

[54] **PATTERN CAM FOLLOWER THROW-OUT MECHANISM FOR SEWING MACHINES**

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[57] **ABSTRACT**

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A single operator influenced control member is disclosed in a sewing machine together with mechanisms associated therewith for effecting in seriatim an uncoupling of the needle reciprocating drive and elevation of the needle bar, a withdrawal of the pattern cam followers out of tracking relation with the pattern cams, and the setting of a latch device for preventing return of the operator influenced member. The retrograde preventing latch device is released by the ensuing operation of the sewing machine actuating mechanism.

[52] U.S. Cl. **112/158 A, 112/221**

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

[58] Field of Search 112/158 R, 158 A, 158 B, 112/158 D, 221

[56] **References Cited**
UNITED STATES PATENTS

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6 Claims, 4 Drawing Figures

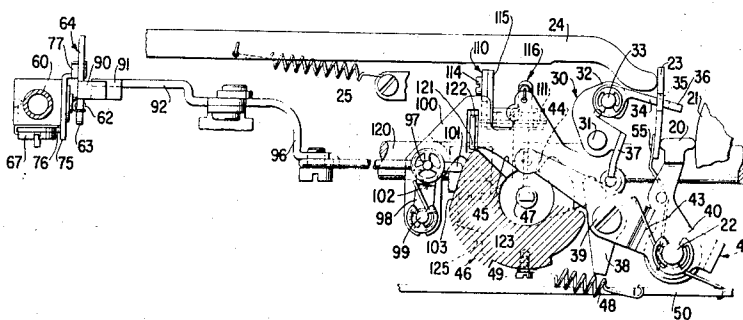


Fig. 1

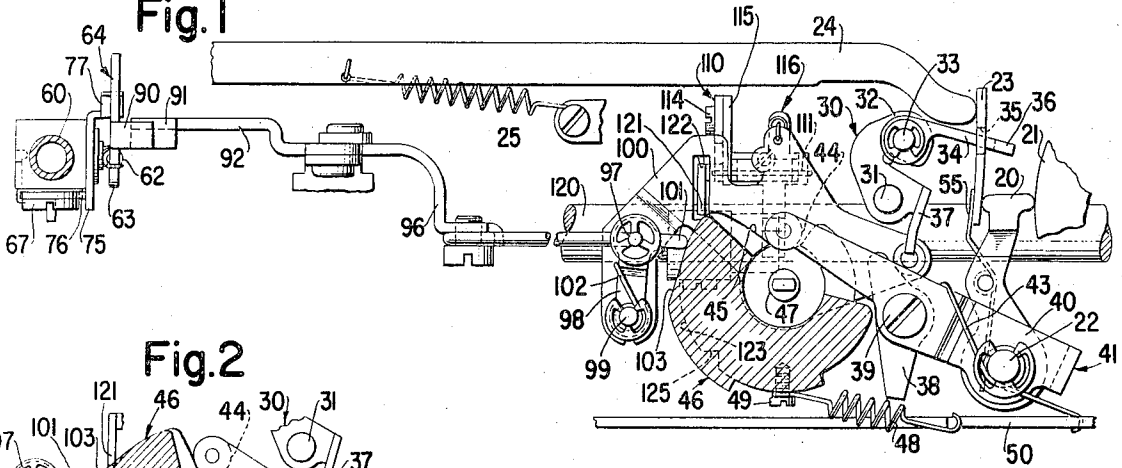


Fig. 2

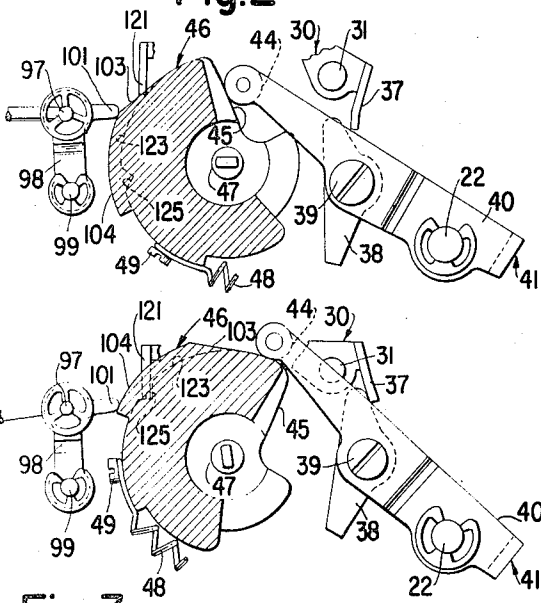


Fig. 3

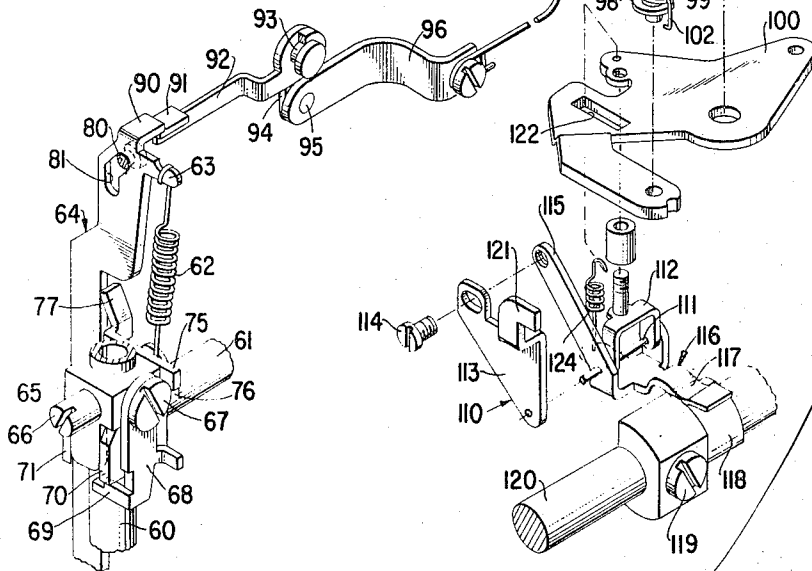
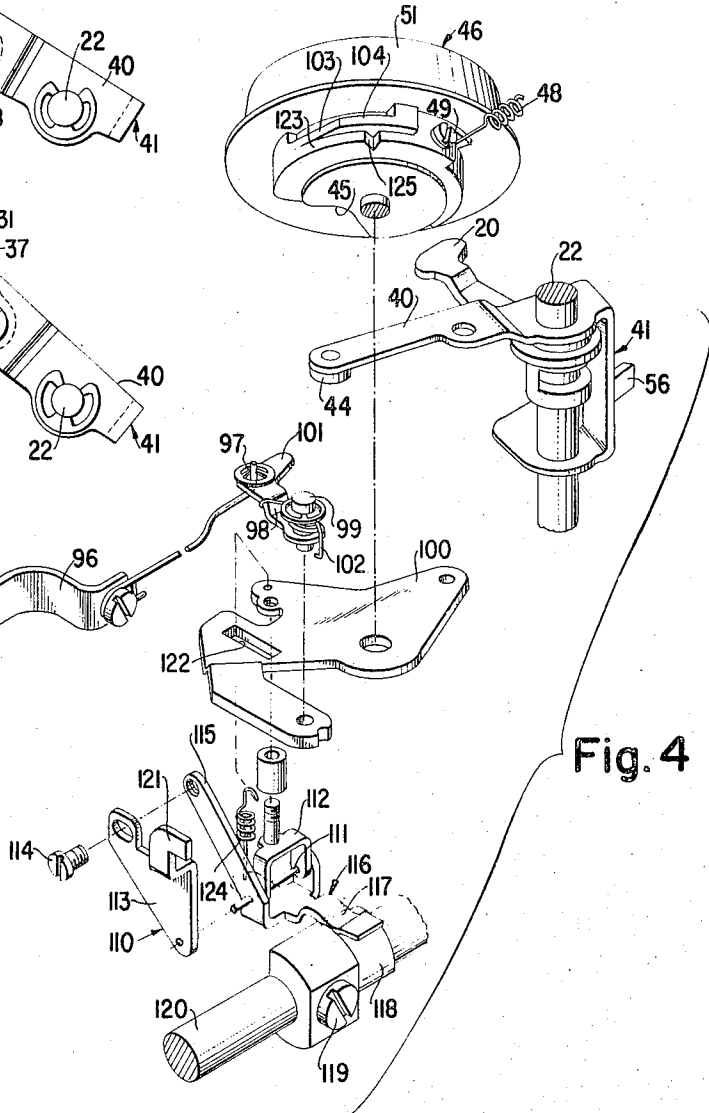


Fig. 4



PATTERN CAM FOLLOWER THROW-OUT MECHANISM FOR SEWING MACHINES

BACKGROUND OF THE INVENTION

Prior cam selecting mechanisms which could be operated while the needle penetrates the work have the disadvantage that the needle or the work fabrics may be damaged during cam selection. It is known to prevent the possibility of such damage by providing means for preventing cam selection except when the needle occupies an elevated position but this is disadvantageous in that it imposes an additional step in the cam selection process, namely, that of first turning the machine handwheel to position the needle up.

