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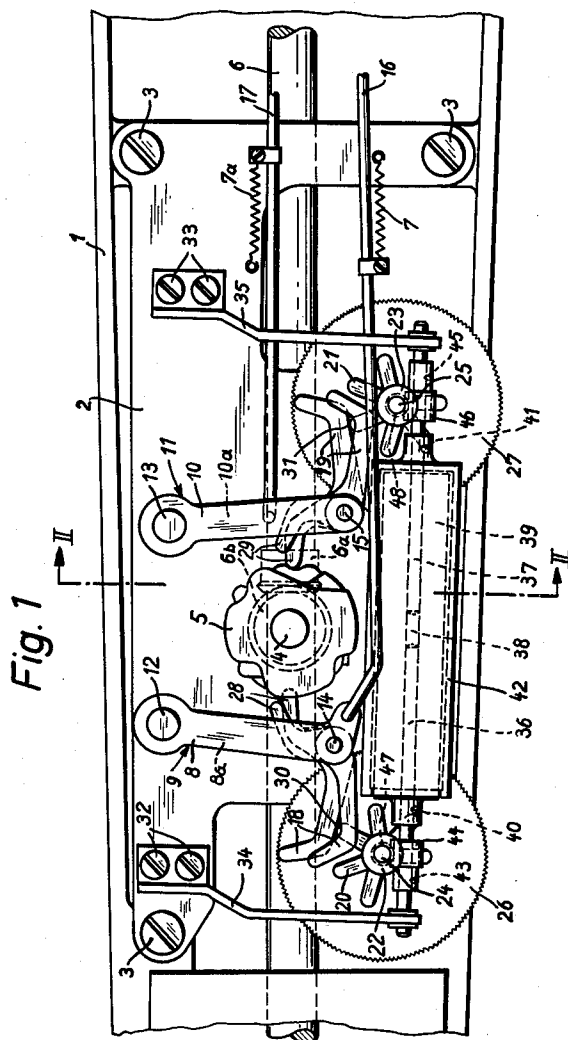
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3,143,985

ORNAMENTAL SEAM DEVICES FOR SEWING MACHINES

Filed March 18, 1959

4 Sheets-Sheet 1



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FIG. 2

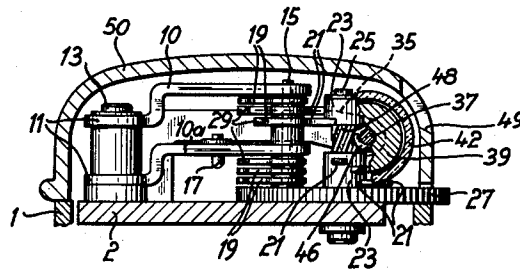


FIG. 4

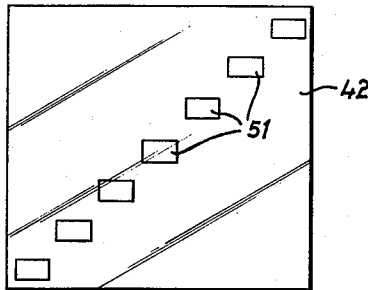
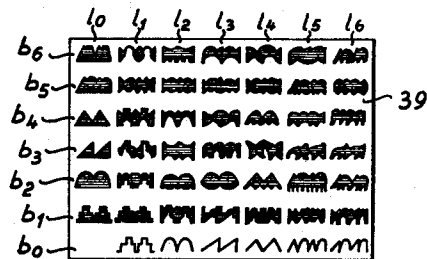


