

[54] **CAM AND FOLLOWER RELEASE MECHANISM FOR SEWING MACHINES**

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[58] Field of Search 74/567, 54; 112/158 A, 158 R

[56] **References Cited**

UNITED STATES PATENTS

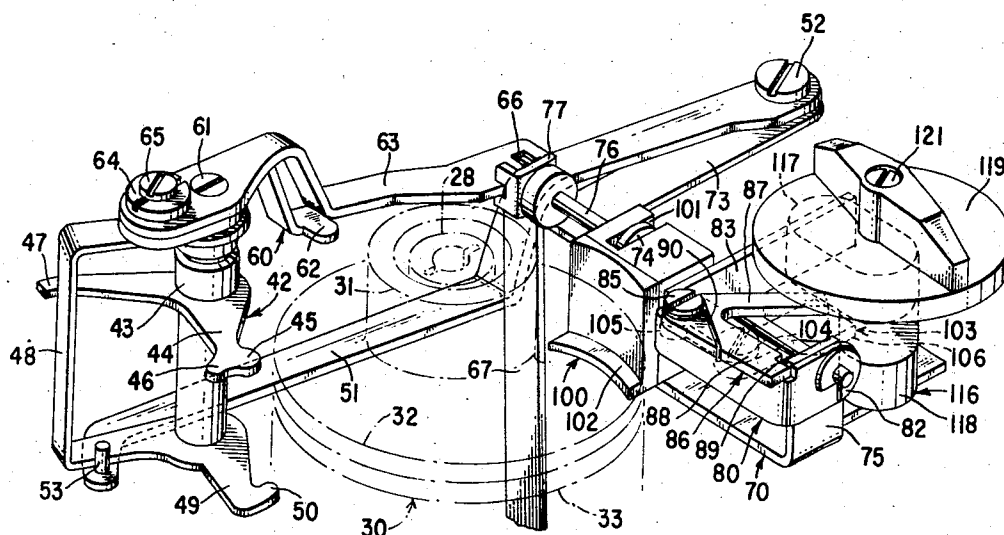
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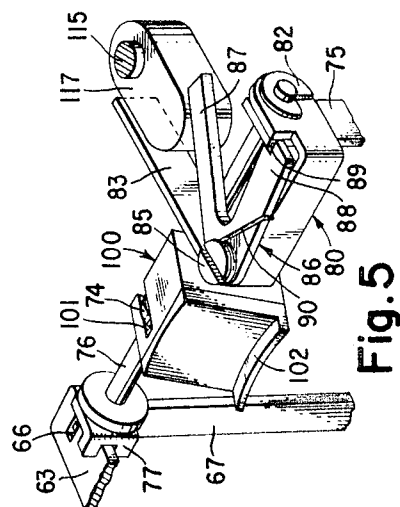
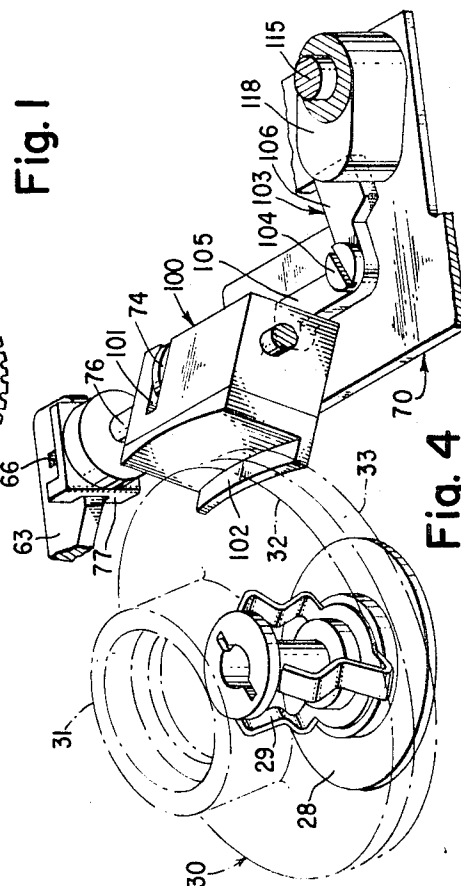
