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MEANS FOR AUTOMATIC LOCKING AND RELEASING RECHANGABLE
WORK GUIDING CAMS IN ZIG-ZAG SEWING-MACHINES

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2 Sheets-Sheet 1

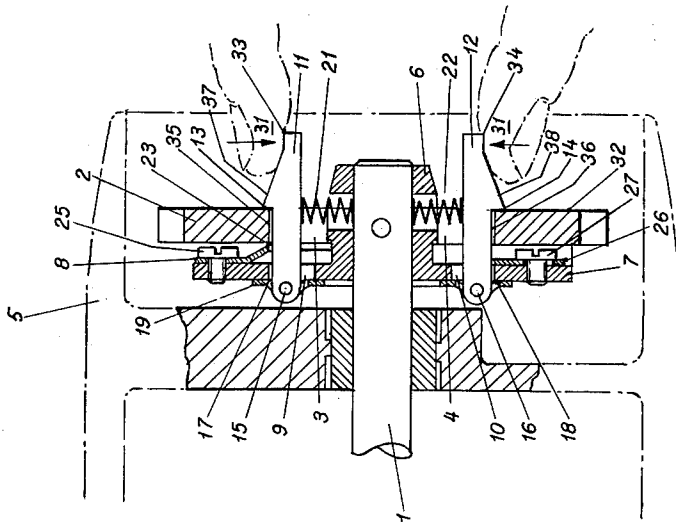


Fig. 1

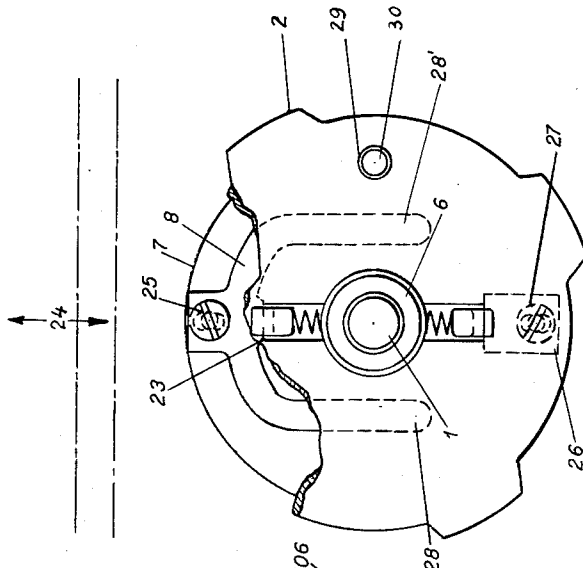


Fig. 2

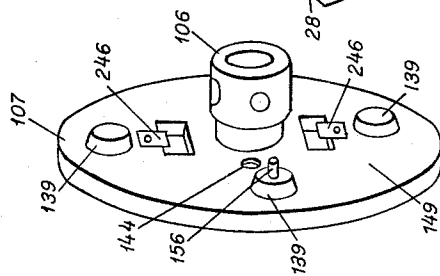


Fig. 5

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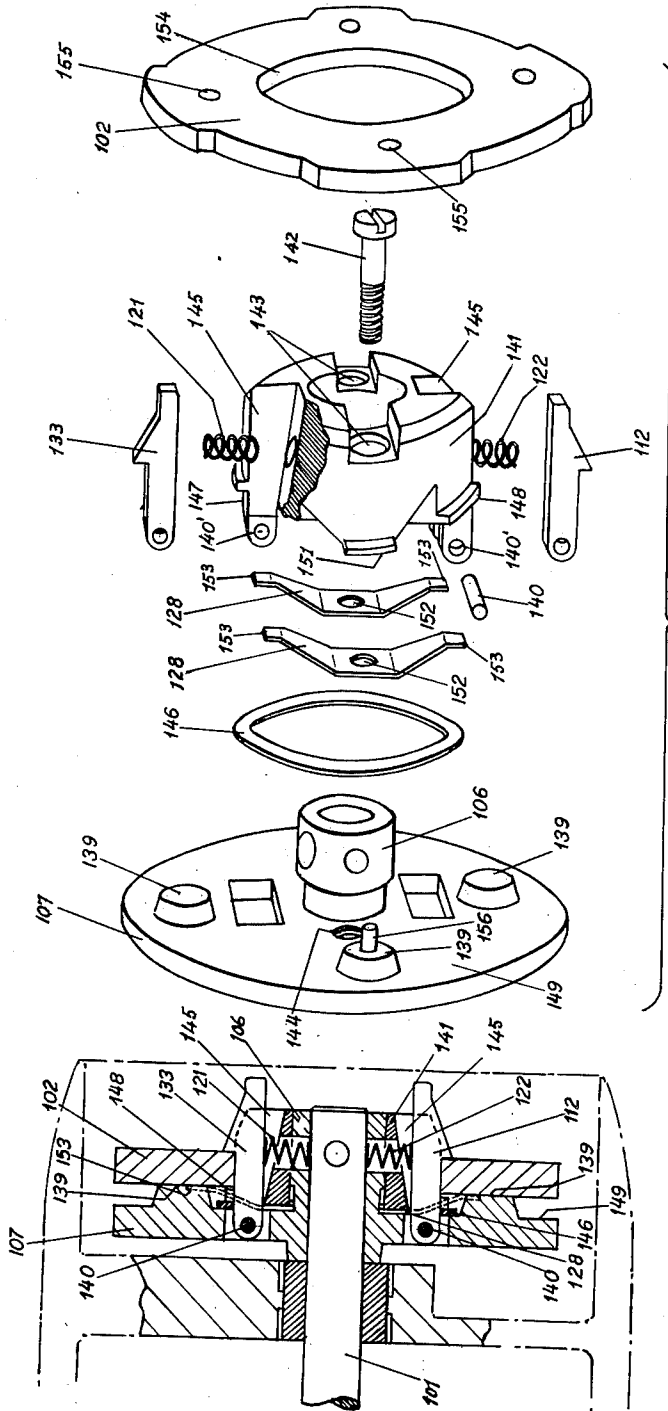


FIG. 4

FIG. 3

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MEANS FOR AUTOMATIC LOCKING AND RELEASING RECHANGABLE WORK GUIDING CAMS IN ZIG-ZAG SEWING-MACHINES

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In modern sewing machines of the zig-zag type cams are used which are adapted to effect cyclic automatic displacements of the needle bar transversely and of the feed dog for the purpose of obtaining automatically cyclic ornamental seams.

Said cams must be changed every time that it is desired to perform by machine a seam different from the previous one; and in the machines of domestic kind it is necessary that the operator, even the less skilled, may be able to effect the change of the cam in a rapid, simple and intuitive manner, without the risk of causing damage to the machine or mounting the cam in a wrong way.

The device for automatic locking and releasing of said cams, which forms the object of the present invention, responds to these requirements.

Said device comprises releasable clutch means for the cam, acting against the cam expulsion means, both carried by supports driven in rotation by the shaft of the cam. The device is characterized in that said releasable clutch means consists of a pair of spring hook levers pivoted behind the mounted cam, in diametrically opposed points of the relative support, said levers having projections on their free ends bearing against the front face of the cam in such a manner as to make it possible to disengage them by the direct action of two fingers, while the cam expulsion means consist of springs placed behind the cam itself, between the latter and the relative support.