FIG. 3



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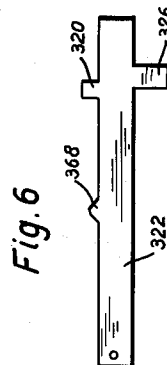
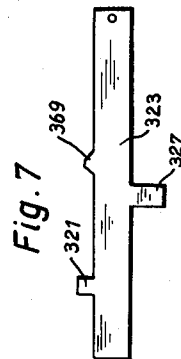
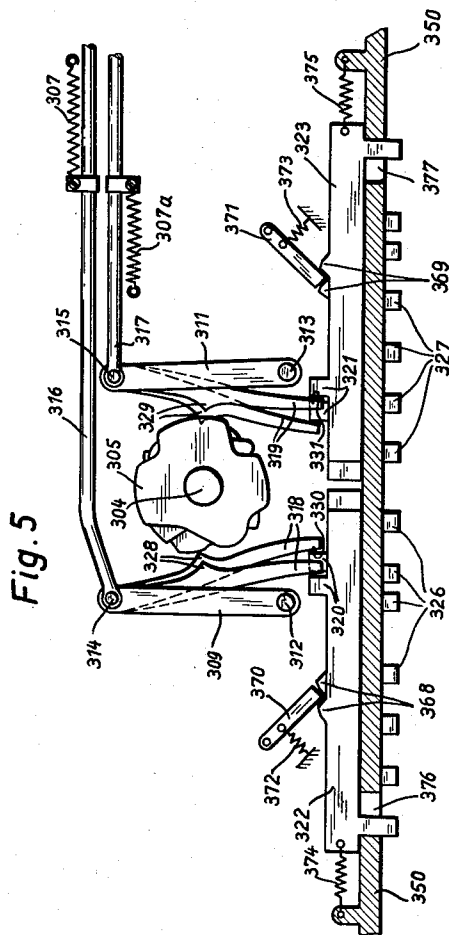
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4 Sheets-Sheet 3



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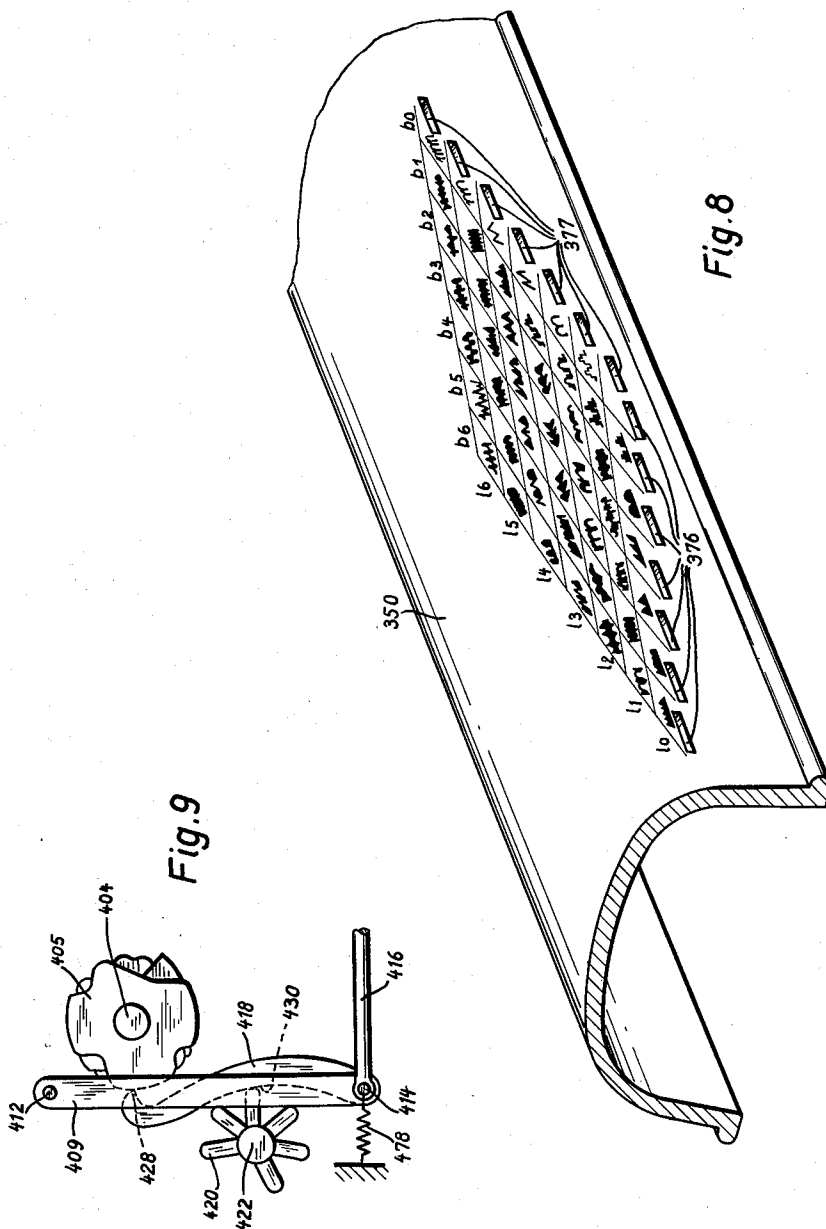
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ORNAMENTAL SEAM DEVICES FOR SEWING MACHINES

