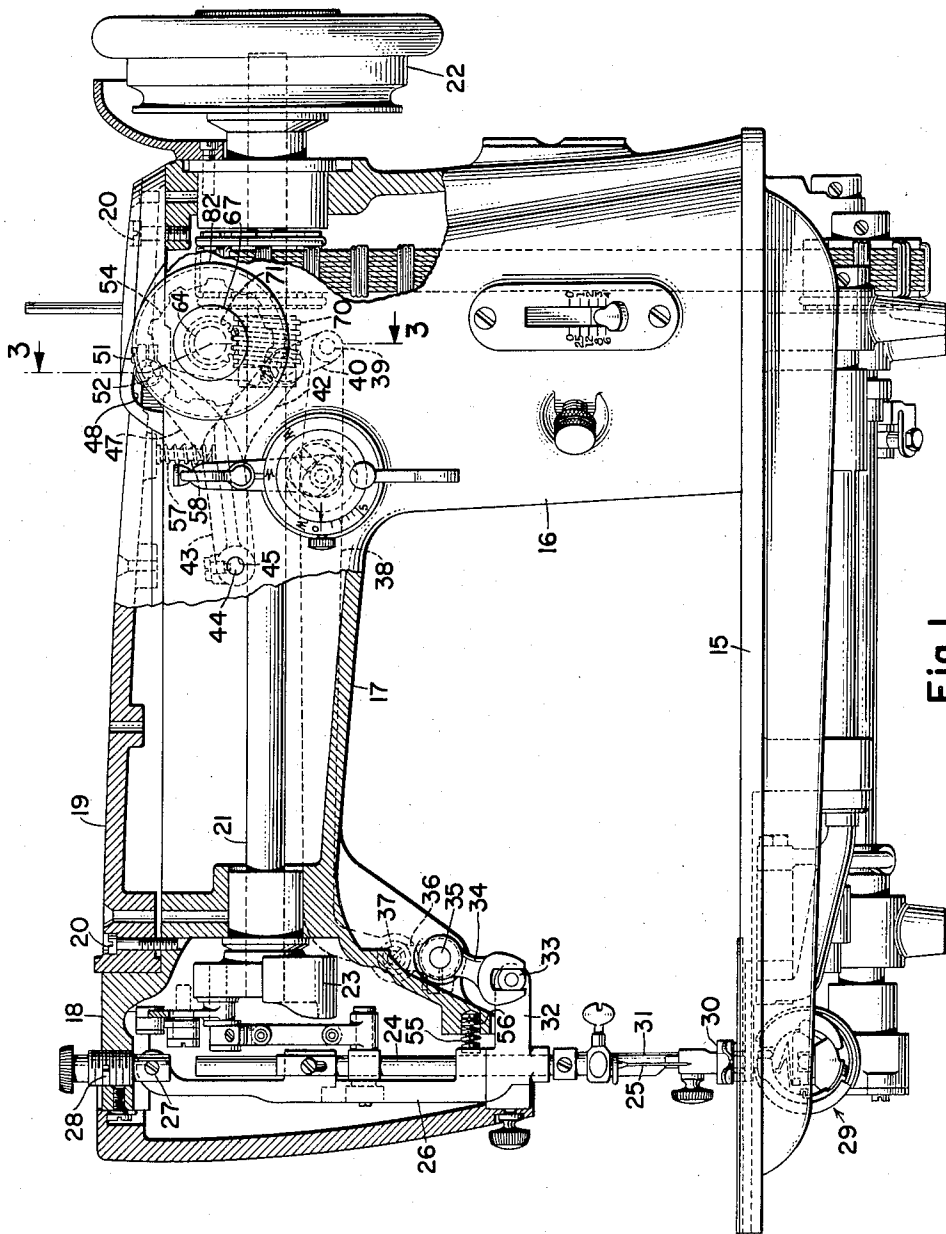


Fig. 1.

