

June 18, 1963

G. MEIER

3,094,086

CONTROL MECHANISM FOR ZIG-ZAG SEWING MACHINES

Filed Jan. 4, 1961

FIG. 1

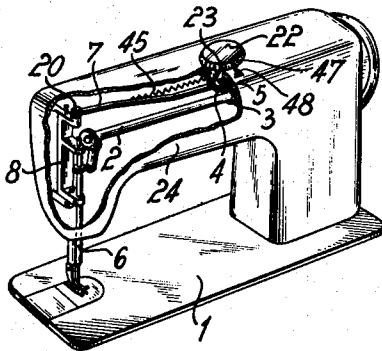


FIG. 4

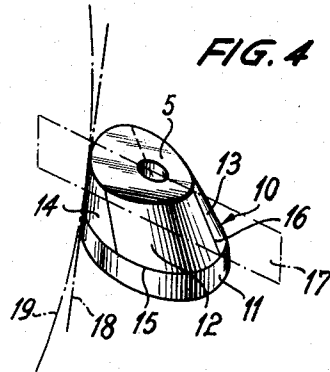


FIG. 2

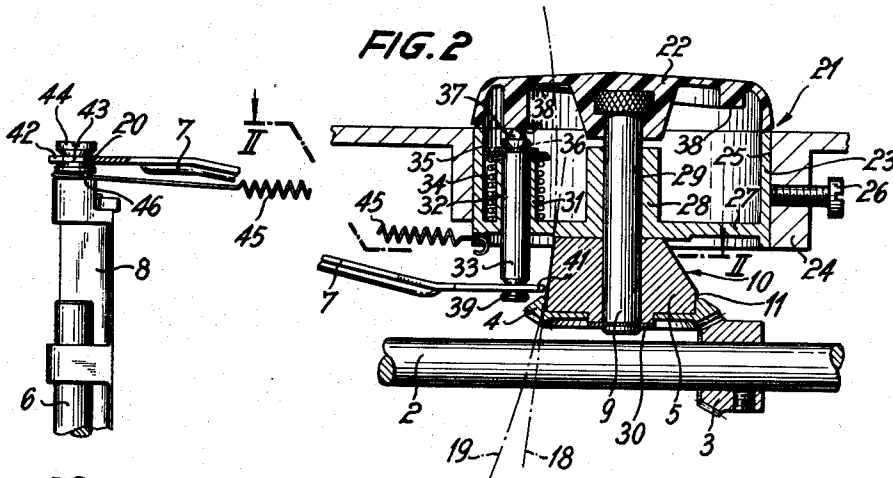
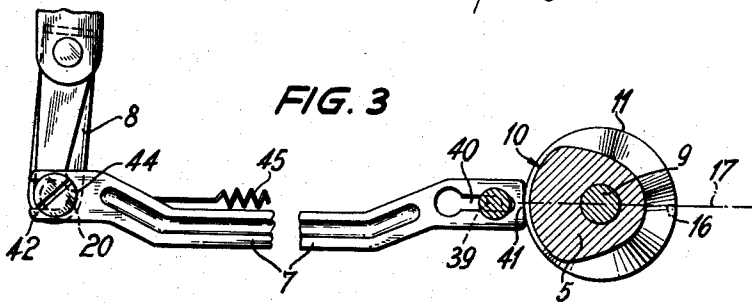


FIG. 3



INVENTOR:  
GÜNTHER MEIER  
BY  
H. W. 7/64  
ATTORNEY

1

3,094,086

## CONTROL MECHANISM FOR ZIG-ZAG SEWING MACHINES

Günther Meier, Weingarten, Baden, Germany, assignor to Gritzner-Kayser Aktiengesellschaft, Karlsruhe-Durlach, Germany, a German company

Filed Jan. 4, 1961, Ser. No. 80,596

Claims priority, application Germany Jan. 5, 1960

3 Claims. (Cl. 112-158)

The present invention relates to sewing machines of the type which are fitted with devices for producing simple straight seams and zig-zag seams.

Sewing machines of this type are already known wherein the lateral swinging out movement of the needle bar, for converting from straight seam sewing to the production of zig-zag seams, is effected by a follower co-operating with a control eccentric. The control eccentric for changing the over-stitch width is conically constructed and axially displaceable relative to the follower. The production of straight seams is effected in that position of the swinging frame of the needle bar wherein the follower is out of engagement with the eccentric.

In the known constructions, the said devices occupy considerable space and cannot be fitted within the housing of the sewing machine. The arrangement thereof on the side of the horizontal upper arm facing the operator gives the sewing machine an unsightly appearance and continuously exposes the devices to soiling and damage. In addition, devices fitted on the outside of the upper arm prevent the operator from obtaining a clear and close view of the sewing situation. However, it is very important to have a clear view of the latter particularly in difficult sewing work, such as the sewing of button holes.