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4 Sheets-Sheet 4



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ORNAMENTAL SEAM DEVICES FOR SEWING MACHINES

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Filed Mar. 18, 1959, Ser. No. 800,278

Claims priority, application Germany Mar. 19, 1958

9 Claims. (Cl. 112—158)

The present invention relates to devices of sewing machines for producing ornamental seams, wherein a driving shaft is provided with several pattern cam discs with which scanning fingers are associated which are arranged in a group to be displaceable independently of one another on a common spring-loaded transmission rocker arm for the device of the sewing machine to be controlled.

Devices of this kind having at least one scanning finger per pattern cam disc have the advantage that one can change over from one cam disc to another without previously raising the rocker arm. In contrast to this, the rocker arm which carries the finger and appertains to devices having only one scanning finger for several cam discs must always be previously raised from the cam discs.

The first mentioned devices, on which the invention is based, are so constructed that individual scanning fingers may be locked selectively by means, namely change-over switches and locking devices, arranged on the rocker arm in such manner that they are in engagement with the appropriate pattern cam disc. The advantage of this is that the locking device and the change-over switch or switches swing jointly in operation as they are also arranged on the transmission rocker arm. This results, however, in constructional difficulties in projecting the change-over switch or switches out of the machine casing without the use of large and unsightly openings therein. For this reason these members are not extended outwardly and the disadvantage is accepted that a cover in the machine casing must be opened for the change-over operation.

The object of the invention is to avoid these disadvantages and to provide an ornamental seam device with a stationary driving shaft for the pattern cam discs and with at least one scanner finger per cam disc in which the change-over switch or switches are stationary in operation. The object of the device is also to leave freedom of choice with regard to the type and arrangement of the change-over switches. All this is achieved in accordance with the present invention by the feature that the bearing axis of the transmission rocker arm, the bearing axis of the scanner fingers on the transmission rocker arm, the scanning ends of the scanner fingers and supporting fingers for the scanner fingers which supporting fingers are immovable in the operating position, are so arranged in a spatial relationship, three-dimensionally to one another that deflections of the scanner fingers relatively to the transmission rocker arm, which are caused by the deflection of the scanning lugs in contact with the cam discs, react on the transmission rocker arm itself to make it swing out.

Further features of the invention and details of the advantages achieved thereby will be apparent from the following description of the embodiments of the new device as illustrated in the accompanying drawings in which:

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FIGURE 1 shows one embodiment of an ornamental seam device in plan view on the arm of a sewing machine with the cover removed, non-essential parts being omitted for clearer understanding of the invention.

FIGURE 2 is a section on the line II—II of FIGURE 1.

FIGURE 3 is a development of the roller, shown in FIGURES 1 and 2, which bears the seam formation images.

FIGURE 4 is a development of an indicating cylinder surrounding the roller of FIGURES 1—3.

FIGURE 5 illustrates a second embodiment of the invention.

FIGURES 6 and 7 are separate views of change-over slides of FIGURE 5.

FIGURE 8 is a perspective view showing a cover for the device of FIGURE 5.

FIGURE 9 is a schematic view of a third embodiment of the invention.

In the embodiment shown in FIGURES 1—4, a carrier plate 2 is secured to an arm 1 of the sewing machine by means of screws 3. Mounted on the carrier plate 2 is a vertical shaft 4 on which six pattern cam discs 5 are mounted one above the other in an assembly. The shaft 4 is driven by the arm shaft 6 of the machine by way of a gear 6a which meshes with a gear 6b mounted on shaft 4. Pairs of swinging levers 8, 8a and 10, 10a are rotatably journaled on each side of the pattern cam disc assembly on stub shafts or pins 12 and 13 mounted on the carrier plate 2 and are rigidly connected by spindles 14 and 15 so that each pair forms one of the transmission rocker arms 9 and 11. Each arm is linked by a mechanical connection including one of draw rods 16 and 17, respectively, but otherwise not shown, with the adjusting members of the devices for changing the stitch width and stitch position, which devices may also be constructed in any desired manner and are therefore not shown. Springs 7 and 7a act on each of these devices to ensure that the respective transmission rocker arms 9 and 11 are pressed in the direction of a shaft 4 of the pattern cam disc assembly, so far as the maximum deflection of the said devices permits.