WITNESS  
*Goopy Pecina*

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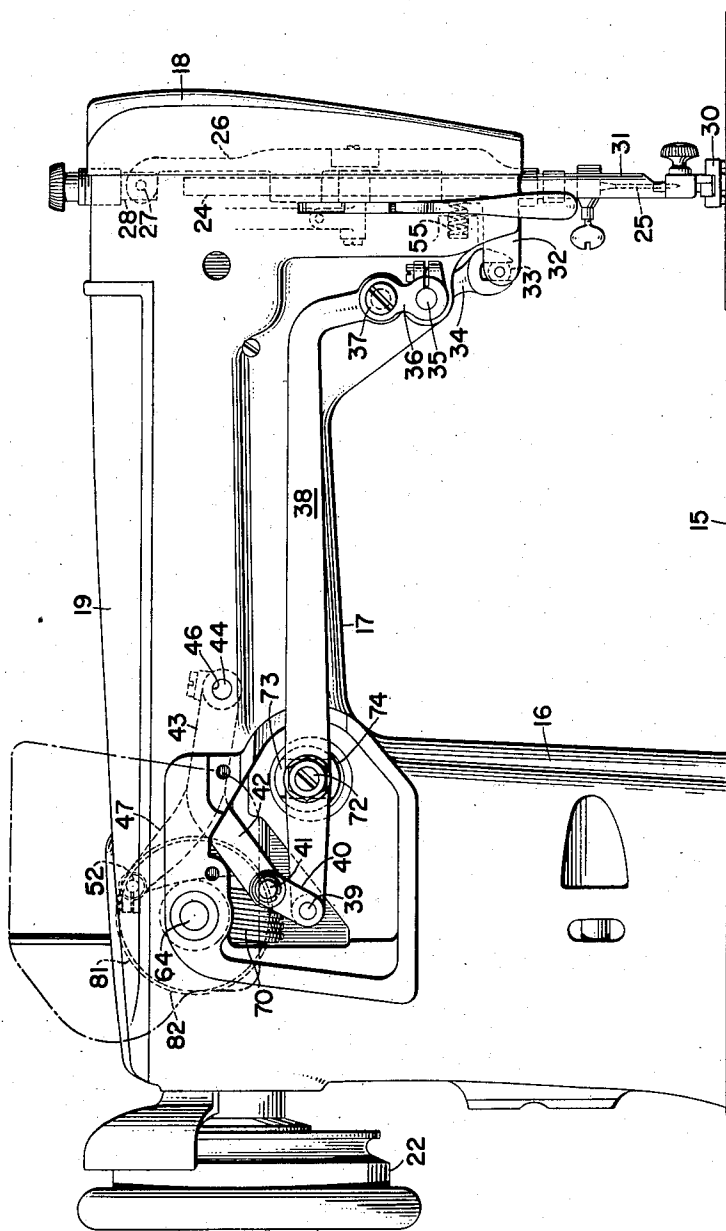


Fig. 2.

