ABSTRACT: A pattern cam removal device for removing a seated pattern cam upwardly from the interior of a sewing machine to an accessible position. A plunger is slidably axially relatively to the cam shaft and at the lower end of the plunger there is attached a pronged elevator member. When the plunger is raised, the pronged elevator member raises a pattern cam to a position where it is accessible for exchange. A pair of resilient-retaining fingers hold the pattern cam in place on the base portion of the device.
MECHANISM FOR SELECTIVELY RETAINING OR REMOVING AN EXCHANGEABLE PATTERN

BACKGROUND OF THE INVENTION

In a sewing machine which sews in both a straight stitch pattern and in an ornamental stitch pattern, the ornamental stitch pattern is determined by the lateral jogging of the needle bar. The lateral jogging of the needle bar is controlled by one or more rotating stitch pattern cams which are mounted on a rotatable cam shaft in the sewing machine casing. To change from one stitch pattern to another stitch pattern, the operator of the sewing machine must exchange one stitch pattern cam for another stitch pattern cam. The usual procedure to accomplish this change involves delving beneath the top portion of a sewing machine casing to locate the stitch pattern cam, grasping the already mounted stitch pattern cam by means of a handle provided thereon, pulling the cam from the machine and replacing it with another pattern cam. The difficulties of this procedure are inconsistent with the conveniences usually provided in the modern sewing machine.

One cause of the difficulties encountered in attempting to remove a pattern cam from a sewing machine is the lack of access space available for removal of the cam. A sewing machine is usually provided with a small access opening in the top horizontal portion of the sewing machine. At maximum, three fingers may be inserted into this access opening and thus grasping the cam, which must be tightly seated on the cam shaft, can be an awkward chore.

Another problem encountered in attempting to remove a pattern cam from the sewing machine is that the operator of a sewing machine is often a woman with long manicured fingernails and frequently when the woman inserts her fingers in the access opening, the result is a broken fingernail.

The interior portion of a sewing machine is usually well oiled and when the operator must insert her fingers inside the sewing machine they may pick up oil and this may lead to the fabric workpiece becoming soiled.

Another problem with the usual pattern cam is that it must have a handle extension rising up from the flat cam surface so that the operator can remove the cam and this results in the cam being approximately three times larger in height than it really need be. This construction requirement adds to the storage space requirement.

Numerous attempts have been made to provide relief from the above-mentioned difficulties. These attempts have resulted in relatively elaborate, automatic, ejection-spring loaded devices which are expensive to fabricate and which require a great deal of space in the sewing machine casing when mounted therein. Furthermore, since they are somewhat elaborate, malfunctions are numerous and the cost of repair in relation to the problem solved becomes disproportionate.

SUMMARY OF THE INVENTION

The above-mentioned difficulties are obviated by the present cam removal device. The device itself is mounted on the upper portion of a cam shaft within the sewing machine casing and it enables the sewing machine operator to obtain access to a pattern cam by merely lifting a plunger which is constrained axially in the sewing machine casing. The device, secured to the cam shaft, has a slotted base portion and a central hub both of which have an axial bore. The plunger slides in the axial bore and a three pronged elevator is attached at the lower extremity of the plunger. When the plunger is raised it causes the three pronged elevator to rise through the slotted base portion and thereby raise a seated cam to a position where it will be easily accessible to the sewing machine operator. A pair of bowing fingers on the lateral bars hold a seated pattern cam to the base once the operator has placed the cam on the device. The pattern cam removal device is semi-automatic in that it is not spring loaded, for the purpose of automatically ejecting a cam, and so the elevation of the pattern cam is directly controlled by the operator and the construction of the device remains simple.

OBJECTS OF THE INVENTION

It is therefore an object of this invention to provide a pattern cam removal device which will render the cam easily accessible to the operator.

It is an object of this invention to obviate the necessity of the operator inserting her fingers into the sewing machine thereby eliminating the possibility of broken fingernails caused by trying to remove the cam and also eliminating the possibility of soiled workpieces.

Another object of this invention is to save storage space by eliminating the necessity for providing an extension on the pattern cam to enable the operator to grasp the cam from the sewing machine.

It is another object of this invention to provide a pattern cam support which is reliable, inexpensive to fabricate, and which takes up a minimum amount of space in the sewing machine casing.

Other objects and advantages will become apparent from the following description of one embodiment of the invention and the novel features will be particularly pointed out hereinafter in the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded perspective of the pattern cam support device without a pattern cam.

FIG. 2 is a top plan view of the assembled pattern cam support device without a pattern cam.

FIG. 3 is an elevation view of the pattern cam support device taken substantially along the section line 3-3 of FIG. 2, showing a pattern cam mounted thereon in operative position.

FIG. 4 is an elevation view similar to that of FIG. 3, showing a pattern cam in a raised position for exchange.

DETAILED DESCRIPTION OF THE INVENTION

Inside the casing of a cam controlled ornamental stitch sewing machine of the type described in U.S. Pat. No. 2,862,468, Dec. 2, 1958, to R. E. Johnson for an “Ornamental Switch Sewing Machine” there may be at least one exchangeable pattern cam for controlling the lateral jogging movements which the needle bar will follow. According to the present invention, as shown in the drawings, a pattern cam removal device 11 is mounted upon a rotating cam shaft 13 within a sewing machine casing (not shown). An exchangeable pattern cam 15 may be removable mounted on top of the pattern cam removal device as shown in FIGS. 3 and 4.

