SELECTOR LOCKING ARRANGEMENT FOR SEWING MACHINES

INVENTORS
Yasukata Eguchi
Susumu Hongo

BY
Michael S. Striker
SELECTOR LOCKING ARRANGEMENT FOR SEWING MACHINES

Yasukata Eguchi and Susumu Hanayu, Tokyo, Japan, assignors to Janome Sewing Machine Co., Ltd., Tokyo, Japan
Filed Sept. 27, 1963, Ser. No. 312,111
Claims priority, application Japan, Oct. 2, 1962, 37/57,135
12 Claims. (Cl. 112—158)

The present application is a continuation-in-part application of my copending application Serial No. 67,994 filed November 8, 1960 which is a continuation in part application of my abandoned application Serial No. 802,691 filed March 30, 1959 entitled "Cam Selecting Arrangement For Zig-Zag Stitch Sewing Machine."

The present invention relates to a pattern selector locking arrangement for a sewing machine, and more particularly to a selector button arrangement in which simultaneous actuation of two selector buttons is prevented. It is the main object of the present invention to prevent the control of a needle bar assembly in accordance with two different stitch patterns.

Another object of the invention is to provide in a push button selector mechanism, interlocking means preventing the simultaneous actuation of two or more push buttons.

Another object of the invention is to provide a simple, inexpensive, and reliably operating interlocking arrangement for a selector mechanism permitting at any time only one selection.

With these objects in view, the present invention relates to a pattern selector locking arrangement for an ornamental sewing machine which comprises a needle bar assembly, a plurality of pattern control means controlling the needle bar assembly, and a plurality of selector push buttons respectively associated with the pattern control means.

In accordance with the present invention, locking means including an elongated channel having a predetermined length and a row of locking members guided in the channel are provided. Locking members which are preferably cylinders adapted to roll in the channel are guided in the channel for longitudinal movement only and have a total length less than the length of the channel.

Each selector button has a locking part which is located within the channel when the respective selector button is moved to a selecting position for rendering the respective pattern control means operative. The locking parts of the selector buttons are so constructed that each selector part carrying the locking members such a distance apart that they completely fill the channel in abutting positions.

Consequently, no other locking part can assume a locking position located in the channel so that only one selector button can be moved at any time to the selecting position.

As a result, the simultaneous selection of two patterns by two or more simultaneously operated push buttons, is prevented.

In the preferred embodiment of the invention, the channel includes a channel part having a longitudinal groove for cylindrical locking members, and a cover plate closing the groove. The groove and channel part are formed with pairs of registering cutouts into which the locking parts of the push buttons project when the respective push button is actuated to select a pattern.

Spring means normally urge each selector button to a normal position, and arresting means are provided for arresting each selector button in the selecting position thereof. Whenever another selector button is actuated, a previously arrested selector button is released and returns to its normal position. Consequently, the operation of a second selector button will cause return of a previously actuated selector button to its normal position so that the respective locking part is withdrawn from the locking channel, permitting the second actuated selector button to move to the selecting position with its locking part located in the locking channel between adjacent locking members.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

FIG. 1 is a perspective front view of a sewing machine provided with the selector locking mechanism of the invention;
FIG. 2 is a fragmentary horizontal sectional view of the sewing machine;
FIG. 3 is a cross sectional view taken on line III—III in FIG. 2;
FIG. 4 is an exploded perspective view illustrating the components of the mechanism of the invention;
FIG. 5 is a perspective top view illustrating the selector locking arrangement of the invention in assembled condition;
FIG. 6 is a cross sectional view taken on line VI—VI in FIG. 2; and
FIG. 7 is a fragmentary longitudinal sectional view illustrating the needle bar assembly.

Referring now to the drawings, the casing 60 of a sewing machine is open on top and closed by cover plate 61 which may be removed if access to the mechanism within the casing is desired. A main drive shaft 1 is mounted in bearings on casing 60 and drives through a reduction gear transmission 56, 57, 58, and 59, a cam shaft 2 which is parallel to drive shaft 1 and located above the same, as best seen in FIGS. 3 and 5. A series of cams 3 is mounted on cam shaft 2 and held in place by a collar 62. Cams 3 have different cam track patterns in accordance with different ornamental designs to be produced by the laterally oscillating needle bar assembly of the sewing machine.