WITNESS  
*Gospy Picone*

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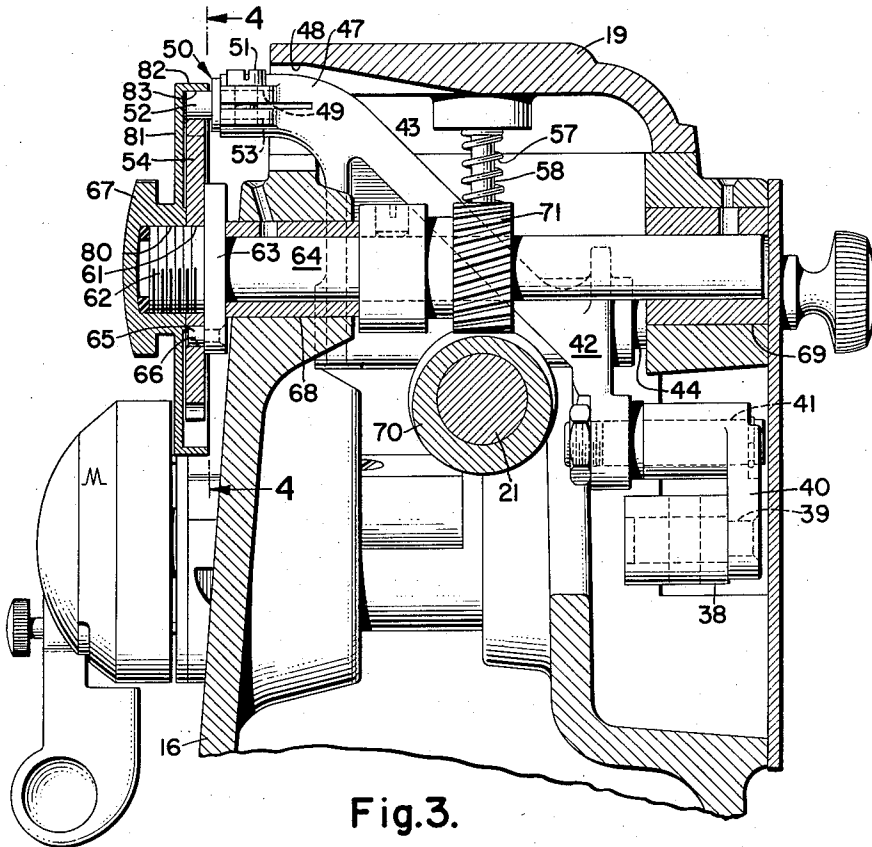


Fig. 3.

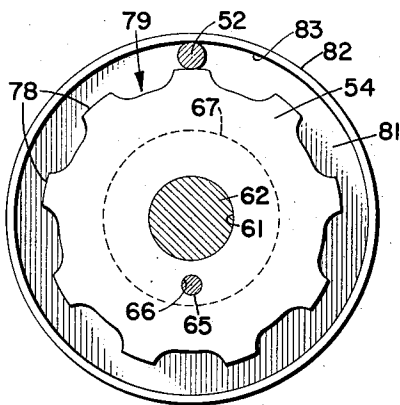


Fig. 4.

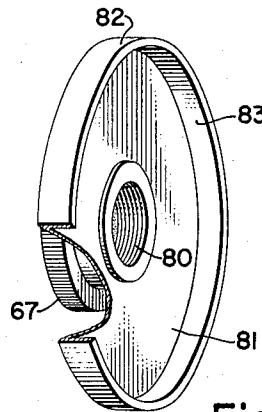


Fig. 5.

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WITNESS

*Grady Pecina*

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2,862,404

## ORNAMENTAL STITCH SEWING MACHINES AND CAM MECHANISMS THEREFOR

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Application August 2, 1955, Serial No. 525,985

5 Claims. (Cl. 74—567)

This invention relates to improvements in ornamental stitch sewing machines of the laterally vibrating needle type wherein the lateral needle movements are produced by a rotary pattern cam, and has for an object to provide means whereby the lateral or zigzag movements of the needle may be positively confined between predetermined limits during the high-speed operation of the sewing machine.

A further object of the invention is to provide an improved rotary edge cam construction for use in an ornamental stitch sewing machine.

With the above and other objects in view, as will hereinafter appear, the invention comprises the devices, combinations, and arrangements of parts hereinafter set forth and illustrated in the accompanying drawings of a preferred embodiment of the invention, from which the several features of the invention and the advantages attained thereby will be readily understood by those skilled in the art.

In the drawings,

Fig. 1 represents a side elevation, partly in section, of a sewing machine containing the present improvements.

Fig. 2 represents a rear side elevation of the bracket-arm of the machine.

Fig. 3 represents, on an enlarged scale, a sectional view taken substantially along the line 3—3 of Fig. 1.

Fig. 4 represents a sectional view taken along the line 4—4 of Fig. 3.

Fig. 5 represents a fragmentary perspective view of a portion of the pattern cam mechanism.

The present improvements are illustrated in the drawings herein described as embodied in a zigzag stitch sewing machine of the type disclosed in the United States patent application of Perla and Koenig, Serial No. 386,684, filed October 19, 1953.

