

Dec. 4, 1962

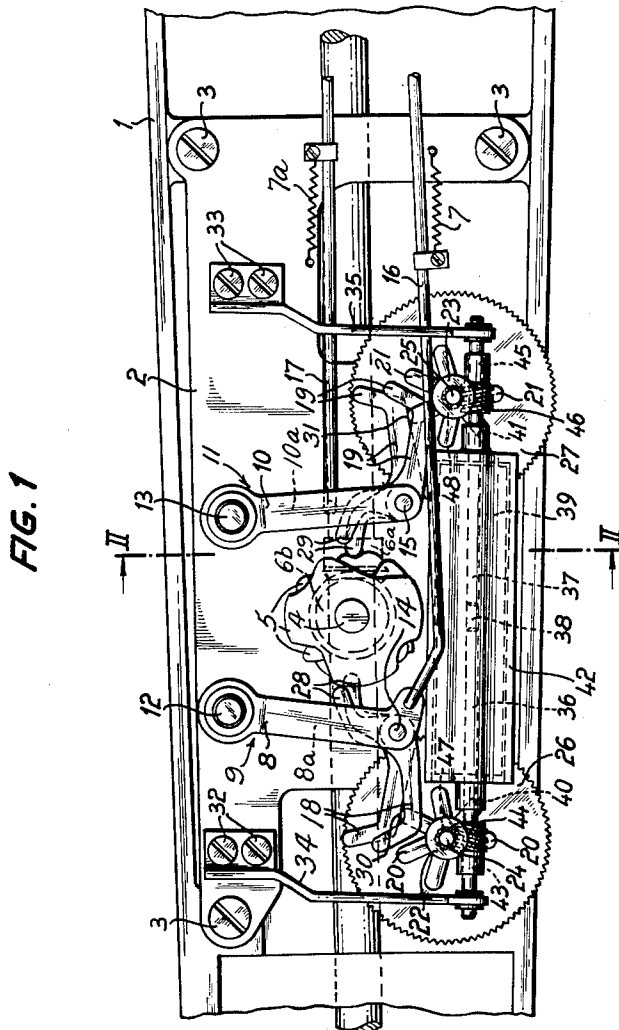
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3,066,623

SEAM FORMATION INDICATOR APPARATUS FOR SEWING MACHINES

Filed March 18, 1959

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FIG. 2

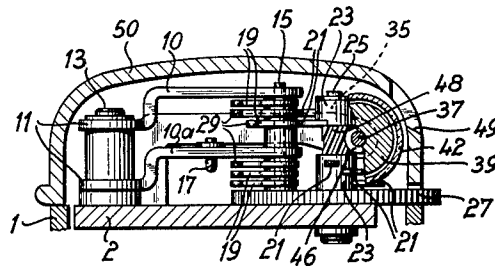


FIG. 4

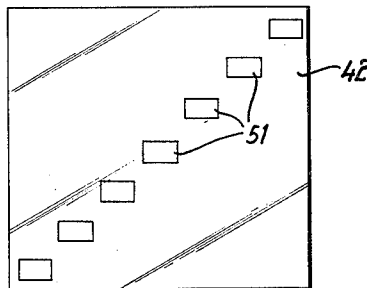
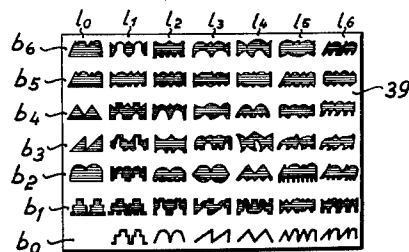


FIG. 3



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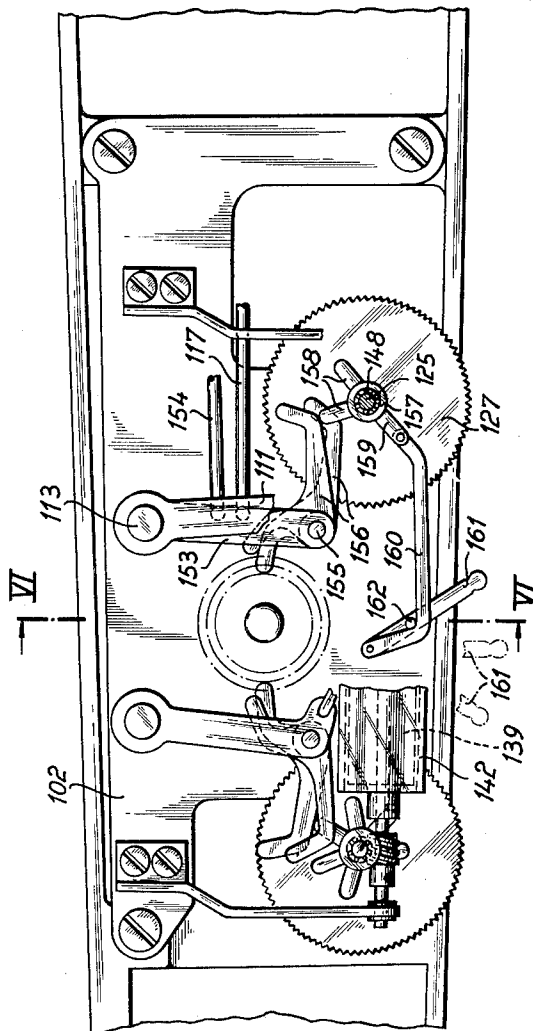
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FIG. 5