Referring to FIG. 1, the pattern cam removal device comprises a base portion 17 and a central hub 19. The upper surface 21 of the base portion provides a cam seat for the exchangeable pattern cam. It should be appreciated that the base portion itself may have permanent cam formations on its outer circumference if so desired. The base portion is formed with a pair of arcuate recesses 23 and three spaced slots 25, the purpose of these formations being later explained. An axial bore 27 has been formed both through the central hub and the base portion. The central hub has a pair of vertical notches 29 cut into opposite sides of its circumference and these notches continue the full height of the central hub and partially below the upper surface of the base portion. These notches also extend outwardly to the arcuate recesses 23. A key 31 is formed onto the central hub from the upper extremity of the central hub to the base portion upper surface 21. This key provides a guide when inserting a cam onto the central hub and also prevents relative rotation between the cam and the pattern cam removal device.

A seated cam is held onto the base portion upper surface or cam seat by a pair of “L” shaped vertically mounted resilient-retaining fingers 35, each having an arcuate base 37 and an upright portion 38. The arcuate shaped base allows the retaining fingers to be supportably slipped into the arcuate recesses 23 of the base portion of the pattern cam removal device. An elongated aperture 39 is formed in each base of the
retaining fingers. The retaining fingers are held to the pattern cam removal device by means of a pair of screws 41 one of which passes through the aperture in the base of each of the retaining fingers and also passes through each of a pair of holes 43 in the arcuate recesses 23 of the base portion of the pattern cam removal device and are secured into the cam shaft in threaded holes 45. Therefore, two screws may hold the pattern cam removal device and the cam retaining fingers to the cam shaft. The resilient fingers 35 are each formed so that the upright portion 38 is normally spaced apart from the central hub. However, when a cam is being mounted on the cam shaft the upright portions of these fingers are pushed into the notches 29 in the central hub and because of a particular bowed shape of these fingers they are held there by the cam until the cam is fully seated. Then the fingers are permitted by their bowed shape to partially overlie the top surface of the seated cam thereby holding the cam to the cam seat.

A plunger 53 is slidably mounted within the axial bore 27. The plunger has a head portion 55, a shaft portion 57, and a reduced extremity 58. When the plunger is in a completely down position it extends below the underside of the base portion of the pattern cam removal device.

A pattern cam elevator 59 consists of a washerlike base portion 61 having a central aperture 63 in which the reduced extremity of the plunger shaft is brazed. Three spaced prongs 65 are formed integrally with the washerlike base and extend upwardly therefrom. Fully assembled, the prongs of the pattern cam elevator are in register with and slidably within the slots 25 which are formed in the base portion 17 of the pattern cam removal device. The pattern cam elevator may travel within the hollowed out portion 67 beneath the underside of the pattern cam removal device. When the plunger is raised upwardly, the prongs of the pattern cam elevator will not ride out of the slots because the washerlike base will abut the underside of the base portion 17 of the pattern cam removal device. When the plunger is fully depressed the prongs will not ride out of the slots because the head of the plunger will abut the central hub.

The operation of the device is as simple as its construction. To seat a pattern cam, the cam need only be aligned with the key portion of the central hub and pressed down on the central hub until the retaining fingers overlie the top of the cam. To remove a cam, the plunger is pulled up against the force of the resilient-retaining fingers until the cam pushes the resilient fingers into the notches formed in the central hub and passes over the fingers. Thereafter the cam will be in an easily accessible raised position for removal by hand.

It will be understood that various changes in the details, material, arrangements of parts and operating conditions which have been herein described and illustrated in order to explain the nature of the invention may be made by those of ordinary skill in the art within the principles and scope of this invention.

Having thus set forth the nature of the invention what is claimed herein as new:

1. In an ornamental stitch sewing machine of the type having a laterally jogging needle bar responsive to a rotating stitch pattern cam mounted on a rotating cam shaft, a pattern cam removal device adapted for removing a mounted pattern cam comprising:
   a. a base portion supported on said cam shaft and rotatable with said cam shaft;
   b. a central hub integral with said base portion having an axial bore therethrough;
   c. a plunger fitted within said axial bore;
   d. at least one resilient-retaining finger for retaining a pattern cam on the base portion;
   e. a cam elevator connected to the plunger and directly operative thereby, said cam elevator underlying the mounted pattern cam whereby, as the plunger is raised the cam elevator is also raised forcing the pattern cam upwardly on the central hub beyond the restraining influence of the resilient-retaining finger until the cam rests in an easily accessible position.

2. The pattern cam removal device as recited in claim 1 further comprising:
   a. said base portion having a plurality of slots formed therethrough;
   b. said cam elevator operatively connected to the plunger beneath the base portion, the cam elevator having vertical prongs in registration with the plurality of slots through the base portion, whereby as the plunger is raised the vertical prongs are moved upwardly through the plurality of slots to contact the pattern cam mounted on the base portion and raise it upwardly.

3. The pattern cam removal means as recited in claim 2 wherein the cam elevator has a washerlike base portion having a central aperture and three prongs extending vertically therefrom, said cam elevator being secured to the lower portion of the plunger.

4. The pattern cam removal device as recited in claim 1 further comprising:
   a. a pair of vertically mounted resilient-retaining fingers for retaining a pattern cam on the base portion;
   b. the base portion having a pair of diametrically disposed recesses for mounting the resilient-retaining fingers;
   c. the central hub having a pair of diametrically disposed vertical notches aligned with the recesses in the base portion for accepting the retaining fingers flush with the central hub when a pattern cam is being mounted on or removed from the central hub.

5. The pattern cam removal device as recited in claim 4 wherein the retaining fingers partially overlie a pattern cam when it is seated on the base portion.

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