It is thus sufficient to simply push the cam towards its application position on the rotatable shaft, when the latter is free, so that the cam settles in a correct position and, vice-versa, it is sufficient, when the cam must be removed, to approach both levers to each other by acting on their free ends with two fingers for leaving the springs placed behind the cam free to push the cam outwards in such a manner as to make it possible to extract it very easily from its shaft.

In a preferred embodiment, the hook levers are pivoted upon a sleeve fixed, in an easily removable manner, on the front of a cam-supporting flange, projecting from a means driven, in rotation, by the cam-carrying shaft, upon which the sleeve is so centered as to be possible to compose the device according to the invention, independently of the machine on which it has to be applied, in a group standing by itself, apt to be rapidly and easily applied on the machine, if necessary. The hook levers can however be also directly mounted on said flange.

Examples of these different embodiments are illustrated, in application on a zig-zag sewing machine, in the accompanying drawings, where:

Fig. 1 is a longitudinal section of an embodiment of the invention, of which

Fig. 2 is a front view with cam partially broken in order to show the expulsion spring placed behind said cam;

Fig. 3 is a view similar to the one in Fig. 1 of an embodiment of the invention, and

Fig. 4 is a perspective view of the different detached members of Fig. 3 being disposed in mounting order.

Fig. 5 is a perspective view of an embodiment of the cam-supporting flange.