The same number of selector buttons 4a, 4b are provided as there are cams 3, the selector buttons being mounted on the front wall of the machine casing, as best seen in FIG. 1. The selector buttons are arranged in an upper group 4a and in a lower group 4b so that each selector button has a sufficiently large finger engaging area, whereas comparatively little space is taken up by the selector buttons.

Each selector button 4a has an arm 5 extending inwardly from the upper portion of the respective selector button, while each lower selector button has an arm 6 extending from the lower portion of the respective button, as best seen in FIG. 5. Arms 5 and 6 have bushings 7 through which a shaft 9 passes so that the selector buttons are mounted for angular movement between a normal inoperative position and a depressed position.

The arms 5 and 6 are respectively located opposite cams 3 and aligned in vertical planes with the respective associated cams. A double-armed cam follower 13 is mounted for pivotal movement on a control part 11 of the respective arm 5 or 6 and connected to the arm by a pivot pin 12, as best seen in FIG. 4. Each cam follower has one end portion 12a cooperating with the respective associated cam 3, and another end portion 12b cooperating with a rockable member 18 which is mounted for angular movement on a supporting pivot 19 secured to
the frame portion 17. The other end of member 18 is secured to a supporting shaft 20 by a screw 21. Shaft 20 being rotatably mounted on a cross member of frame 17 as best seen in FIG. 2. The other end of shaft 20 remote from rockable member 18 has a transverse actuating arm 22 which cooperates with the needle bar assembly, as will be explained hereinafter. When any one of selector buttons 4a or 4b is depressed to assume a selecting position, the respective cam follower 13 engages with one of cam 3 and with the other end rockable member 18 so that the same, and thereby arm 22, are rocked in accordance with the cam track pattern of the selected cam.

Each arm 5 or 6 of a selector button 4a or 4b has a locking part 10. A spring 14 is mounted on bushing 7 of each selector button, and has one spring arm 14a bearing against a fixed stop plate 16 of L-shaped cross section, and another spring arm 14b engaging the inner surface of the respective selector button so that locking part 10 is urged toward the inner surface of casing 60 to hold the respective selector button in its normal inoperative position. Stop plate 16 is secured to frame 17 by means of screws 15.

Arresting means are provided for arresting the push buttons in the depressed selecting positions. An arresting bar 23 is pivotally supported on pivot pins 24 and 25 to extend parallel to cam shaft 2. A spring 26 has one arm 26a bearing against arresting bar 23 and another spring arm 26b bearing against frame 17. Arresting member 23 has an angular cross section and is formed with a hook-shaped arresting portion 23a, as best seen in FIGS. 4 and 5.

As best seen in FIG. 3, the locking part 10 has an end portion 10a formed with a recess 10b. One face of portion 10a abuts a stop 28 of L-shaped cross section in the normal position of the respective selector button, while the surface of recess 10b slides over the upper edge of arresting portion 23a to lock arresting member 23 against the action of spring 26 so that locking arm 10 is locked by arresting portion 23a when arresting bar 23 snaps back to its normal position after the respective selector button has been fully depressed to its selecting position. This position is shown for selector button 46 in FIG. 3, and it will be seen that the respective cam follower 13 engages with the respective cam 3 and rockable member 18 so that the same is oscillated under the control of cam 3 selected by depression of the respective selector button 4b. Rockable member 18 has a surface 18a adapted to be slidably contacted by the end portion 12b of every cam follower 13.

When rockable member 18 is thus oscillated by a selected cam follower, the transverse arm on support shaft 20 actuates the needle bar assembly as best seen in FIG. 7. The needle bar 31 is mounted on a rockable support 30 which carries a pivot 32 on which a rod 33 is mounted by bushings 33a and 33b. Bar 33 terminates in a member 34 secured by screws 35 and having a contact edge 34a abutting the upper surface of arm 22 under the action of the spring 30a. A pin 36 is secured to a horizontal portion 35c of rod 33 and is engaged by the forked portion 37a of an amplitude adjusting lever 37 supported on frame 17. The other end of lever 37 is pivotally connected to a link 40 at 39. Link 40 has a slot 40a by which the link is guided on a screw 41 on frame 17, as best seen in FIG. 2.