Journalled on the spindles 14 and 15 are freely swinging scanning fingers 18 and 19, six in each case and on both sides of each of the six pattern cam discs 5 there are located on the same level therewith, one each of the six scanning fingers 18 or 19 respectively. Again at the same level with each of the scanning fingers 18 and 19 are located supporting or bearing fingers 20 and 21 respectively which project radially in each case from a hub 22 or 23 as the case may be and are displaced around the periphery thereof with respect to one another in the manner of steps. The hubs 22 and 23 are rigidly connected to vertical shafts 24 and 25 which in turn are journaled in the supporting plate 2 and are connected in each case with a knurled turning knob 26 and 27 projecting beyond the arm 1. A locking device (not shown) locks the turning knobs 26 and 27 and consequently the hubs 22 and 23 in the position shown in FIGURE 1 and in all the positions which deviate from that of FIGURE 1 by a whole multiple of the angle between respective supporting fingers 20 or 21. These are arranged in groups of six displaced with respect to one another with the fingers of each group radially spaced by an angle equal to $\frac{1}{6}$ th of a circle and with an empty space remaining in

the otherwise regular series of supporting fingers 20 and 21 on the hubs 22 or 23 respectively.

The turning of the knobs 26 and 27, which function as change-over switches, from one locked position into another produces the result that the particular supporting finger 20 of one group or 21 of the other which is in contact with the scanning finger 18 or 19 respectively is turned away from said scanning finger and another supporting finger is brought to the scanning finger associated with its group. In this way it is possible selectively to support any one of the scanning fingers 18 or 19 by its supporting finger 20 or 21 respectively. In one position of each hub 22, 23, no supporting finger 18 or 19 is supported, owing to the empty position in the otherwise regular series of supporting fingers 20 or 21.

The act of supporting or abutting a scanning finger 18 or 19 has the result that the finger cannot swing unimpeded round its spindle 14 or 15 should its scanning end 28 or 29 swing out due to the pattern cam disc associated therewith. Instead, it slides on a surface 30 or 31 of the supporting finger 20 or 21 associated therewith and thus adjusts, by means of the transmission rocker arm 9 or 11, the stitch width or the stitch position synchronously with the shape of the curve of the pattern cam disc associated therewith. The other pattern cam discs are inoperative since the deflections of the unsupported scanning fingers 18 and 19 associated with each of said other discs are effected only around the spindle 14 or 15 without reacting on the transmission rocker arm 9 or 11. What is effective is therefore only the pattern cam disc, the scanning finger 18 or 19 of which is precisely co-operating with its associated supporting finger 20 or 21.

If, owing to the empty place in the series of supporting fingers 20 or 21, none of the scanning fingers 18 or 19 of a transmission rocker arm 9 or 11 is supported, it follows that none of the cam discs act on the appropriate transmission rocker arm 9 or 11, since the arms 9, 11 can be swung out only as far as the maximum deflection of the device of the sewing machine connected therewith towards the pattern cam discs, and even in this position, which is approximately the most remote, the scanning fingers 18 or 19, owing to the vacant place on the roller 22 or 23 have sufficient space outside the circle 6 of the greatest curve radius to allow for this inactivity. In this operative position the appropriate device of the sewing machine can be fixed by hand in any desired place in its entire range of adjustment.

Secured by means of screws 32, 33 on the carrier plate 2 are bearing arms 34, 35 in which shafts 36 and 37 are respectively journaled to rotate but are prevented from axial displacement. Both shafts 36 and 37 extend into a bore 38 of a roller 39, but although the shaft 36 is non-rotatably connected to the roller 39 by means of a set screw 40 the shaft 37 and the roller 39 may turn relatively to each other. On the other hand, the shaft 37, is non-rotatably connected by means of a set screw 41 to a transparent indicator cylinder 42 surrounding the roller 39 at a slight distance therefrom.