The known cam selecting techniques, therefore, provide for equally disadvantageous alternatives i.e., the possibility of needle or work fabric damage on the one hand, or the imposition of additional manipulative steps on the other hand.

SUMMARY OF THE INVENTION

It is an object of this invention to provide a cam selector mechanism for a sewing machine which may be operated in any position of the needle without danger of needle breakage or work damage and without the requirement of any additional operation of manipulative steps on the part of the machine operator. This object of the invention is attained by the provision of separable clutch means between the sewing machine needle and the needle reciprocating mechanism together with mechanism effective to separate the clutch means in response to an initial movement of the cam follower retracting mechanism prior to retraction of the cam follower out of cam tracking relation. With this arrangement, the needle is released from the endwise reciprocating mechanism and is freed for elevation out of the work as by a lifting spring prior to cam follower throw-out.

DESCRIPTION OF THE DRAWINGS

With the above and additional objects and advantages in view as will hereinafter appear, this invention is illustrated in the accompanying drawings of a preferred embodiment in which:

FIG. 1 is a top plan view of portions of a sewing machine cam follower mechanism and portions of a skip stitch mechanism associated with a sewing machine needle bar together with the pattern cam follower throw-out mechanism of this invention shown in the position which the parts occupy during sewing when the cam follower throw-out is ineffective,

FIG. 2 is a top plan view of only a part of the mechanism illustrated in FIG. 1 but with the pattern cam throw-out mechanism in an intermediate position in which the skip stitch mechanism is operated but the cam follower throw-out is yet uninfluenced,

FIG. 3 is a top plan view similar to that of FIG. 2 but showing the pattern cam follower in a fully effective position, and

FIG. 4 is a disassembled perspective view of portions of the mechanism illustrated in FIG. 1.

Indicated at 20 in the drawings is a pattern cam follower adapted to track the peripheral cam surface of a pattern cam 21 in the machine frame. The pattern cam follower is carried on a pivot stud 22 in the machine frame and is engaged by a shiftable transfer plate 23

carried in the machine frame. A needle bar driving link 24 extends into engagement with the opposite side of the transfer plate 23 from that which engages the pattern cam follower, and the needle bar driving link is biased by a spring 25 against the transfer plate so as to urge the pattern cam follower into tracking relation with the pattern cam.

It will be understood that the needle bar driving link 24 is adapted to be connected with a needle bar gate (not shown) so as to impart lateral jogging movements to the gate which serve to influence lateral needle movement in the formation of zigzag stitches. Any conventional needle bar gate arrangement may be used with the pattern cam throw-out mechanism of this invention.

For throwing the pattern cam follower 20 out of tracking relation with the pattern cam 21, a throw-out bell crank lever 30 is fulcrumed on a pivot stud 31 in the machine frame and formed with one arm 32 carrying a pin 33 on which is pivoted a link 34 which extends through an aperture 35 in the transfer plate 23. At the opposite side of the transfer plate from the lever 30, the link 34 is formed with a down-turned lug 36 for engaging and shifting the transfer plate. The lever 30 is formed with a second arm 37 adapted to be engaged by an adjustable block 38 carried by a clamp screw 39 on the upper arm 40 of a bracket 41 which is oscillatable on the pivot stud 22 and biased by a spring 43 counterclockwise as shown in FIGS. 1 and 4. A roller 44 on the bracket arm 40 tracks a radially sloping cam surface 45 formed on an operator influenced follower unloading disc 46 pivoted on a vertical shaft 47 in the machine frame. The follower unloading disc is biased into an art at rest position as shown in FIG. 1 by a spring 48 secured on the disc by a screw 49 and anchored to the machine frame of which a fragment is illustrated at 50 in FIG. 1.

The vertical shaft 47 on which the follower or unloading disc is pivotally mounted may form a part of a pattern cam selecting mechanism of any conventional construction for transferring the pattern cam follower 20 from one to another pattern cam 21. In any event, the cam follower retracting mechanism of this invention is selectively independent of the pattern cam selector means.

A follower unloading disc 46 may be formed with any suitable knurling or finger grip 51 to facilitate grasp by a machine operator so that it may be turned clockwise as viewed in FIG. 1 to effect the throw-out of the pattern cam follower 21.