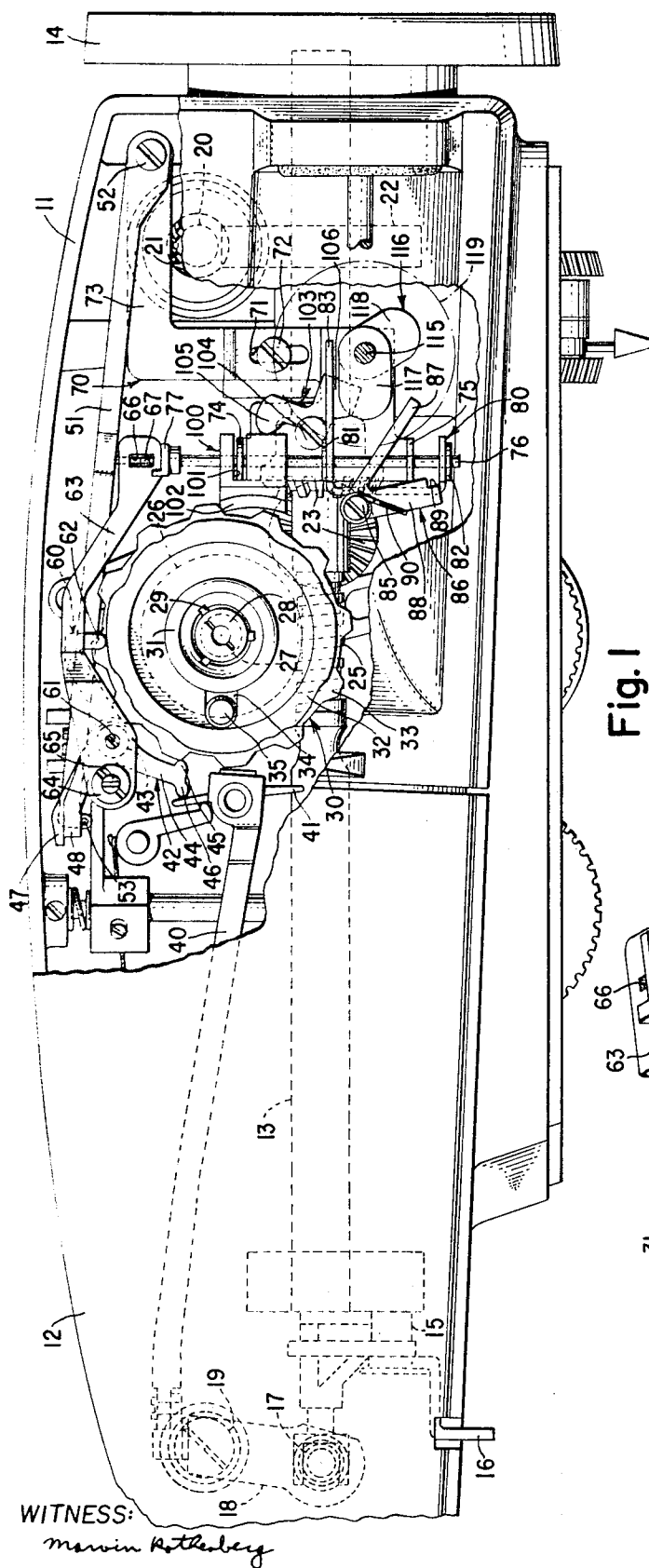
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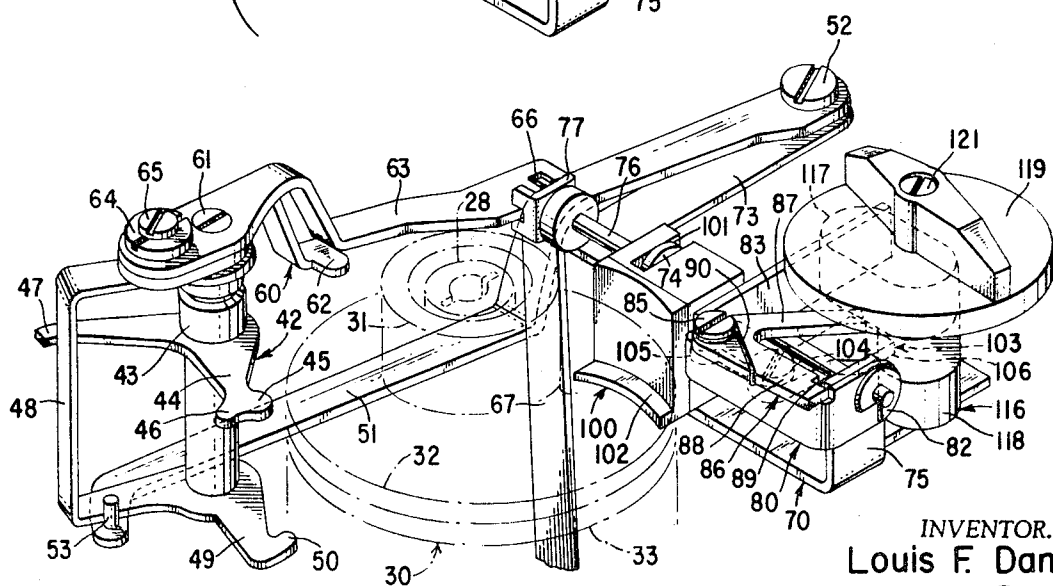
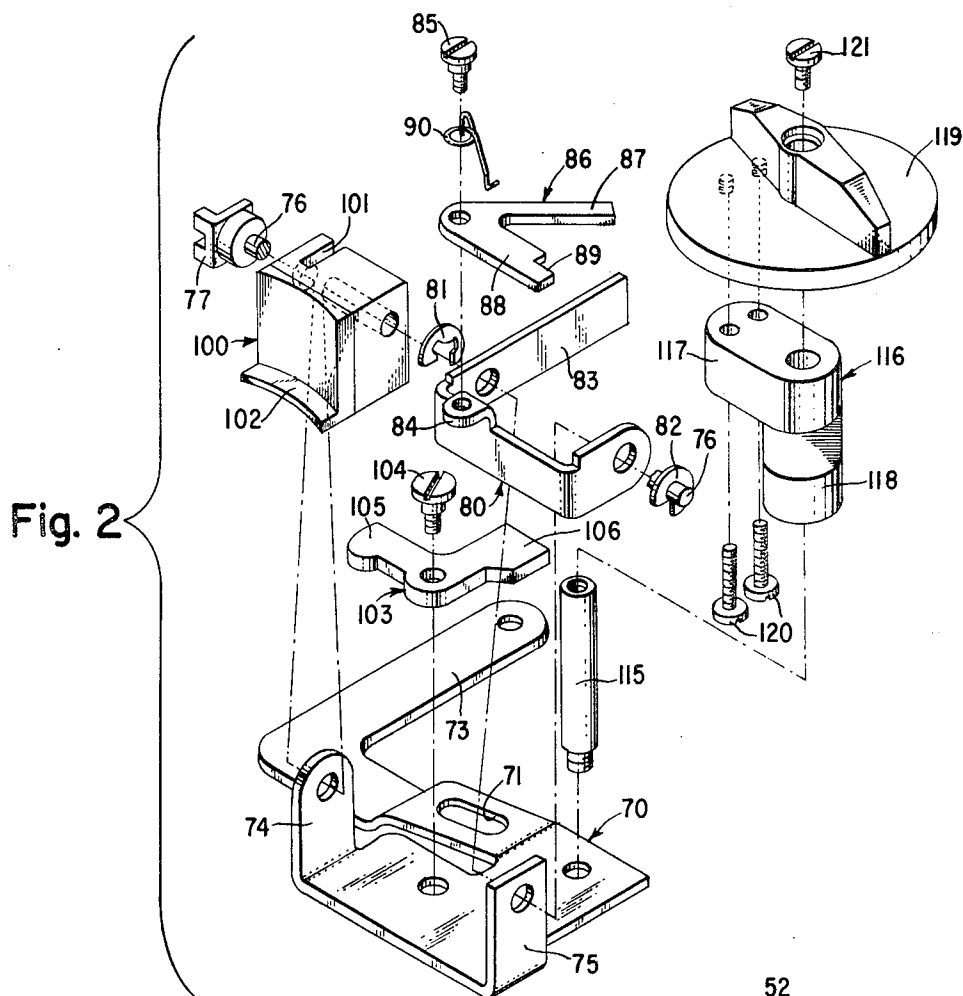
[57] **ABSTRACT**