Secured to the shaft 36 by means of a set screw 43 is a helical gear wheel 44 which engages with a helical gear wheel 47 on the shaft 24, and secured to the shaft 37 by means of a set screw 45 is a helical gear wheel 46 which meshes with a helical gear wheel 48 on the shaft 25. In this way rotation of the knobs 26 and 27, apart from the already described selection of a pattern cam disc 5, effects the rotation of the shafts 36 and 37 and, since each helical gear transmission 44-47 and 46-48 has the ratio 1:1, the shafts 36, 37 are angularly displaced through the angle of displacement of the knobs 26 or 27.

The development of the roller 39 shown in FIGURE 3 shows the stitch formers in stitch form groups 1₀, 1₁, 1₂, 1₃, 1₄, 1₅, 1₆, b₀, b₁, b₂, b₃, b₄, b₅, b₆, each group 1₁ of which receives the seam formations which can be sewn upon the switching on of the stitch position adjusting device to one of the pattern cam discs 5, that is to say upon

the adjustment of this device to one of its possible forms and likewise each group b₁ receives the seam formers which may be sewn upon the adjustment of the stitch width adjusting device to one of its possible forms. The seam forming groups 1₀-1₆ form together a number of stitch form series which intersect with the series of the group b₀-b₆. The series of the group b₀-b₆ run parallel to the axis of the roller 39 as also to an indicator window 49 in a cover 50 of the machine casing. By turning the knob 26 serving as a change-over switch any desired series of the group b₀-b₆ can be brought into register with the indicator window 49, whilst the appropriate automatically controlled course is set for the stitch width adjusting device at the same time.

The transparent indicator cylinder 42, which can be turned by means of the knob 27 serving as a change-over switch, and the development of which is shown in FIGURE 4, is provided with diagonal indicating marks 51 each of which is associated with a seam form group 1₁ and when they register with the indicator window 49 in the cover 50 the seam formation which may be sewn with this adjustment of the knob 27, of the associated group 1₁, is shown. The stitch position adjusting device is simultaneously automatically adjusted to the associated automatic sequence of control.

The indicator window 49 in the cover 50 forms together with the rotatable roller 39 an indicating means, the rotatable indicating cylinder 42 forms another indicating means both of which point to the place of intersection between the seam-form groups b₁ and 1₁, with which the seam formation sewn is associated.

The seam form groups b₀ and 1₀ each corresponds to a position of the knobs 26 and 27 in which, owing to the vacant place in the otherwise uniform series of supporting fingers 20 and 21 the stitch width and stitch position adjusting device is free for hand adjustment. If both devices are available for hand adjustment the field at the place of intersection from b₀ and 1₀ is indicated by the word "OFF" which indicates to the operator the switched off condition of the entire automatic control mechanism.

In the construction shown in FIGURES 5-8, transmission rocker arms 309, 311 are rotatably disposed on opposite sides of the cam nest consisting of six cam discs 305 secured to a shaft 304 (FIG. 5) about pins 312, 313 fixed relatively to the casing. In turn, on the arms, six scanning fingers 318 and 319 are journaled to rotate freely, each about a spindle 314 and 315, as the case may be, these fingers corresponding to the number of pattern cam discs 305. Linked to the transmission rocker arms 309, 311, are draw bars 316 and 317 respectively which are connected with the adjusting members of the stitch width and stitch position adjusting mechanism constructed in known manner and therefore not shown. Return springs 307 and 307a on draw-bars 316 and 317 urge the transmission rocker arms 309 and 311 against the pattern cam nest 305, at a maximum as far as a position corresponding to the full deflection of the particular device. The scanning fingers 318, 319 have scanning lugs 328 and 329 and abutment surfaces 330 and 331 for supporting fingers 320 or 321. These supporting fingers 320, 321 are parts of switch-over slides or slide members 322, 323 arranged one above the other in an assembly, one of each of which is shown in FIGURES 6 and 7. Each of the slide members 322 or 323 has a pawl projection 368 or 369 for co-operating with pawls 370 or 371 common to all the slides of an assembly indicated at 322 or 323 respectively. The pawls 370, 371 are under the control of springs 372, 373 respectively while each of the change-over slides 322 or 323 is under the control of a spring 374 or 375 respectively.