It will be appreciated that in the embodiment shown in the accompanying drawings, turning of the follower unloading disc 46 will throw out the cam follower 20 by removing the transfer plate from the pattern cam in a direction to the left as viewed in FIG. 1. A light spring 55 which is secured on the cam follower 20 and formed with opposite arms which extend behind the transfer plate and into engagement with the pivot stud 22, respectively, will bias the pattern cam follower against the transfer plate and cause the cam follower to move with the plate away from the pattern cam when the follower unloading disc is turned. It is also pointed out that the bracket 41 may be formed with a radial lug 56 which may be used to retract any other follower out of tracking relation with its respective pattern cam so that the mechanism of this invention may be used to retract

a plurality of cam followers simultaneously out of cam tracking relation.

As thus far described, it will be appreciated that when the cam follower 20 is thrown out of tracking relation with its pattern cam 21, the needle bar driving link 24 will be shifted into an extreme position away from the pattern cam, and in so doing, the needle bar will be shifted laterally into an extreme position. If, therefore, as described thus far, the pattern cam follower is thrown out while the needle occupies a position penetrating in work fabric, damage may occur to the needle or to the work fabric depending upon the nature of the fabrics being stitched and the size of the needle being used. If a relatively heavy fabric is being stitched, the needle may be bent or broken by cam follower retraction while the needle penetrates the work. Conversely, if a delicate fabric is being stitched, movement of the needle laterally while in the work may tear or distort the delicate fabric. The present invention, as will now be described, incorporates a feature in combination with the cam follower throw-out mechanism by which such possibility of damage to the needle or to the work fabrics by operation of the cam follower throw-out will be obviated.

FIGS. 1 and 4 of the drawings include illustration of a fragment of the needle bar mechanism of a sewing machine which includes a skip stitch mechanism. This skip stitch mechanism may be constructed as disclosed in greater detail in the copending U.S. Pat. application No. 347,983, filed Apr. 4, 1973, Docket No. 71-A-179 by K. D. Adams and J. P. Brockman, to which reference may be had. This mechanism includes a needle bar 60 which is provided with a separable connection with the drive stud 61 by which the needle bar is imparted endwise reciprocatory movements. When the connection between the needle bar and the needle bar drive stud is unlatched, the needle bar may be elevated into a raised position in which the needle will be lifted out of work penetrating position by a spring 62 anchored on the needle bar at one extremity and anchored at the other extremity on a projecting arm 63 of a slide member 64 which serves the purpose of actuating the latch release mechanism for interrupting the drive between the needle bar and each drive stud.

More specifically, a collar 65 secured by a screw 66 to the needle bar 60 supports a pivot screw 67 on which is swingable a latch lever 68 formed with a latch arm 69 which is shiftable selectively into or out of engagement beneath one latch ear 70 of a bifurcated needle bar embracing which with the other ear 71 straddles the needle bar. The bifurcated ears 70 and 71 are integrally constructed with the drive stud 61. The drive stud 61 with its integral bifurcated bracket is freely slidable along the needle bar and can be connected with the collar 65 on the needle bar only when the latch lever 68 is swung into the closed position shown in FIG. 4. A release lever 75 pivoted on the collar 65 is engageable with an arm 76 formed on the latch lever 68 and is formed with an extension 77 engageable with the slide member 64. As shown in FIG. 4, the slide member 64 is shiftable supported on one or more pins 80 carried by the machine frame which are embraced by inclined slots 81 formed in the slide member so that as the slide member is elevated it will be moved laterally toward the right as viewed in FIG. 4 and in so doing will shift the release lever 75 causing the latch lever to turn and uncouple the drive between the drive stud 61 and

the needle bar thus releasing the needle bar for elevation response to the spring 62.

A lateral tab 90 formed on the slide member 64 overlies a platform 91 formed at the extremity of a bell crank arm 92 fulcrumed on a pin 93 in the machine frame. A depending arm 94 of the bell crank lever is pivotally interconnected at 95 with a link 96 that is connected in turn as at 97 to a lever 98 fulcrumed on a pivot stud 99 carried in a support bracket 100 adapted to be carried in the machine frame. The lever 98 is formed with a follower nose 101 which is held into tracking relation with the periphery of the unloading disc 46 by a spring 102. The periphery of the unloading disc 46 tracked by the follower nose 101 includes an outwardly inclined ramp portion 103 which merges with a segment 104 of uniform diameter. As shown in FIGS. 1, 2 and 3, the initial increment of turning movement of the unloading disc will cause the cam follower nose 101 to track the inclined ramp portion 103 of the peripheral cam track which will turn the bell crank arm 92 upwardly causing the slide member of the skip stitch mechanism to be elevated to unlatch the needle bar from its drive stud. The needle bar will thus be unlatched and caused to be elevated out of work penetration prior to engagement of the block 38 with the throw-out bell crank lever 30 as is clearly shown in FIG. 2. As the unloading disc 46 is turned an additional increment in a clockwise direction from the position illustrated in FIG. 2 to that illustrated in FIG. 3 the cam follower nose 101 will track the uniform diameter section 104 of the periphery maintaining the skip stitch mechanism unlatched while the block 38 will shift the throw-out bell crank lever 30 and cause the pattern cam follower 20 to be retracted out of tracking relation with the pattern cam 21. Using the arrangement described above, therefore, the pattern cam follower may be removed out of tracking relation with its pattern cam at any point in the operation of the sewing machine without regard to needle or work fabric damage.