A manually influenced mechanism for removing the cam followers from tracking relation with a replaceable pattern cam unit in a sewing machine and for dislodging the replaceable pattern cam unit from retention means therefor on a cam shaft to facilitate exchange of pattern cam units.

1 Claim, 5 Drawing Figures







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CAM AND FOLLOWER RELEASE MECHANISM FOR SEWING MACHINES

BACKGROUND OF THE INVENTION

A number of constructions are known in the prior art for dislodging exchangeable pattern cams from operative position in a sewing machine mechanism to facilitate exchange of the pattern cams. Where a number of cam elements are combined into a single pattern cam unit, and a number of separate cam followers are used, removal and exchange of cam units is frequently so impeded by the interference of the cam followers that exchange of pattern cams is made extremely difficult.

It is an object of the present invention to provide a manually operable device for facilitating exchange of pattern cam units. This object is attained by the provision of a mechanism for retracting all of the cam followers which track the pattern cam to be replaced, and the provision of additional mechanism effective while the cam followers are held in retracted position for dislodging the pattern cam from a retaining means on a cam shaft.

It is also a feature of this invention that the cam follower retraction mechanism may be maintained in effective position holding the cam followers retracted by a latch device which remains effective until a manual control is returned completely to an at rest position so that a fresh pattern cam may be inserted in place on the cam shaft without interference with the cam followers.

DESCRIPTION OF THE DRAWINGS

A preferred embodiment of this invention is illustrated in the accompanying drawings in which:

FIG. 1 is a top plan view of a sewing machine with a portion of the top cover broken away and illustrating this invention applied thereto in position for sewing,

FIG. 2 is an exploded perspective view of the mechanism of this invention,

FIG. 3 is a perspective view of the assembled mechanism of this invention together with fragments of the sewing machine cam follower mechanism and with an exchangeable pattern cam illustrated in phantom lines with the parts shown in a position holding the cam followers retracted,

FIG. 4 is a perspective view of the pattern cam dislodging portion of the mechanism of this invention in a position effective to dislodge a pattern cam out of position for sewing, and

FIG. 5 is a perspective view of another portion of the mechanism of this invention showing the latch in effective position to retain the cam followers in retracted position.

This invention may be applied to any sewing machine which has an exchangeable pattern cam and one or more retractable cam followers for tracking a pattern cam in place in the sewing machine. Reference is made to U.S. Pat. No. 3,585,876, June 22, 1971 of Marsh et al., which discloses a sewing machine in considerable detail of the type to which this invention may be applied.

In the accompanying drawings, a sewing machine is illustrated having a casing 11 which is closed by a top cover 12. A main shaft 13 journaled in the casing carries a balance wheel 14 and a crank 15 which is operatively connected to actuate a needle thread take up 16

and to impart endwise reciprocation to a needle bar 17 slidable in a needle bar gate 18 pivoted as at 19 in the sewing machine casing.