The object of the present invention is to so construct the device for controlling the needle bar rocker that it not only can be fitted within the housing of the sewing machine but also will permit infinitely variable adjustment of the over-stitch width, so that buttonholes of different widths can be completed.

This object is achieved in accordance with the present invention by constructing the control eccentric together with means for axial displacement of the follower relative to the control eccentric and also the drive for the control eccentric, as a unitary structure so that it can be introduced as a whole into the housing of the machine from outside.

As an additional feature of the present invention, a very simple means for the infinitely variable adjustment of the over-stitch width and the edge width of buttonholes consists in a control eccentric which has a circumference of three surfaces inclined towards its axis of rotation and a further generated surface in the form of a straight circular cylinder, the radius of which corresponds to the maximum distance of the generated surface from the axis of rotation, whilst, of the said three inclined surfaces, the incline of one surface corresponds to the direction of a tangent which is located on the line of transition from the inclined surfaces control eccentric to the straight circular cylinder to an arc having the mounting point of the link or follower on the needle bar rocker as its centre and the length of the follower as its radius.

If importance is to be attached to effecting a practically complete pre-assembly of all parts of the device, and simultaneously being able to effect very simple assembly and dismantling, a further feature of the invention involves the use of a cylindrical housing for the device which consists of upper and lower parts, two bearings being provided, one for a spindle constituting an axis of rotation of the eccentric and the other for an adjusting pin for the follower.

2

Further features of the invention and details of the advantages achieved thereby will be apparent from the following description of one embodiment by way of example while is illustrated in the accompanying drawings and in which:

FIGURE 1 is a perspective view partly in section of a sewing machine having a fitted device for producing simple straight seams and zig-zag seams.

FIGURE 2 is a front elevation partly in section of the device when fitted to a sewing machine.

FIGURE 3 is a section on the line II-II of FIGURE 2.

FIGURE 4 is a perspective view of the control eccentric.

The sewing machine as a whole is indicated by the reference 1. Mounted on the arm shaft 2 of the machine is a bevel gear 3 which drives, at a gear ratio of 1:2, a spur bevel gear 4 which is rigidly connected to an eccentric 5 and constitutes a member of a drive transmission therefor.

The needle bar 6 of the machine, besides having imparted to it in a known manner a reciprocating up and down movement by the shaft 2, has lateral deflections imparted to it by the eccentric 5, through a link or follower 7 and a rotatably journaled frame or rocker 8. The eccentric 5 is supported on a spindle for rotation about the axis 9 of the spindle and at one end has a periphery 10 which is composed of a generated surface 11 corresponding to a straight circular cylinder, the radius of which is equal to the maximum distance of the circumference 10 from the spindle axis 9. The periphery 10 of the eccentric 5 also comprises three arcuate surfaces 12, 13, 14 which are inclined towards the spindle axis 9, and merge at the point of transition indicated by the curved line 15 into the generated surface 11. The inclined surfaces 12, 13 merge in a line 16 and are symmetrical to a plane 17 which passes both through the said line 16 and the spindle axis 9. Further, said surfaces 12, 13 extend on both sides of the line 16 concentrically to the spindle axis 9 in conformity with the duration of the needle insertion.

The inclined surface 14 which constitutes the connection between the other ends of the inclined surfaces 12 and 13, is bisected by the plane 17 and extends over its entire length concentrically to the spindle axis 9. The inclination thereof corresponds to the direction of a tangent 18 to an arc 19 which is drawn from a securing point 20 of the follower 7 on the needle bar rocker 8, with the length of the follower 7 as radius, where said arc coincides with the line 15.

A cylindrical casing 21 or support is provided which consists of two parts constituted by a rotatably adjustable cover 22 and a lower cylindrical part 23. The casing 21 is secured by means of a screw 26 in a vertical bore 25 formed in the arm 24 of the sewing machine.

The lower part 23 of the casing 21 has a base 27, in the centre of which a bearing 28 having a bore 29 is provided for the spindle 9. The spindle 9 is secured at its other end in the cover 22, and rotatably supports, outside the casing 21 the already mentioned eccentric 5. The latter is protected against axial displacement, on the one hand, by the base 27 and, on the other hand, by a retaining washer 30. A second bearing 31 provided in the base 27 has a bore 32 in which an adjusting pin 33, which extends parallel to the spindle axis 9, is displaceably mounted.

The bearing 31 is surrounded by a coiled spring 34, one end of which bears against a retaining washer 35 secured to the adjusting pin 33. The upper end of the adjusting pin 33 is constructed as a ball socket 36 in which a ball 37 is seated for cooperation with the lower and inclined face of an annulus 38 which is provided internally of the adjustable cover 22 and extending concentrically about the spindle axis 9.