An additional feature of this invention resides in a mechanism effective to retain the operator influenced unloading disc 46 in the fully effective position maintaining the pattern cam follower thrown out of tracking relation with the pattern cam 21 so that the hands of a machine operator are freed, for instance, to manipulate a cam selecting mechanism or other sewing machine control devices without the requirement of maintaining the unloading disc in such fully effective position. Latching of the unloading disc 46 in the fully effective position is influenced by a latch lever 110 which is fulcrumed on a pivot pin 111 carried in a support yoke 112 secured beneath the support bracket 100. Preferably, the latch lever 110 is made up of a latch arm 113 which is secured by a fastening screw 114 to one arm 115 of a latch release bell crank lever 116 having a trip arm 117 which projects into the path of a cam block 118 secured as by a set screw 119 to a shaft 120 which is a part of the sewing machine actuating mechanism. The latch arm 113 is formed with a projecting finger 121 which extends through a slot 122 in the support bracket 100 into engagement with a peripheral portion 123 of the unloading disc 46. A spring 124 serves to bias the latch lever 110 in a direction to maintain the latch finger 121 pressed into engagement with the peripheral portion 123 of the unloading disc. As shown in FIG. 3 a latch notch 125 is formed in the peripheral

portion 123 of the unloading disc and is adapted in the fully effective position of the unloading disc 46 to accommodate the latch finger 121 which then maintains the unloading disc in such fully effective position.

When the sewing machine actuating mechanism is next operated either by a hand turning of the sewing machine mechanism or by an initiation of the operation of the sewing machine under the conventional power drive, the cam block 118 will engage and shift the trip arm 117 and with it the latch lever 110 to shift the latch finger 121 out of the latch notch 125 thus releasing the unloading disc 46 for return by the biasing effective of spring 48 into the position shown in FIG. 1 in which the pattern cam follower 20 will be reestablished in effective tracking relation with the cam 21.

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

1. In a sewing machine having stitch forming instrumentalities, actuating mechanism for said stitch forming instrumentalities, pattern information carrier means driven by said actuating mechanism, a follower tracking said pattern information carrier means, and operative connections between said follower and said stitch forming instrumentalities, a follower throw-out mechanism comprising a control member shiftably supported on said sewing machine for movement selectively between an ineffective extreme position through an intermediate position to an effective extreme position, separable clutch means arranged between said stitch forming instrumentalities and said actuating mechanism, throw-out mechanism for said separable clutch means operative in said intermediate and effective extreme positions of said control member, and a follower retracting mechanism operatively responsive to movement of said control member into said effective extreme position.

2. In a sewing machine as set forth in claim 1 in which

said stitch forming instrumentalities include a reciprocable work penetrating needle and said separable clutch means is arranged between said needle and the actuating mechanism for imparting work penetrating reciprocation to said needle, and in which biasing means is provided for urging said needle out of work penetrating position upon operation of the throw-out mechanism for said separable clutch means prior to the operation of said follower retracting mechanism.

3. In a sewing machine as set forth in claim 1 in which said pattern information carrier means includes a rotatable pattern cam and in which said follower comprises a lever pivotally supported in said sewing machine for oscillation in response to tracking of said pattern cam in which said throwout mechanism for said separable clutch means becomes effective prior to movement of said follower lever in response to said follower retracting mechanism.

4. In a sewing machine as set forth in claim 3 in which said pattern information carrier means includes a plurality of rotatable pattern cams arranged coaxially in a stack, and pattern cam selector means arranged on said sewing machine effective independently of said follower throw-out mechanism.

5. In a sewing machine as set forth in claim 1 including latch means for retaining said control member in said effective extreme position.

6. In a sewing machine as set forth in claim 5 including spring means biasing said control member toward said ineffective extreme position, and latch release means carried by said sewing machine actuating mechanism and effective upon initiation of actuation of said stitch forming instrumentalities for releasing said latch means which retains said control member in said effective extreme position.

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