United States Patent

Urciola et al.

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[54] **CAM SELECTOR MECHANISMS FOR SEWING MACHINES**

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[52] **U.S. Cl.** ..... **112/158 A**

[51] **Int. Cl.** **D05b 3/02**

[58] **Field of Search** ..... 112/158 R, 158 A, 158 D

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[57] **ABSTRACT**

A cam selecting machine for a zigzag sewing machine needle jogging mechanism in which a single control block is formed with not only camming means for shifting a cam follower relatively to a cam stack, but also with camming means correlated therewith for removing the cam follower out of tracking relation with the cam stack during each cam selecting manipulation.

3 Claims, 3 Drawing Figures

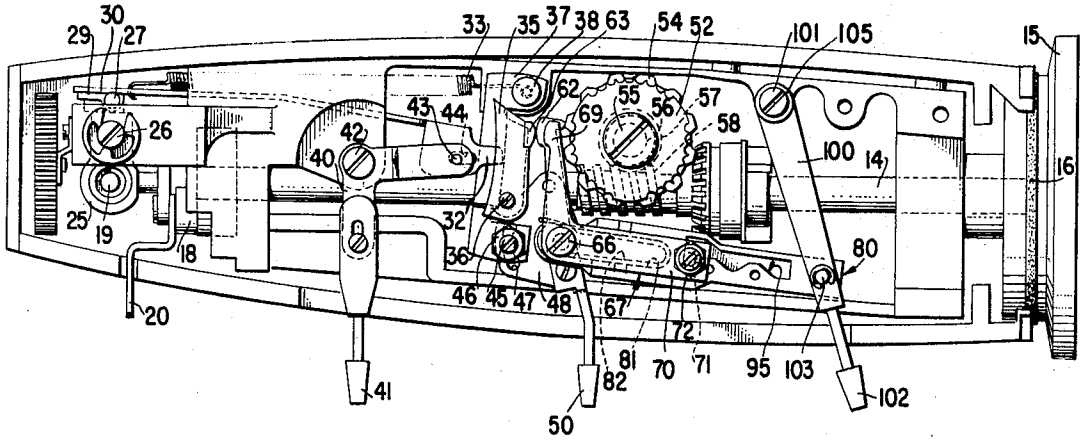

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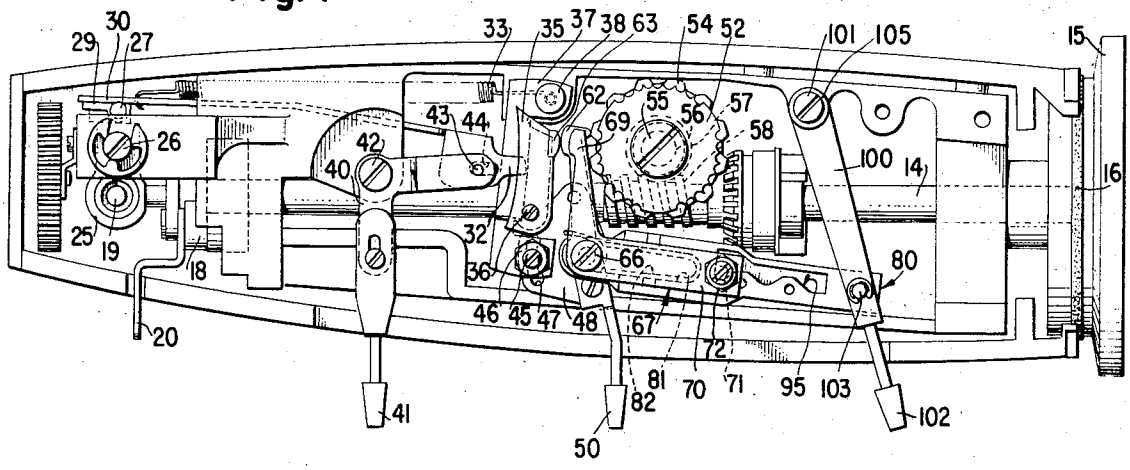
Fig. 1