Shaft 42 is turnably mounted on frame 17 and has a manually operated nob 43 located on the outside of casing 60. Shaft 42 has an arm 45 connected at the end thereof with link 44. The other end of link 44 is turnably mounted on a pivot pin 46b on a downwardly depending plate 46b projecting from link 40. A pin 47 is fixed on frame 17 and limits the up and down movement of arm 22 so that the maximum amplitude of movement under the control of the cams is determined.

When any one of the selector buttons is moved to a selecting position while another push button is already in the selecting position, the locking part 10 of the second selector button will depress arresting means 23 momentarily so that the locking end portion 10a of the previously depressed selector button will be released by arresting bar 23, permitting the first selector button to return to its normal position. However, the above described arrangement permits the simultaneous movement of two selector buttons by the operator, which will result in placing two cam followers 13 in operative positions connecting the respective cams 3 with rockable member 18 so that the needle bar assembly will perform as oscillatory movement corresponding to the combined patterns of the two operative cams 3. While the arrangement may be desirable under certain conditions, in accordance with the present invention such occurrence is to be prevented, and a selector locking arrangement is provided for the purpose of preventing simultaneous actuation of two or more selector buttons.

Referring particularly to FIGS. 3, 4 and 5, a channel part 51 is secured by screws 48 to the frame of the machine and is formed with a longitudinal groove 49. A wall of channel part 51 is formed with longitudinally spaced cutouts 50. Locking members 55 of cylindrical shape 49 placed in groove 49 is closed by a cover plate 53 which has cutouts 52 corresponding to cutouts 50. When cover plate 53 is secured to channel part 51 by screws 54, groove 49 is completely closed including the open ends thereof, and the locking rollers 55 are confined within the thus formed channel due to the fact that the longitudinal extension of cutouts 50 and 52 is less than the distance of the locking rollers 55. As best seen in FIG. 5, members 51 and 53 form a closed channel having cutouts formed by pairs of aligned and registering cutouts 50 and 52. The pairs of cutouts are respectively located opposite portions 10c of locking parts 10 of the selector buttons, and the selector buttons are arranged in such a manner that each depressed selector button in its selecting position will have a part of the end portion 10a of locking part 10 located in a pair of cutouts projecting into groove 49 between adjacent locking members 55.

The total length of the row of locking members 55 in groove 49 is less than the length of groove 49, the difference corresponding to the thickness of locking part 10a. Consequently, only one locking end portion 10a can be placed in a locking position located in the groove 49 of the channel between two locking members 55. When one locking part 10 has its end portion 10a locked in this locking position, the locking members 55 are spread, and the outermost locking members 55 about the inner surfaces of the lateral portions of cover 53 which close the ends of groove 49. Consequently, only one push button can be in the depressed selecting position at any time.

Assuming that one push button is first actuated, and its locking end portion 10a located within the channel between two locking members 55, and the second selector button is operated for the purpose of selecting a different pattern, then the wall of recess 10b of locking part 10 of the second selector button will pivot arresting member 23 downward against the action of spring 26 while moving to the selecting position, and such downward pivotal movement of arresting bar 23 will cause release of locking part 10 of the previously selected selector button permitting the same to return under the action of spring 14 to its normal position.

However, when the operator makes an attempt to depress two selector buttons at the same time, two locking end portions 10a will move into the corresponding pairs of cutouts 50, 52, and respectively press against two different pairs of locking members 55, spreading all locking members until the outermost locking members 55 about the end plates of cover 53. Since the combined thickness of locking end portions 10a of the two selector buttons is twice the space still available in the channel
between the locking members 55, none of the push buttons can be moved to the selecting position, so that it is

not possible to render two cam followers operative. Of course, if one of the two actuated push buttons moves ahead of the other, then it will assume the selecting position, and the other push button will be prevented from moving further by tightly abutting locking members 55. While the locking member 55 are illustrated to the cylindrical rollers, it will be understood that other shapes will serve the same purpose and that the locking members may be, for example, spherical balls.