3

The adjusting pin 33 in the region of its lower end has a groove 39, in which the follower 7 slotted at 40 is hooked. The follower 7 has a bearing portion 41 on one end and a fork 42 on the other. The fork 42 engages in a groove 43 of a hinged or shackle bolt 44 which is secured to the needle bar rocker 8. The bearing portion 41 of the follower 7 is drawn by a spring 45, which is hooked in the lower part 23 of the casing 21 and in a second groove 46 of the bolt 44, against the generated surface 10 of the eccentric 5. The position of the bearing part 41, which is influenced by the inclined face of the annulus 38 by way of the adjusting pin 33 located parallel to the spindle axis 9, can be read on a scale 47 disposed on the adjustable cover 22 of the casing 21 opposite a pointer 48.

It will be appreciated that when the bearing part 41 of the follower 7 is adjusted to contact the generated surface 11 of the eccentric 5, which is constituted by a straight cylinder, the needle bar rocker 8 is maintained permanently in its extreme left position, since the generated surface 11 is at the maximum distance of the circumference 10 of the eccentric from the spindle axis 9. When however, the bearing part 41 is brought alternately into contact with the inclined surfaces 12, 13, 14, the needle bar rocker 8 displaced, i.e. it is swung by the surfaces 12 and 13 to the right and back again, while during contact with the surface 14 it is kept in the extreme left position. The deflection of the needle bar rocker 8 is reduced as the bearing member 41 approaches the generated surface 11 and becomes greater, the further it is pushed away therefrom.

When it is desired to sew straight stitches, the bearing part 41 of the follower 7 is adjusted to contact generated surface 11, but for sewing zig-zag stitches, the follower 7 is brought into contact with the inclined surfaces 12, 13, 14, whereupon the scale 47 indicates the overstretch width.

When sewing buttonholes the overstretch width, adjusted for the bar width, is bisected for edge sewing. Due to the infinitely variable adjustability of the follower 7 with its bearing member 41, this is possible for any overstretch width, the scale 47 facilitating the adjusting operations.

In the foregoing, the invention has been described with reference to a specific illustrative device. It will be evident, however, that variations and modifications may be made without departing from the scope and broader spirit of the invention as set forth in the appended claims. The specification and drawings are accordingly to be regarded in an illustrative rather than in a limiting sense.

I claim:

1. In a zig-zag sewing machine including a needle bar carrying a needle and mounted both for reciprocation and oscillation transverse to the feed direction, and drive means operably connected to said bar, to reciprocate said needle; control mechanism for selectively producing straight stitches and zig-zag stitches of gradually variable amplitude comprising a three-dimensional control member with means to rotate the same by said drive means, said member being composed of a circular cylindrical portion concentric with its axis of rotation and an eccen-

4

tric conical portion adjoining said cylindrical portion, said eccentric portion including three angular partial surfaces being inclined towards said axis and merging into each other, one of said surfaces having a circular arc-shaped cross-section concentric to said axis and the surfaces adjoining said first surface having eccentric cross-sections symmetrical to the center line of said arc-shaped cross-section, a spring-urged follower link disposed transversely to said axis and having one end operably connected to said bar, to oscillate the same, and arranged with its opposite end bearing against said member, means to adjust the bearing point of said link upon said member in a direction parallel to said axis, whereby to produce straight stitches along a predetermined stitching line during engagement of said link with the cylindrical portion of said member and to produce zig-zag stitches extending to gradually variable amplitudes and in a single direction from said line during engagement of said link with the eccentric portion of said member, the incline of said first surface towards said axis coinciding with the tangent to a point of a circle located at the transition between the cylindrical and conical portions of said member with said circle having the connecting point of said link upon said bar as its center and having a radius equal to the length of said link.

2. In a zig-zag sewing machine as claimed in claim 1, including a housing enclosing said needle bar, said drive means and said link, said adjusting means being comprised of a spring-loaded pin connected to said link at a point thereof adjoining said member, and control means relatively slidably supporting said pin by said housing in a direction parallel to said axis.

3. In a zig-zag sewing machine as claimed in claim 1, including a housing enclosing said needle bar, said drive means and said link, said adjusting means being comprised of a spring-loaded pin connected to said link at a point thereof adjoining said member, means relatively slidably supporting said pin by said housing in a direction parallel to said axis, an adjusting member rotatably mounted upon and projecting from said housing, said adjusting member having a camming surface engaging said pin, and cooperating scale and index means upon said adjusting member and housing to indicate the adjusting position of said link.

#### References Cited in the file of this patent

##### UNITED STATES PATENTS

2,196,416	Jacob .....	Apr. 9, 1940
2,621,495	Garbarini .....	Dec. 16, 1952
2,788,677	Hayek .....	Apr. 16, 1957
2,817,248	Motzet et al. ....	Dec. 24, 1957
2,971,482	Koike .....	Feb. 14, 1961
2,979,002	Casas-Robert et al. ....	Apr. 11, 1961
3,043,253	Wank et al. ....	July 10, 1962

##### FOREIGN PATENTS

543,731	Italy .....	May 24, 1956
---------	-------------	--------------