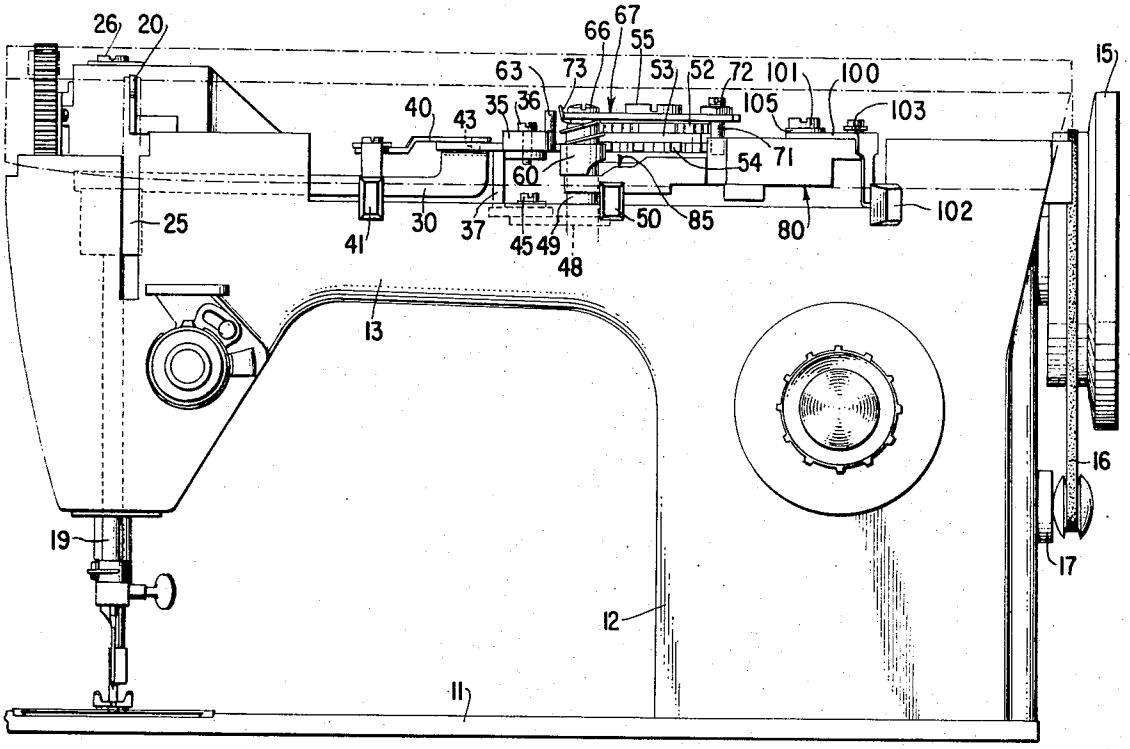


Fig. 2

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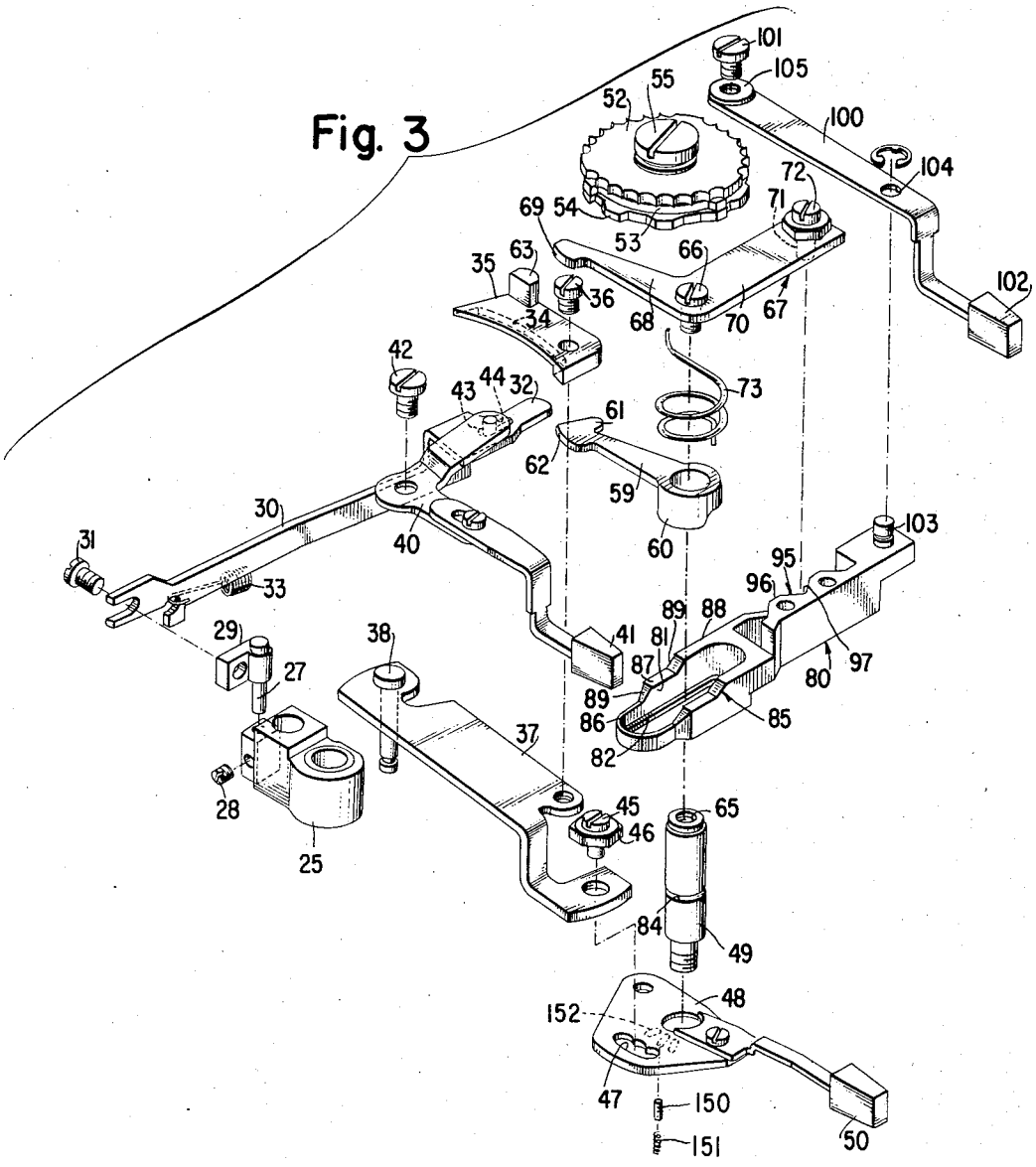
Fig. 3