Referring to the drawings, the sewing machine illustrated has a frame comprising a bed-plate 15 affording a work-support from one end of which rises a hollow standard 16 of a bracket-arm 17 overhanging the bed-plate and terminating at its free end in a hollow head 18.

The bracket-arm 17 is open at its upper portion so as to form a substantially trough-shaped unit and this opening is adapted to be closed by means of a cover-plate 19 which is removably secured in position by means of a plurality of bolts 20—20.

Rotatably journaled in suitable bearings provided in the bracket-arm 17 is a horizontally disposed main shaft 21 extending lengthwise of the bracket-arm and carrying at one end a driving pulley 22. At its opposite end the main shaft 21 carries a crank 23 connected in a conventional manner to a vertically disposed needle-bar 24.

The needle-bar 24 carries at its lower end a needle 25 and is journaled for endwise reciprocation in suitable bearings provided in a vibratory gate 26. The gate 26 is pivotally hung upon a screw stud 27 carried by a supporting member 28 adjustably threaded into the upper wall of the bracket-arm 18 to provide for swinging movements

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of the gate 26 about a pivotal axis substantially transverse to the axis of rotation of the main shaft 21. Cooperating with the needle 25 below the bed-plate 15 and in the formation of lock-stitches is a loop-taker 29 supported for rotation in the vertical plane parallel to and rearwardly of the plane of needle vibration. The loop-taker 29 is rotated twice for each complete needle reciprocation by a suitable driving connection with the main shaft 21. Suitable feeding mechanism of the lower four-motion type is provided for advancing the work past the needle in a direction transverse to the plane of needle vibration, and any usual or suitable presser-foot 30 may be secured to a conventional presser-bar 31 so as to oppose the work-engaging portion of the feeding mechanism in a conventional manner.

Extending horizontally from the lower end of the needle-bar gate 26 is an arm 32 of which the free end portion extends externally of the bracket-arm 18 and carries a pivot block 33. Embracing the pivot block 33 is a forked end of a rock-arm 34 depending from the front end of a short rock shaft 35 disposed horizontally transverse to the main shaft 21 and suitably journaled at the under side of the bracket-arm head 18. Extending upwardly from the rock shaft 35 at the rearward side of the head 18 is a rock-arm 36 of which the upper end is connected by a pivot screw 37 to one end of a pitman 38 disposed horizontally and externally at the rearward side of the bracket-arm 17. The other end of the pitman 38 is pivotally connected by means of a pin 39 to a link 40, the other end portion of which is in turn connected by means of a second pin 41 to an arm 42 depending from a cam-actuated member 43 which is pivotally mounted within the bracket-arm 17 of the sewing machine by means of a horizontal shaft 44 which extends transversely across the sewing machine bracket-arm to be received within oppositely disposed apertures 45 and 46 formed in the bracket-arm.

Projecting upwardly and laterally from the member 43 is a second arm 47 which extends through an aperture 48 formed within the cover-plate 19 so as to be positioned outside the confines of the sewing machine frame. As may be best understood by reference to Figs. 1 and 3, the arm 47 is provided with a longitudinally split aperture 49 containing a cam follower pin, generally designated by the numeral 50, which pin is locked within the aperture 49 by means of a set screw 51. This pin 50 comprises a cam-engaging cylindrical portion 52 and a reduced cylindrical shoulder portion 53 which is received within the arm aperture 49.

The cam follower 52 is forced into engagement with the periphery of a rotary cam 54 by means of a pair of compression springs. One of these compression springs 55 is disposed within the hollow head portion 18 of the bracket-arm with one end of the spring located within an aperture 56 formed within the head so as to maintain the spring in a proper position whereby the other end portion may bear against the lower end portion of the needle-bar gate 26 for the purpose of biasing the gate in a direction away from the sewing machine head thereby to urge the cam follower 52 into engagement with the periphery of the cam 54.