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According to the embodiment of Figs. 1 and 2, shaft 1, carrying cam 2 provided with two radial diametrically opposed openings 3 and 4, is caused to rotate, through a gear or belt transmission (not shown), by the driving shaft of the zig-zag sewing-machine with a determined speed-ratio.

On the end of shaft 1 disposed towards the outside of the machine frame 5 is fixed hub 6 having a disc flange 7 designed to carry cam 2, with the interposition of a flat spring 8, which pushes the cam outwards. Flange 7 has two openings 9 and 10 corresponding to openings 3 and 4 of cam 2, through which pass the two small levers 11 and 12 with outward ends shaped as teeth having plain surfaces 13 and 14, adapted to engage the front surface 32 of cam 2. The two levers 11 and 12 are mounted on pivots 15 and 16 respectively, about which they can swing.

The two pivots 15 and 16 are held by suitable recesses 17, 18 formed in a ring 19 firmly fixed on flange 7.

The two levers 11 and 12 are pushed outwards by springs 21, 22 respectively, which in fact make the lever action elastic. The displacement of lever 11 is limited on the outside by side 23 of spring 8, said spring being adapted to be displaced and adjusted according to arrow 24 by unscrewing screw 25, which locks it; the similar displacement of lever 12 is limited by means of the small adjustable plate 26 adapted to be locked by screw 27. In order to allow both spring 8 and plate 26 to be displaced, the holes, through which the respective screws 25 and 27 pass, are oblong.

Cam 2 is placed and locked in correct position by introducing it on shaft 1, by which it is centered, and then by causing its eccentric hole 29 to coincide with pin 30 fixed to flange 7, said pin determining the exact angular orientation of the cam. When the cam is in correct position, in its seat, it keeps wings 28 and 28' of spring 8 pressed, said wings maintaining the cam constantly pushed outwards.

The operation and use of the device can now be commenced.

Suppose that a cam 2 is already mounted and it is wished to change it with another, it is sufficient to press with two fingers the small levers 11 and 12 according to arrows 31 and 31', thus overcoming the resistance of springs 21 and 22; plain surfaces 13 and 14 of levers 11 and 12 will then leave the front surface 32 of cam 2 so that the latter, pushed by the two wings 28 and 28' of spring 8, will slide out free to be removed.

The two small levers 11 and 12 will stop against the stops 23 and 26 predisposed in such a position that the ends 33 and 34 of said levers may be within a circumference with a diameter suitably smaller than the one of surfaces 35—36 of the corresponding openings 3 and 4 of cam 2.

For mounting a new cam it will then be sufficient to introduce the cam on hub 6 disposing hole 29 on pin 30.

Surfaces 35 and 36, sliding on the inclined surfaces 37—38, will cause levers 11 and 12 to be depressed downwardly so that the cam can be pushed inwardly, thus pressing wings 28—28' of spring 8, till cam 2 assumes its operating position.

Levers 11 and 12, pushed outwards by springs 21 and 22, will lock cam 2 in said position, by their plain surfaces 13 and 14.

In the embodiment according to Figs. 3 and 4, flange 107 with hub 106 is fixed on the rotating shaft 101, as described for the first embodiment. On flange 107 are provided plain zones 139 which serve as supports for the demountable cam 102. The locking hook levers 112 and 133 are mounted by means of pivots 140 on the small ears 140' of a sleeve 141, which is adapted to be intro-

duced on hub 106 and fixed by screws 142, said screws entering holes 143 of sleeve 141 and being screwed in the threaded holes 144 of flange 107.

Hook levers 112 and 133 are guided in hollows 145 of sleeve 141 and pushed outwards by springs 121 and 122.

The limitation of outward movement of hook levers 112 and 133, when the cam is removed, is effected by ring 146, which is centered on band 147 of sleeve 141 and is held between projection 148 and plain surface 149 of flange 107. Ring 146 can, if desired, be substituted by two small plates 246 (see Fig. 5) adjustably mounted on flange 107 supporting the cam near levers 112 and 133, and cooperating with said levers by means of their edges.

The axial push of the cam outwardly is effected by two springs 128 which are held between plain sectors 151 and plain surface 149 by screws 142 passing through the respective holes 152.

The ends 153 of springs 128 cause cam 102 to move in an outward direction, when hooks 112 and 133 are pushed towards axis 101, in similar manner to the one described for the first embodiment.