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CAM SELECTOR MECHANISMS FOR SEWING MACHINES

BACKGROUND OF THE INVENTION

In sewing machines which employ a plurality of pattern cams in a stack, any one of which may be utilized to control a machine operation such as needle jogging, mechanisms which have been known heretofore for selecting a particular pattern cam have either required separate mechanisms for separating the cam follower during cam selection or have provided separate and distinct control elements for effecting removal of the cam follower from the cam stack during selection. Removal of the cam follower from the cam stack during cam selection is necessary if interference is to be avoided during selection; and where separate trains of mechanism are employed for this purpose, not only is the mechanism more complicated and costly, but the assembly thereof becomes highly critical and complicated because very accurate timing is required as between the cam selecting movements and the follower movements into and out of tracking relation with the cam stack.

SUMMARY OF THE INVENTION

It is an object of this invention to provide a cam selecting mechanism in which both selecting movements of the cam follower relatively to a cam stack and movements of the cam follower into and out of tracking relation with the cam stack during cam selection are inherently interrelated and timed, one relatively to the other and do not depend upon adjustments or calibration during assembly of the machine. The objects of this invention are attained by the provision of an integral control block shiftably supported relatively to a cam follower and formed not only with cam surfaces for influencing the relative position of the cam follower along the stack of cams, but also formed with cam surfaces for removing the follower from the cam stack during each selecting motion. Thus when the control block is formed, as by a molding process or the like, the interrelation of the control surfaces is determined.

DESCRIPTION OF THE DRAWINGS

With the above and additional objects and advantages as will be described hereinafter, this invention will be described with reference to the accompanying drawings of a preferred embodiment in which:

FIG. **1** represents a top plan view of a sewing machine in which the top cover plate has been removed to expose the mechanism with this invention applied thereto,

FIG. **2** is a front elevational view of the sewing machine of FIG. **1**, and

FIG. **3** is an exploded perspective view of the needle jogging mechanism and the cam selecting mechanism of this invention.

This invention is illustrated in the accompanying drawings as applied to a conventional sewing machine having a bed **11** from which rises a standard **12** supporting a bracket arm **13** overhanging the bed. A main shaft **14** is journalled in the sewing machine bracket arm and carries a balance wheel pulley **15** which is driven by a belt **16** from an electric motor **17** which

may be supported on the sewing machine standard **12**. A crank mechanism **18** on the main shaft **14** is operatively connected to impart endwise reciprocatory movements to a needle carrying bar **19** and to impart oscillatory movement to a needle thread take-up **20**.