A drive shaft 20 which may be the shaft of an electric motor (not shown) carries a worm 21 operatively meshing with a worm wheel 22 on the main shaft. A set of bevel gears 23 provides operative connection from the main shaft to other stitch-forming mechanisms (not shown), and a worm 25 on the main shaft meshes with a worm wheel 26 for driving a cam shaft 27. At the top of the cam shaft a reception seat 28 is formed which is provided with spring retaining clips 29 adapted to exchangeably accommodate a replaceable pattern cam 30 on the cam shaft. The replaceable pattern cam may be formed with a handle 31 and may comprise a plurality of axially spaced cam disks such as a work feed controlling cam 32 and a needle jogging control cam 33. An aperture 34 in the pattern cam which embraces a drive lug 35 carried on the cam shaft, locks the replaceable pattern cam for rotation with the cam shaft.

One or more non-exchangeable pattern cams (not shown) may be permanently secured on the cam shaft beneath the reception seat 28 for the exchangeable pattern cam 30.

A cam follower mechanism for transmitting information from the needle jogging control cam 33 to the needle bar gate 18 includes a link 40 pivotally connected to the needle bar gate and carrying an integrating plate 41 at the opposite end. A bell crank lever indicated generally at 42 fulcrumed on a vertical stud 43 fixed in the machine casing 11 is formed with a follower arm 44 having a cam tracking finger 45 and an integrating plate engaging finger 46. The bell crank lever 42 also includes a throw-out arm 47 arranged for engagement with a bracket 48 which is also pivoted on the fulcrum stud 43. The bracket 48 may be formed integrally with a follower arm 49 having a cam tracking finger 50 disposed to track a non-exchangeable pattern cam fixed on the cam shaft. A cam throw-out lever 51 pivoted on the shoulder screw 52 carries a pin 53 for engaging and shifting the bracket 48 to remove the cam tracking fingers 45 and 50 from their respective cams.

A cam follower mechanism for transmitting information from the work feed controlling cam 32 to the sewing machine work feeding mechanism includes a follower lever 60 pivoted on a fulcrum screw 61 carried in the stud 43. The follower lever 60 is formed with a cam tracking finger 62 at one side of the fulcrum screw 61 and at the other side of the fulcrum screw the follower lever is connected to a lever 63 by an eccentric pin 64 which may be locked in selected position by a clamp screw 65. The lever 63 which is also pivoted on the fulcrum screw 61 is notched as at 66 to accommodate a feed control lever 67 which extends to the feed regulating mechanism (not shown) of the sewing machine.

The mechanism of this invention for retracting all of the cam followers and for dislodging the pattern cams when exchange of pattern cams is desired is carried on a mounting bracket 70 having a slot 71 through which passes a fastening screw 72 by which the bracket may be secured to the machine casing. An arm 73 formed on the bracket 70 accommodates the shoulder screw 52 for the follower throw-out lever 51. The bracket 70 also has a pair of upturned ears 74 and 75 each aper-

tured slidably to accommodate a push rod 76. At one end the push rod carries a bifurcated head 77 which abuts both levers 63 and 67 of the cam control work feed regulating mechanism. A yoke 80 which is arranged on the push rod 76 straddles the upturned bracket ear 75 but is confined on the push rod between a pair of spring clips 81 and 82 which are forced into annular notches in the push rod. A lateral arm 83 on the yoke 80 serves as an abutment against which a force may be applied to move the push rod. An ear 84 on the yoke 80 accommodates a fulcrum screw 85 for a latch lever 86 formed with an operating arm 87 and with a latch arm 88 having a notch 89 formed therein. A light spring 90 biases the latch arm 88 toward the upturned bracket ear 75.

For dislodging a pattern cam from the retaining spring clips 29 on the cam shaft, a block 100 is pivoted loosely on the push rod 76. The block 100 is formed with a slot 101 embracing the ear 74 of the bracket 70 so that the block cannot move axially along the push rod. A lip 102 protruding from the block 100 underlies the edge of a pattern cam 30 in place on the cam shaft so that when the block is tilted the pattern cam will be forcibly dislodged from the spring retaining clips 29 and lifted upward into a position for convenient access by a machine operator. To tilt the block 100, a bell crank lever 103 is pivoted on the bracket 70 by a shoulder screw 104. One arm 105 of the bell crank lever engages the block 100 while the other arm 106 is the operating arm.