The change-over slides 322 or 323 are of identical construction with the exception of the position of their slide knobs 326 or 327 respectively. The latter are so arranged relatively to each other that each of them pro-

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jects through a different opening 376 or 377 as the case may be in the cover 350 illustrated in FIGURE 8. The openings 376 or 377 are somewhat longer than the width of a slide operating knob 326 or 327 so that the change-over slides 322 or 323 are displaceable against the action of their return springs 374 or 375 by the amount of the difference. Six scanning fingers 318 or 319 on each side are always opposite seven switch over slides 322 or 323 so that, in each case one of the latter remains without scanning finger 318 or 319 associated therewith and merely serves as a cut out, upon the displacement of which, against the action of its return spring 374 or 375 the release of any other one of the remaining change-over slides is effected from its assembly 322 or 323 by means of the pawl arrangement 368-367 or 369-371. Naturally the drawing forward of any other change-over slide from the assembly 322 or 323 has a releasing effect on a slide of this assembly which has already been drawn forward.

The drawing forward of a change-over slide 322 or 323 against the force of a spring 374 or 375 acting thereon and its engagement by the pawl arrangement 368-370 or 369-371 causes its supporting finger 320 or 321 to come into contact with the abutment surface 330 or 331 of the scanning finger 318 or 319 associated therewith. The deflection of this scanning lug 328 or 329 by the pattern cam disc associated therewith results in a swinging out of the transmission rocker arm 309 or 311 while the other scanning finger 318 or 319 of the transmission rocker arm 309 or 311, since they are unsupported, can swing freely around the spindle 314 or 315, exert no reaction on their rocker arm.

The openings 376 and 377 and consequently the knobs 326, 327 projecting therethrough are in each case arranged along two intersecting sides of a four sided area of seam images made up of seam forming series l_1 and b_1 disposed respectively in intersecting groups.

Each series of operating knobs 326 or 327 is therefore associated with a controllable device of the sewing machine for setting the stitch position or location. The displacement of one of the change-over slides 322, 323 serving at any particular time as a switch for a particular operating condition into the operative position, that is in the direction of the center of the seam formed field, indicates the effective setting of the seam form series l_1 or b_1 associated with this switch. In this connection the operating members 326, 327 serve as the indicating means for one of these stitch series or groups by pointing to the stitch group l_1 , b_1 , associated therewith at any time, inasmuch as their position is shifted toward center of the field of the stitch image. The two lower change-over switches of each series 322 or 323 are the two cut out switches already mentioned. In its position displaced towards the center of the field, the automatic control of the associated device of the sewing machine, the stitch width or stitch position adjusting device is switched off and free for hand adjustment.

In the embodiment shown in FIGURE 9 a transmission rocker arm 409 is journaled to swing about a pin 412 which is stationary relative to the casing. In turn scanner fingers 418 are journaled to swing freely on a spindle 414 and six such scanner fingers are provided in the embodiment shown for six pattern cam discs 405 arranged one above the other on a shaft 404. A transmission rocker arm 409 is drawn away from the pattern cam disc assembly by a spring 478 and is connected by a draw rod 416 to a device of the sewing machine to be controlled, such as the needle bar rocker directly, or to the stitch width adjusting device.

Individually associated with the six scanning fingers 418 are six supporting fingers 420 which project radially from a rotatable roller and are arranged opposite each other in the peripheral direction at spaced angles of $\frac{1}{4}$ of 360° so that an empty place remains in an otherwise regular series of six supporting fingers 420. The roller

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422 may be locked at angles of $\frac{1}{4}$ of 360° so that, by turning from one locking position to the other, any one of the supporting fingers 420 can be brought to the abutment surface 430 of the scanning finger 418 associated therewith. By this means its scanning end 428 is urged against the pattern cam disc 405 associated therewith.

When the end 428 of the scanning finger 418 supported by a finger 420 swings out, its bearing axis 414 is also swung out and this movement is transmitted to the draw bar 416 and consequently to the device of the sewing machine to be controlled. The pattern cam discs 405, which are associated with the scanning fingers 418 not being contacted or supported at the moment, remain inoperative, since these scanning fingers 418 can swing freely relative to the transmission rocker 409 when their scanning lugs 428 swing out and therefore transmit no movement to the latter. If the empty place in the series of supporting fingers is opposite the abutment surface 430 of the scanning finger 418, none of the latter are supported and the device of the sewing machine controlled by the drawing rod 416 may be locked in any position of its entire range of adjustment by hand.