The needle carrying bar **19** is journalled for endwise reciprocatory movement in a gate **25** which is pivotally supported in the sewing machine bracket arm on a stud **26**. Secured by a set screw **28** in the gate is a connecting pin **27** by which a bracket **29** is pivoted to the needle bar gate. A needle jogging drive link **30** is secured to the bracket **29** by a fastening screw **31**. A rounded nose **32** formed on the drive link **30** is maintained by a spring **33** against a radial shoulder **34** which is formed on an oscillating lever **35**. The lever **35** is pivoted on a shoulder screw **36** to a needle positioning bracket **37** supported for turning movement on a pivot pin **38** secured in the sewing machine bracket arm.

To control the width of zigzag stitching a bell crank lever **40** with a handle **41** projecting exteriorly of the frame is fulcrummed on a shoulder screw **42** in the machine frame. The lever **40** carries a pin **43** passing through a slot **44** in the drive link **30** by which the rounded nose **32** on the drive link will be shifted along the radial shoulder **34** of the oscillating lever **35** to vary the width of zigzag stitching in proportion to the distance of the nose **32** from the screw **36** on which the oscillating lever is pivoted.

An eccentric pin **45** is threaded in the needle positioning bracket **37** and secured in selected position therein by a lock nut **46** passing through a slot **47** in a needle position adjusting lever **48**. The lever **48** is fulcrummed on a stud **49** in the bracket arm **13** and is formed with a handle **50** projecting exteriorly of the machine frame. By setting the handle **50** the neutral position of needle vibration may be regulated to occur to the left, right or center of the field of zigzag stitching. These positions of adjustment may be defined by a detent plunger **150** shiftably supported in the bracket arm and urged by a spring **151** into a respective one of the locating notches **152** formed beneath the lever **48**.

For controlling the pattern of zigzag stitching, three differently formed pattern cams **52**, **53** and **54** are secured by a fastening screw **55** to a cam shaft **56** journalled in the machine frame. The cam shaft also carries a worm wheel **57** which meshes with a worm **58** carried on the sewing machine main shaft **14** so as to impart rotary movement to the stack of pattern cams at a fraction of the speed of rotation of the main shaft. The cam follower lever arm **59** is formed with a hub portion **60** (FIG. **3**) which is slidably pivoted on the stud **49**. At the free extremity, the cam follower lever arm is formed with a cam follower finger **61** adapted to track the periphery of any selected one of the pattern cams **52**, **53** or **54**. Opposite the cam follower finger, the cam follower lever arm is formed with an abutment finger **62** which occupies a position in engagement with a vertical elongate rib **63** formed on the oscillating lever **35**.

The above described pattern cam influenced needle jogging mechanism is typical of a conventional arrangement well-known in the art of zigzag sewing. This mechanism is well adapted to accommodate the pattern cam selecting mechanism of this invention although other known types of needle jogging mechanisms may also accommodate the present cam selecting arrangement advantageously.

As shown in FIG. 3, the stud 49 is formed at the top with a threaded axial hole 65 to accommodate a shoulder pivot screw 66 by which a throw-out lever 67 for the cam follower lever arm is fulcrummed. One arm 68 of the throw-out lever 67 is formed with a finger 69 adapted to abut the vertical rib 63 of the oscillating lever 35. The other arm 70 of the throw-out lever 67 carries a follower pin 71 which may take the form of an eccentric pin threaded into the lever arm 70 and locked thereon by a lock unit 72. A light coil spring 73 is arranged between the throw-out lever 67 and the cam follower lever arm 59. The coil spring 73 encircles the stud 49 and engages the throw-out lever 67 with one extremity and the cam follower lever arm 59 with the other extremity. The coil spring 73 provides not only a light downward bias on the cam follower lever arm 59 tending to slide the lever arm 59 downwardly along the stud 49; but also provides a light turning movement urging the cam follower lever arm 59 away from the periphery of the pattern cams 52, 53 and 54. The force exerted by the spring 73 tending to turn the cam follower lever arm away from the cam stack is preferably only a small fraction of the force exerted by the spring 33 urging the needle jogging linkage toward the pattern cams.

As shown in FIG. 3, this invention provides for selection of any one of the pattern cams 52, 53 or 54 to be tracked by the finger 61 of the cam follower lever arm 59 by a simple mechanism employing an integral control block 80. The control block is formed with an elongate slot 81 adapted to embrace the stud 49 so that the control block is slidably pivoted on the stud 49. An internal lip 82 bordering the slot 81 is constrained in an annular groove 84 in the stud so that the groove provides an abutment for supporting the control block. The control block may be deformed to snap the lip into the groove. The control block 80 is arranged on the stud 49 between the groove 94 and the hub 60 of the cam follower lever arm 59. Along the slot 81 the control member is formed with a first control cam surface 85 comprising a series of steps 86, 87 and 88 differentiated by dimension in height and equal in number to the number of pattern cams 52, 53 and 54 in the pattern cam stack. A sloping ramp 89 is formed between each of the steps to ease the transition from one step to the other.