It is evident that any selector button in selecting position will cause the rockable member 18 and thereby the needle bar assembly to be oscillated in accordance with the cam track pattern of the respective selected cam 3. Such transverse oscillatory movement will form an ornamental stitch when the needle is at the same time operated to perform the conventional up and down stitching movement. The means for producing such stitching movement and the feeding means for the material are entirely conventional, and therefore not explained in the present application.

The recess 10b in locking part 10a is shaped to cooperate with the slanted wall portion 23b of the arresting members 23 to achieve a smooth pivoting and displacement of the arresting member 23 during movement of any selector button from the normal inoperative position to its operative selecting position. It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of ornamental sewing machines differing from the types described above.

While the invention has been illustrated and described embodied in a selector locking arrangement preventing operation of a needle bar assembly in accordance with two different patterns, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. A sewing machine, comprising, in combination, a needle bar assembly; a plurality of control means controlling said needle bar assembly; locking means including an elongated channel having a predetermined length and a row of locking members guided in said channel for longitudinal movement only and having a total length less than said predetermined length; a plurality of selector means having control parts respectively connected with said control means and being individually movable between a normal position, and a selecting position for placing the respective control means in an operative condition controlling said needle bar assembly, each selector means including a locking part located outside of said channel in said normal position, and in said channel in said selecting position, said locking parts being constructed so that each locking part in said selecting position spreads said locking members said predetermined distance to completely fill said channel in abutting positions so that no other locking part can assume said locking position whereby only one selector means can be moved to said selecting position.

2. A pattern selector locking arrangement for a sewing machine, comprising, in combination, a needle bar assembly operable to make transverse stitches; a plurality of pattern control means respectively associated with different stitch patterns and controlling said needle bar assembly; locking means including an elongated channel having a predetermined length and a row of locking members guided in said channel for longitudinal movement only and having a total length less than said predetermined length by a predetermined distance; a plurality of selector means having control parts respectively connected with said pattern control means and being individually movable between a normal position, and a selecting position for placing the respective pattern control means in an operative condition controlling said needle bar assembly to make the respective stitch pattern, each selector means including a locking part located outside of said channel in said normal position, and in said channel in said selecting position, said locking parts being constructed so that each locking part in said selecting position spreads said locking members said predetermined distance to completely fill said channel in abutting positions so that no other locking part can assume said locking position whereby only one selector button means can be moved to said selecting position and simultaneous selection of two patterns is prevented; spring means urging
each selector button means to said normal position; and arresting means engaging and arresting said locking part of each selector button means to said selecting position, and being operable by each selector button means moving to said selecting position to release said locking part of a selector button means in said selecting position. 5. A sewing machine comprising, in combination, a needle bar assembly; a plurality of control means controlling said needle bar assembly; locking means including an elongated closed channel having a predetermined length and being formed with longitudinally spaced transverse cutouts, and a row of locking members guided in said channel for longitudinal movement only and having a total length less than said predetermined length by a predetermined distance and each locking member having a longitudinal extension less than the longitudinal extension of each of said cutouts so as to be confined in said channel; and a plurality of selector means having control parts respectively connected with said control means and being individually movable between a normal position and a selecting position for placing the respective control means in an operative condition controlling said needle bar assembly, each selector means including a locking part, said locking parts being, respectively, located opposite and aligned with said cutouts at each locking part located outside of said channel in said normal position, and in one of said cutouts and in said channel in said selecting position, said locking parts being constructed so that each locking part in said locking position spreads said locking members said predetermined distance to completely fill said channel in abutting positions so that no other locking part can assume said locking position whereby only one selector means can be moved to said selecting position. 6. A sewing machine comprising, in combination, a needle bar assembly; a plurality of control means controlling said needle bar assembly; locking means including an elongated closed channel having a predetermined length and being formed with longitudinally spaced transverse cutouts, and a row of locking members guided in said channel for longitudinal movement only and having a total length less than said predetermined length by a predetermined distance and each locking member having a longitudinal extension less than the longitudinal extension of each of said cutouts so as to be confined in said channel; and a plurality of selector means having control parts respectively connected with said control means and being individually movable between a normal position and a selecting position for placing the respective control means in an operative condition controlling said needle bar assembly, each selector means including a locking part, said locking parts being, respectively, located opposite and aligned with said cutouts at each locking part located outside of said channel in said normal position, and in one of said cutouts and in said channel in said selecting position, said locking parts being constructed so that each locking part in said locking position spreads said locking members said predetermined distance to completely fill said channel in abutting positions so that no other locking part can assume said locking position whereby only one selector means can be moved to said selecting position. 7. A pattern selector locking arrangement for a sewing machine comprising, in combination, a needle bar assembly operable to make transverse stitches; a plurality of pattern control means respectively associated with different stitch patterns and controlling said needle bar assembly; locking means including an elongated closed channel having a predetermined length and being formed with longitudinally spaced transverse cutouts, and a row of locking members guided in said channel for longitudinal movement only and having a total length less than said predetermined length by a predetermined distance so that each locking part in said locking position spreads said locking members said predetermined distance to completely fill said channel in abutting positions so that no other locking part can assume said locking position whereby only one selector means can be moved to said selecting position.
part can assume said locking position whereby only one selector means can be moved to said selecting position and simultaneous selection of two patterns is prevented.