A second compression spring 57 is mounted about a pin 58 depending from the under side of the cover-plate 19. As may be observed from Figs. 1 and 3, the spring 57 is disposed directly over the member 43 so that the lower end portion of the spring will urge the member downwardly about its pivot shaft 44 thereby to complement the spring 55 in urging the cam follower 52 against the peripheral portion of the rotary cam 54.

Referring particularly to Figs. 1 and 3, the cam 54 is provided with an aperture 61 so that the cam may be

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removably disposed over the threaded end portion 62 and against the shoulder portion 63 of a cam shaft 64. More specifically, the cam shaft 64 has its shoulder 63 provided with a pin 65 which is received within an appropriate aperture 66 formed within the cam 54 for the purpose of locating the cam in its proper position upon the cam shaft. A thumb screw 67 is adapted to be received over the threaded end portion 62 of the cam shaft 64 for the purpose of locking the cam 54 in its operative position.

The cam shaft 64 is journaled in the front and rear walls of the bracket-arm 17 in bearing bushings 68 and 69 with the cam shaft being disposed above and horizontally transverse to the main shaft 21. A spiral gear 70 carried by the main shaft 21 drives a spiral gear 71 secured upon the cam shaft 64 whereby the latter is rotated, for example, at  $\frac{1}{18}$  speed of rotation of the main shaft 21.

From the foregoing, it will be understood that during the operation of the machine, the cam 54 being carried by the rotary stub shaft 64 will rotate about the shaft axis and thus actuate the cam follower 52 to the end that the member 43 will rise and fall in a manner as dictated by the peripheral shape of the cam 54 and thus the pitman 38, through the medium of the arm 42 and link 40, will have its left-hand end portion, as viewed in Fig. 2, vibrated in a vertical plane.

In order to translate the vertical vibratory movements of the pitman 38 into effective endwise reciprocatory movements thereby to impart swinging movements to the needle-bar gate 26, an appropriate guide block, not herein shown, is suitably secured upon the pitman by a bolt 72, which guide block is shiftably disposed within a guideway 73 constituted by a rearwardly open slot formed in the outer or rearwardly exposed face of a guide head 74. As is well known, the angular adjustment of the guide head 74 controls the amplitude of reciprocatory movements of the pitman 38 all in a manner as is disclosed in the above noted Perla and Koenig patent application.

Those skilled in the art will readily appreciate that during the high speed operation of the present type of sewing machine the cam follower 52 together with its carrying arm 47 will be forced away from the rotary pattern cam 54 due to the fact that the peripheral extremities 78—78 of the undulating pattern cam surface, generally designated by the numeral 79, will forcibly strike the follower 52 and the springs 55 and 57 will not be strong enough to maintain the follower 52 in intimate contact with the peripheral cam surface. Manifestly, it follows that if the follower 52 shifts radially from the peripheral cam extremities 78 the needle will shift laterally beyond its designed limits and thus produce an improper pattern of stitches. It is a primary object of the present invention to prevent any such malfunctioning of the sewing machine mechanism by providing means for maintaining the cam follower 52 in intimate engagement with the peripheral cam extremities 78—78 during the operation of the sewing machine irrespective of the machine speed.

As may be best seen from Figs. 3 and 4, the pattern cam 54 comprises a disk-like structure with an undulating pattern cam surface 79 formed about its periphery with which pattern cam surface the cam follower 52 is designed to track. In a preferred form of the present invention the cam 54 has cooperating therewith a thumb nut 67 which is provided with a threaded central aperture 80 designed to be removably positioned over the threaded end portion 62 of the cam shaft 64 for the purpose of locking the cam 54 in its operative position against the cam shaft shoulder 63. Integrally formed with the thumb nut 67 is a disk 81 having its peripheral portion bent laterally thereby to form an annulus 82 whose internal surface 83 is disposed concentric with the axis of the cam shaft 64 and about the peripheral surface of the cam 54. From Fig. 4 it is to be particularly observed that the internal surface 83 of the disk 81 is spaced radially from the peripheral cam surface 79 so as to form a cam-follower receiving groove. From

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Figs. 3 and 4 it will be understood that the cam follower 52 is adapted to be positioned within this groove so as to track the peripheral pattern cam surface 79 under the impetus of the springs 55 and 57 and it is the function of the annulus 82 to maintain the cam follower 52 in intimate engagement with the peripheral cam extremities 78—78 during the operation of the sewing machine and particularly during the high-speed operation of the machine. As has been pointed out above, during the high-speed operation of the sewing machine the cam follower 52 has a tendency to move outwardly from the extremities or high points 78—78 and thus produce an imperfect pattern of stitches. The present annulus 82 functions to overcome this tendency of the cam follower.