In the foregoing, the invention has been described with reference to a specific illustrative device. It will be evident, however, that variations and modifications, as well as the substitution of equivalent elements for those shown for illustration, 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 a limiting sense.

We claim:

1. An ornamental stitch sewing device for a sewing machine, comprising, in combination, stationary supporting means, a drive shaft rotatable relative to said supporting means and a plurality of cams mounted on said drive shaft, a spring biased rocker arm having a pivot support on said supporting means, a plurality of cam followers each having a free end and a follower portion movable into engagement with one of said cams and each having a pivot joint with said rocker arm for movement independently relative to any other one of said plurality of cam followers, and a setting device presenting a plurality of supporting fingers each corresponding to a respective one of said cam followers and movable into engagement with the free end of its respective cam follower to provide a fixed support for said follower during transmission of deflections from the associated cam to said rocker arm.

2. An ornamental stitch sewing device for a sewing machine, comprising, in combination, stationary supporting means, a drive shaft rotatable relative to said supporting means and a plurality of cams mounted on said drive shaft, a spring biased rocker arm having a pivot support on said supporting means, a plurality of cam followers each having a free end and a follower portion movable into engagement with one of said cams and each having a pivot joint with said rocker arm for movement independently relative to any other one of said plurality of cam followers, and a setting device presenting a plurality of supporting fingers each corresponding to a respective one of said cam followers and movable into engagement with the free end of its respective cam follower to provide a fixed support for said follower during transmission of deflections from the associated cam to said rocker arm, said supporting fingers having sliding surfaces for the free ends of said cam followers.

3. An ornamental stitch sewing device for a sewing machine, comprising, in combination, stationary supporting means, a drive shaft rotatably relative to said supporting means and a plurality of cams mounted on said drive shaft, a spring biased rocker arm having a pivot supported on said supporting means, a plurality of cam followers each having a free end and a follower portion movable into engagement with one of said cams and each having a pivot joint with said rocker arm for move-

ment independently relative to any other one of said plurality of cam followers, and a setting device presenting a plurality of supporting fingers each corresponding to a respective one of said cam followers and movable into engagement with the free end of its respective cam follower to provide a fixed support for said follower during transmission of deflections from the associated cam to said rocker arm, said supporting fingers having sliding surfaces for the free ends of said cam followers, and said followers being in the form of two armed levers having one arm defining a sliding surface and another arm constituting the follower end.

4. An ornamental stitch sewing device for a sewing machine, comprising, in combination, stationary supporting means, a drive shaft rotatable relative to said supporting means and a plurality of cams mounted on said drive shaft, a spring biased rocker arm having a pivot support on said supporting means, a plurality of cam followers each having a free end and a follower portion movable into engagement with one of said cams and each having a pivot joint with said rocker arm for movement independently relative to any other one of said plurality of cam followers, and a setting device presenting a plurality of supporting fingers each corresponding to a respective one of said cam followers and movable into engagement with the free end of its respective cam follower to provide a fixed support for said follower during transmission of deflections from the associated cams to said rocker arm, said supporting fingers having sliding surfaces for the free ends of said cam followers, and each of said cam followers having a corresponding sliding surface at said free ends thereof for the associated supporting finger extending substantially perpendicularly to a line connecting the point of support with said pivot support of said rocker arm and substantially parallel to a line connecting the point of support with said pivot joint.

5. An ornamental stitch sewing device for a sewing machine, comprising, in combination, stationary supporting means, a drive shaft rotatable relative to said supporting means and a plurality of cams mounted on said drive shaft, a spring biased rocker arm having a pivot support on said supporting means, a plurality of cam followers each having a free end and a follower portion movable into engagement with one of said cams and each having a pivot joint with said rocker arm for movement independently relative to any other one of said plurality of cam followers, and a setting device presenting a plurality of supporting fingers each corresponding to a respective one of said cam followers and movable into engagement with the free end of its respective cam follower to provide a fixed support for said follower during transmission of deflections from the associated cam to said rocker arm, each of said cam followers having an engagement surface for one of said supporting fingers extending substantially parallel to a line between the pivot support of said rocker arm and the pivot joint of said followers on said rocker arm.