10. A sewing machine, comprising, in combination, a needle bar assembly; a plurality of control means controlling said needle bar assembly; locking means including an elongated channel having a predetermined length, said channel including a channel part having longitudinal wall means forming a longitudinal groove and a cover plate closing said groove, said wall means and said cover plate being formed with longitudinally spaced pairs of registering cutouts, and a row of locking members guided in said channel for longitudinal movement only and having a total length less than said predetermined length by a predetermined distance, each of said locking members being cylindrical and having a diameter less than the longitudinal dimension of each cutout so that said locking members are confined in said groove; and a plurality of selector means having control parts respectively connected with said control means and being individually movable between a normal position, and a selecting position for placing the respective control means in an operative condition controlling said needle bar assembly, each selector means including a locking part, said locking parts being respectively located opposite and aligned with said pairs of cutouts, each locking part being located outside of said channel in said normal position, and in one of said pairs of cutouts and in said groove between two locking members in said selecting position, said locking parts being constructed so that each locking part in said locking position spreads said locking members said predeterminated distance to completely fill said channel in abutting positions so that no other locking part can assume said locking position whereby only one selector means can be moved to said selecting position and simultaneous selection of two patterns is prevented.

12. A pattern selector locking arrangement for a sewing machine, comprising, in combination, a needle bar assembly operable to make transverse stitches; a plurality of pattern control means respectively associated with different stitch patterns and controlling said needle bar assembly; locking means including an elongated channel having a predetermined length, said channel including a channel part having longitudinal wall means forming a longitudinal groove and a cover plate closing said groove, said wall means and said cover plate being formed with longitudinally spaced pairs of registering cutouts, and a row of locking members guided in said channel for longitudinal movement only and having a total length less than said predetermined length by a predetermined distance, each of said locking members being cylindrical and having a diameter less than the longitudinal dimension of each cutout so that said locking members are confined in said groove; a plurality of selector button means having control parts respectively connected with said pattern control means and being individually movable between a normal position, and a selecting position for placing the respective pattern control means in an operative condition controlling said needle bar assembly to make the respective stitch pattern, each selector button means including a locking part, said locking parts being respectively located opposite and aligned with said pairs of cutouts, each locking part being located outside of said channel in said normal position, and in one of said pairs of cutouts and in said groove between two locking members in said selecting position, said locking parts being being constructed so that each locking part in said locking position spreads said locking members said predeterminated distance to completely fill said channel in abutting positions so that no other locking part can assume said locking position whereby only one selector button means can be moved to said selecting position and simultaneous selection of two patterns is prevented; spring means urging each selector button means to said normal position; and arresting means for arresting each selector button means in said selecting position, and being operable by each selector button means moving to said selecting position to release a selector button means in said selecting position.

References Cited by the Examiner

UNITED STATES PATENTS

2,192,621 3/40 Radke -------------------- 74-483
2,451,150 10/48 Brian ------------------- 74-483
3,111,099 11/63 Nishigami ---------------- 112-158

JORDAN FRANKLIN, Primary Examiner.

ROBERT V. SLOAN, Examiner.