From the above, it is to be understood that the thumb nut 67 together with its disk and annulus portions 52 and 82 comprise means for releasably locking the cam 54 upon the cam shaft 64 and for positively constraining the follower element 52 from shifting radially of the cam beyond the position it assumes when in engagement with the peripheral extremities 78—78 of the cam surface 79. Thus, the thumb nut 67 and the member 54 together form a two-part pattern cam structure which is adapted to control the operation of the cam follower 52 and consequently the lateral movements of the needle 25.

Having thus set forth the nature of the invention, what I claim herein is:

1. In a sewing machine having a frame, a rotary cam shaft journaled within said frame, an edge cam mounted upon said rotary shaft for rotation therewith, said cam being in the shape of a disk with an undulating pattern cam surface formed about its periphery, and a cam-follower element spring biased into engagement with the peripheral cam surface so as to be actuated thereby; the improvement which consists in means connected with said cam for positively constraining the follower element from shifting radially of said cam beyond the position it assumes when in engagement with the peripheral extremity of the cam surface.

2. In a sewing machine having a frame, a rotary cam shaft journaled within said frame, an edge cam mounted upon said rotary shaft for rotation therewith, said cam being in the shape of a disk with an undulating pattern cam surface formed about its periphery and a cam-follower element spring biased into engagement with the peripheral cam surface so as to be actuated thereby; the improvement which consists in means connected with said cam for positively constraining the follower element from shifting radially of said cam beyond the position it assumes when in engagement with the peripheral extremity of the cam surface, such last mentioned means including an annular member formed concentrically about the cam disk axis of rotation and disposed about the peripheral cam surface so as to engage the cam follower.

3. In a sewing machine having a frame, a rotary cam shaft journaled within said frame, an edge cam mounted upon said rotary shaft for rotation therewith, said cam being in the shape of a disk with an undulating pattern cam surface formed about its periphery, and a cam-follower element spring biased into engagement with the peripheral cam surface so as to be actuated thereby; the improvement which comprises means for positively constraining the follower element from shifting radially of said cam beyond the position it assumes when in engagement with the peripheral extremity of the cam surface, such last mentioned means including a disk-shaped element having laterally extending from its periphery an annular member which is disposed about the peripheral cam surface so as to engage the cam follower.

4. In a sewing machine having a frame, a rotary cam shaft journaled within said frame, an edge cam removably mounted upon said rotary shaft for rotation therewith, said cam being in the shape of a disk with an undulating pattern cam surface formed about its periphery, and a cam-follower element spring biased into engage-

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ment with the peripheral cam surface so as to be actuated thereby; the improvement which consists in means for releasably locking said cam upon said cam shaft and for positively constraining the follower element from shifting radially of said cam beyond the position it assumes when in engagement with the peripheral extremity of the cam surface.

5. In a sewing machine having a frame, a rotary cam shaft journaled within said frame, an edge cam removably mounted upon said rotary shaft for rotation therewith, said cam being in the shape of a disk with an undulating pattern cam surface formed about its periphery, and a cam-follower element spring biased into engagement with the peripheral cam surface so as to be actuated thereby; the improvement which consists in means for

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releasably locking said cam upon said cam shaft and for positively constraining the follower element from shifting radially of said cam beyond the position it assumes when in engagement with the peripheral extremity of the cam surface, such last mentioned means including a disk-shaped element having laterally extending from its periphery an annular member which is disposed about the peripheral cam surface so as to engage the cam follower.

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