6. An ornamental stitch sewing device for a zig-zag sewing machine, comprising, in combination, stationary supporting means, a drive shaft rotatable relative to said supporting means and a plurality of cams mounted on said drive shaft, a pair of spring biased rocker arms having each a pivot support on said supporting means, a plurality of cam followers arranged in independent groups on said rocker arms, each having a free end and a follower portion movable into engagement with one of said cams and each having a pivot joint with the associated said rocker arm for movement independently relative to any other one of said plurality of cam followers, and a pair of setting devices each presenting a plurality of supporting fingers each of which corresponds to a respective one of said cam followers and is movable into engagement with the free end of one said cam follower in one of said groups to provide a fixed support for said follower during transmission of deflections from the cam associ-

ated with said follower to said rocker arm, said setting devices having operating members such as knobs arranged in a manner that the operating members associated with one group of said supporting fingers of the corresponding rocker arm are in a row which intersects the row formed by the operating members associated with the group of supporting fingers of the corresponding other rocker arm.

7. An ornamental stitch sewing device for a zig-zag sewing machine, comprising, in combination, stationary supporting means, a drive shaft rotatable relative to said supporting means and a plurality of cams mounted on said drive shaft, a pair of spring biased rocker arms having each a pivot support on said supporting means, a plurality of cam followers arranged in independent groups on said rocker arms, each having a free end and a follower portion movable into engagement with one of said cams and each having a pivot joint with the associated said rocker arm for movement independently relative to any other one of said plurality of cam followers, and a pair of setting devices each presenting a plurality of supporting fingers each of which corresponds to a respective one of said cam followers and is movable into engagement with the free end of one said cam follower in one of said groups to provide a fixed support for said follower during transmission of deflections from the cam associated with said follower to said rocker arm, said setting devices having operating members such as knobs arranged in a manner that the operating members associated with one group of said supporting fingers of the corresponding rocker arm are in a row which intersects the row formed by the operating members associated with the group of supporting fingers of the corresponding other rocker arm, and a pattern indicating shield or the like provided with intersecting rows of patterns and disposed proximate said setting devices, said operating members being in the form of indicators pointing to two intersecting rows of stitch patterns each of which contains the pattern associated with the setting of the elements associated with one of said rocker arms.

8. An ornamental stitch sewing device for a zig-zag sewing machine, comprising, in combination, stationary supporting means, a drive shaft rotatable relative to said supporting means and a plurality of cams mounted on said drive shaft, a pair of spring biased rocker arms having each a pivot support on said supporting means, a plurality of cam followers arranged in independent groups on said rocker arms, each having a free end and a follower portion movable into engagement with one of said cams and each having a pivot joint with the associated said rocker arm for movement independently relative to any other one of said plurality of cam followers, and a pair of setting devices each presenting a plurality of supporting fingers each of which corresponds to a respective one of said cam followers and is movable into engagement with the free end of one said cam follower in one of said groups to provide a fixed support for said follower during transmission of deflections from the cam associated with said follower to said rocker arm, said setting devices having operating members such as knobs arranged in a manner that the operating members associated with one group of said supporting fingers of the corresponding rocker arm are in a row which intersects the row formed by the operating members associated with the group of supporting fingers of the corresponding other rocker arm, and a pattern indicating shield or the like provided with intersecting rows of patterns and disposed proximate said setting devices, said operating members being in the form of indicators pointing to two intersecting rows of stitch patterns each of which contains the pattern associated with the setting of the elements associated with one of said rocker arms, and each of said rows of patterns being associated with a particular operating member associated with the setting of one group of elements of said device.

9. An ornamental stitch sewing machine comprising,

in combination, a frame; drive means; turnable cam means mounted on said frame and driven by said drive means, said cam means including a plurality of cams having different cam track patterns; transmission means; a plurality of cam follower means respectively located 5 opposite said cams and connected to said transmission means so that movement of any one cam follower means actuates said transmission means; operator influenced means selectively movable between a plurality of actuated positions abutting at least one selected cam follower means for supporting the same for movement about a 10 fulcrum in a sensing position in which the selected cam follower means engages the respective cam and is rocked by the same about the fulcrum provided by said operator influenced means in said actuated position; and means 15 for rigidly holding said operator influenced means in each

of said actuating positions whereby said transmission means are transversely shifted in conformance with the pattern sensed by said cam follower means moving about said fulcrum while said operator influenced means is rigidly held and motionless.

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