The control block 80 is formed with a second control cam surface 95 preferably comprising a serrated confirmation of alternating cam lobes 96 and depressions 97. The second control cam surface 95 on the control block 80 is tracked by the follower pin 71 on the throw-out lever 67.

For shifting the control block 80, an operator influenced lever 100 which is pivoted on a shouldered screw 101 in the machine frame is formed with a handle 102 located exteriorly of the machine frame. A connection pin 103 carried in the control block passes through an aperture 104 in the lever 100 so that by turning the handle 102 the sewing machine operator may slide the control block relatively to the stud 49 for cam selection. An arched spring washer 105 may be constrained against the lever 100 by the screw 101 frictionally to maintain any selected position of the lever 100.

The first and second control cam surfaces 85 and 95 on the control block 80 are correlated relatively to each other when the block is manufactured so that the control block may be tailored for a particular sewing machine. When the control block is installed in the sewing machine for which it is tailored, the follower throw-out lever 67 will be operated by a lobe 96 of the second control cam surface to free the pattern cam follower finger 61 from the cam stack during each shift of the cam follower lever arm axially along the stud 49 by the first control cam surface 85. Thus, as the hub 60 of the cam follower lever arm rises along a ramp 89 from the step 86, at which the follower finger will track the pattern cam 54, to the step 87, at which the follower finger will track the pattern cam 53, the follower pin 71 of the throw-out lever 67 will traverse a lobe 96 of the second control cam surface 95 forcing the needle jogging mechanism away from the cam stack and allowing the light coil spring 73 to move the cam follower finger 61 from the cam stack so that interference therebetween will be obviated. The depressions 97 in the second control cam surface 95 are positioned to influence the follower pin 71 of the throw-out lever to release the needle jogging linkage in positions in which each of the steps 86, 87 and 88 of the first control cam surface are effective, so that the pattern cam follower will be returned into pattern cam tracking relation in each of the possible cam follower positions.

The mechanism of this invention, therefore, provides for a single integral control member 80 which may be formed by a molding process and in which the relationship between the follower selecting cam surface and the follower retracting cam surface may be predetermined and fixedly established in the control block. The control block thus can be tailored to match the cam selection requirements of any machine construction, and adjustment or assembly during manufacture of the machine is completely obviated.

Having set forth the nature of this invention, what is claimed herein is:

1. A cam selection mechanism for a needle jogging mechanism in the frame of a zigzag sewing machine in which a cam follower arm interposed between the needle jogging mechanism and any selected one pattern cam of a stack of pattern cams is slidably pivoted on a stud which extends relatively to an abutment in the machine frame substantially parallel to the stack of pattern cams, said cam selection mechanism comprising an integral control block slidably pivoted on said stud between said cam follower arm and said machine frame abutment, a manual influenced actuating member in said sewing machine operatively connected to said control block, a first control cam surface formed on said control block and engageable with said cam follower arm to shift said cam follower arm axially along said stud into tracking relation with any selected one of the pattern cams in said stack, a second control cam surface formed on said control block, and linkage carried by said sewing machine and responsive to said second control cam surface for separating said cam follower arm from tracking relation with said pattern cam during shift of said cam follower arm by said first control cam surface.

2. A cam selection mechanism as set forth in claim 1 in which means are provided by biasing said needle jogging mechanism toward said cam stack and said linkage responsive to said second control cam surface

includes a pattern cam follower throw-out lever pivotally supported on said stud and effective to engage and shift said needle jogging mechanism in opposition to the biasing means thereof away from said cam stack, and in which spring means is provided for biasing the cam follower out of tracking relation with a pattern cam in said stack of pattern cams with a force which is less than that applied by said needle jogging mechanism biasing means.

3. A cam selection mechanism as set forth in claim 1 in which said control block comprises a molded member formed with an elongated stud embracing slot, said first control cam surface comprising a series of steps formed along said slot differentiated by dimension in the direction in which the slot passes through said control block and equal in number to the number of pattern cams in said pattern cam stack, and in which said second control cam surface comprises a series of alternate lobes and depressions varying in dimension perpendicular to the direction in which the slot passes through said control block.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,699,910 Dated October 24, 1972

Inventor(s) John A. Urciola, et. al.

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 4, line 66, "by" should read -- for -- .

Signed and sealed this 8th day of May 1973.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

ORM PO-1050 (10-69)

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* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334.