Rotatable on a stud 115 secured in the bracket 70 is an actuator 116 having spaced radial lobes 117 and 118 extending in angularly spaced relation to each other. An operating dial 119 is fixed to the actuator 116 by fastening screws 120 and a shoulder screw 121 passes through the dial and is threaded into the stud 115 to retain the actuator 116 thereon.

In FIG. 1 of the drawings the parts are illustrated in the position which they occupy during normal sewing operations of the sewing machine. The actuator lobes 117 and 118 occupy an operative position out of engagement with the lateral arm 83 and the latch lever operating arm 87, respectively. The push rod head 77 is retracted to allow the cam followers to move into tracking relation with the pattern cams, and the block 100 depends beneath the pattern cams out of interfering position therewith. When it is desired to exchange a pattern cam, the dial 119 is turned by the machine operator in a clockwise direction as viewed in the accompanying drawings. The initial turning movement of the dial 119 will cause the lobe 117 of the actuator 116 to engage the lateral arm 83 and shift the push rod 76 toward the work feed controlling levers 63 and 67. Outward movement of the lever 63 will carry the work feed control follower finger 62 away from the work feed controlling pattern cam 32; and by engagement of the feeding controlling lever 67 with the throw-out lever 51, the needle jogging cam follower finger 45 and 50 will be retracted from their respective pattern cams by turning movement of the bracket 48. As the push rod 76 is shifted toward the left as viewed in FIGS. 3 and 5,

the latch lever 86 will be carried along with the yoke 80 and in response to the urging of the spring 90 the latch notch 89 will shift into engagement with the bracket ear 75 as shown in FIGS. 3 and 5. The latch lever 86 will, therefore, retain the push rod 76 in a position effective to hold the cam followers in retracted position until the dial 119 is returned completely into the at-rest position at which time the lobe 117 of the actuator 116 will engage the operating arm 87 of the latch lever to separate the latch arm 88 from the bracket ear 75 to release the push rod 76.

After the dial 119 has been turned in a clockwise direction to cause engagement of the latch lever 86, as described above, continued turning of the dial will cause the lobe 118 of the actuator 116 to engage the arm 106 of the bell crank lever 103 to cause tilting of the block 100. As shown in FIG. 4, when the block 100 is tilted the lip 102 will be raised against the pattern cam 30 so as to dislodge the pattern cam from the spring retaining clips 29 on the cam shaft and to elevate the pattern cam into an accessible position for removal by the operator.

To insert a different pattern cam on the cam shaft, the operator simply orients the aperture 34 of the newly selected pattern cam with the drive lug 35 and depresses the pattern cam. The downward force incidence of insertion of a new pattern cam will depress the lip 102 of the block 100, and the cam follower fingers 62, 45 and 50 will remain retracted so as not to interfere with cam insertion because of the latch lever 86. The machine can be made effective for sewing simply by a turning movement of the dial 119 in a counterclockwise direction as viewed in the accompanying drawings which will trip the latch lever 86 to permit the cam follower finger to return into tracking relation with the newly selected pattern cam.

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

1. In a sewing machine having pattern cam controlled instrumentalities and including an exchangeable pattern cam, a cam accommodating seat with cam retaining means thereon, and cam follower mechanism arranged to track a pattern cam on said seat, operator influenced mechanism for dislodging an exchangeable pattern cam from said cam accommodating seat comprising a manually operating means having a first actuator movable between an at-rest position and a position effective to shift said cam follower into a throw-out position out of tracking relation with an exchangeable pattern cam on said cam accommodating seat, a second actuator operative in seriatim with and while said first actuator is effective to dislodge said exchangeable pattern cam from said cam retaining means on said cam accommodating seat thereby to move said exchangeable pattern cam into a position easily accessible to the operator, latch means for holding said cam follower in the throw-out position influenced by movement of said first actuator out of an at-rest position, and latch release means operated in response to return of said first actuator into said at-rest position.

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