As the teeth of hook levers 112 and 133 lock cam 102 in its seat by pressing against the periphery of hole 154, the advantage is obtained that cam 102 can have more than one reference hole 155 which must coincide with pin 156 located centrally on support zones 139; consequently cam 102 can be inserted into as many angular positions as are the number of holes 155 provided in the cam, so as to allow one cam various different angular positions and therefore as many combinations for different cyclic seams.

The operation of mounting and removing a cam takes place in the same manner as the one described for the other embodiment.

It is understood that the construction and disposition particulars of the device can vary from those represented in the drawings and above described, the device always remaining within the purview of the invention.

Thus, for instance, not only instead of two locking and unlocking levers it can be used for the same aim only one lever or more than two levers with relative springs, as well as for pushing the cam out of its seat many springs can be substituted to the single or double one, established in any suitable manner on the cam-supporting flange, but also said springs, instead of being of a flat kind, can be of any other suitable kind, for instance spiral springs. On the other hand, the cam locking and unlocking lever or levers instead of being rigidly pivoted by one end and made elastic by a spring, can be levers formed by a flexible plate fixed by one end and provided with a hooking tooth at the opposite free end.

Other modifications not altering the invention at all can be easily conceived by those skilled in the art.

What I claim is:

1. In a zig-zag sewing machine, improved means for the automatic locking and releasing of rechargeable cams comprising releasable clutch means for the cam acting against cam expulsion means, a cam shaft, support means carried by and driven in rotation by the shaft and supporting said clutch means and cam expulsion means, and said releasable clutch means consisting of a pair of spring hook levers pivoted behind the mounted cam on diametrically opposed points of the support, said levers projecting with their free ends from the front face of the cam in such a manner as to make it possible to disengage them by the direct action of two fingers, while the cam expulsion means consists of springs placed behind the cam itself, between the latter and the support, orienting means on said support for engagement with corresponding means on the cam to orient the cam with respect to said shaft, and adjustable limiting means to limit the outward movement of said levers.

2. A zig-zag machine as in claim 1, wherein said hook levers are pivoted on a ring fixed behind the flange of a hub driven in rotation by the cam-carrying shaft, the cam being supported by said flange with the interposition of spring means for its expulsion from its seat, said hook levers crossing corresponding radial openings of both the flange and the cam, in order to engage by their hook the front faces of the cam under the action of springs placed in radial openings of the hub.

3. A zig-zag machine as in claim 2, wherein said spring means for the expulsion of the cam from its seat consist of a horse-shoe-shaped flat spring, adjustably fixed to said flange, so as to act by a portion of its inner edge as a stop for limiting the opening of one of said hook levers, when the cam is removed, the stop of the other lever consisting of the edge of a small plate adjustably fixed on the cam-supporting flange in a position diametrically opposed to the one fixing the spring.

4. A zig-zag machine as in claim 1, wherein said adjustable limiting means consists of the edge of a small plate adjustably fixed on the support means supporting the cam, a plate being provided for each lever.

5. In a zig-zag sewing machine as set forth in claim 1, said support means comprising a sleeve removably fixed on a cam abutting flange, said sleeve having a pair of diametrically opposed openings therein, said cam abutting flange positioned rearwardly of said sleeve and drivingly connected with said shaft, said levers each being pivoted in one of said openings and extending generally axially forwardly, said sleeve having a radially extending hole therein connected with each opening, springs in said holes yieldingly urging said levers outwardly, and spring means for the expulsion of the cam from said support means.

6. A zig-zag machine as in claim 5, wherein said spring means for the expulsion of the cam from its seat consist of a pair of flat springs interposed between said flange and said sleeve, and a pair of screws fixing the sleeve to the flange and each penetrating one of said flat springs.

7. Mechanism for locking and releasing exchangeable cam discs for zig-zag sewing machines comprising a shaft, a support on said shaft, a pair of hook levers pivotally mounted on said support at diametrically opposite points, said levers extending forwardly, a cam disc mounted on said shaft forwardly of said support and having a pair of diametrically opposed apertures therethrough, the free ends of said levers extending through said apertures, each hook lever having a hook surface extending transversely of the axis of the shaft and engaging the front surface of the cam disc and forwardly projecting finger engageable parts in advance thereof, orienting means on said support and said cam disc, spring means mounted on said support for urging the cam disc away from said support, further spring means mounted on said support for urging the hook levers radially outwardly, and adjustable limiting means to limit the outward movement of said levers.

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