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FIG. 10

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$b_4'l_0t_0$	$b_4'l_1t_0$	$b_4'l_2t_0$	$b_4'l_3t_0$	$b_4'l_4t_0$	$b_4'l_5t_0$	$b_4'l_6t_0$
$b_3'l_0t_0$	$b_3'l_1t_0$	$b_3'l_2t_0$	$b_3'l_3t_0$	$b_3'l_4t_0$	$b_3'l_5t_0$	$b_3'l_6t_0$
$b_2'l_0t_0$	$b_2'l_1t_0$	$b_2'l_2t_0$	$b_2'l_3t_0$	$b_2'l_4t_0$	$b_2'l_5t_0$	$b_2'l_6t_0$
$b_1'l_0t_0$	$b_1'l_1t_0$	$b_1'l_2t_0$	$b_1'l_3t_0$	$b_1'l_4t_0$	$b_1'l_5t_0$	$b_1'l_6t_0$
$b_0'l_0t_2$	$b_0'l_1t_2$	$b_0'l_2t_2$	$b_0'l_3t_2$	$b_0'l_4t_2$	$b_0'l_5t_2$	$b_0'l_6t_2$
$b_0'l_0t_1$	$b_0'l_1t_1$	$b_0'l_2t_1$	$b_0'l_3t_1$	$b_0'l_4t_1$	$b_0'l_5t_1$	$b_0'l_6t_1$
$b_0'l_0t_0$	$b_0'l_1t_0$	$b_0'l_2t_0$	$b_0'l_3t_0$	$b_0'l_4t_0$	$b_0'l_5t_0$	$b_0'l_6t_0$

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3,066,623

SEAM FORMATION INDICATOR APPARATUS
FOR SEWING MACHINES

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4 Claims. (Cl. 112-158)

The present invention relates to apparatus for indicating seam formation adjustments on sewing machines fitted with an ornamental seam device.

In sewing machines having an ornamental seam device, connections with various control means can be established by means of adjusting knobs, changeover switches or the like setting means whereby the positions of mechanisms for determining a predetermined seam formation are changed in a periodically repeating cycle. The appropriate seam formation is automatically indicated.

The said devices determining the seam formation on so-called indirectly controlled automatic machines are the mechanisms for changing the stitch position, the stitch width and, if preferred, the material feed. On so-called directly controlled automatic machines these devices are the needle bar oscillator with its movement mechanism and, if preferred, a device for adjusting the material feed. Thus a plurality of seam formations may be sewn by a machine in accordance with the combinations between the various actuated control means of the individual devices.

The object of the present invention is to make it possible to indicate a large number of seam formations with the smallest possible number of mechanisms for establishing the connections between the devices to be controlled and the control means. This is achieved according to the invention by an arrangement of multiple indicating means such that, by the co-operation thereof, any desired seam formation is indicated on the seam forming scale.

In a preferred embodiment of the invention several indicating means, each in operative engagement with the change-over switch, or other setting means are provided and together indicate the seam formation sewn according to the adjustments of the setting means so that they point, on a field of relatively intersecting seam-forming groups, to the point of intersection of all those seam-forming groups to which the sewn seam formation belongs, in that each of these contains all the seam formations capable of being sewn in any given position of the setting means.

Further features of the invention and details of the advantages achieved thereby will be apparent from the following description in conjunction with the drawings in which several embodiments of the invention are illustrated by way of example and in which:

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

FIGURE 2 is a section on the line II-II of FIGURE 1, FIGURE 3 is a development of the drum or roller of FIGURES 1 and 2 which carries the seam formations,

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

FIGURE 5 illustrates in plan view a second embodiment in a manner similar to FIGURE 1.

FIGURE 6 is a section on the line VI-VI of FIGURE 5,

FIGURE 7 is a view on the line VII-VII of FIGURE 6.

FIGURE 8 shows a development of the drum or

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roller of FIGURES 5-7 which carry the seam formations, but illustrating the group characteristics of the seam formations instead of the seam formations themselves.

FIGURE 9 is a development of the indicating cylinder surrounding the roller in FIGURES 5-8.

FIGURE 10 illustrates a further embodiment showing a development of the drum or roller bearing the seam formations and on which group characteristics of the seam formation are shown.

In the embodiment illustrated in FIGURES 1-4 a carrier plate 2 is mounted on an arm 1 of a sewing machine by means of screws 3. Journalled on the carrier plate 2 is a vertical shaft 4 on which six pattern cam discs 5 are mounted one above the other. Only three of these are shown in the drawing. The shaft 4 is driven by the arm shaft 6 of the machine by way of pinion gears 6a and 6b or the like.

Pairs of rocking levers 8, 8a and 10, 10a are rotatably mounted on both sides of the pattern cam disc assembly on pins 12 and 13 secured to the carrier plate 2 and are rigidly connected by spindles 14 and 15 so that they each form a transmission rocker arm 9 and 11 respectively. By means of draw bars 16 and 17 they are mechanically connected in any desired manner (not shown) with the setting members of the devices for changing the stitch width and stitch length which may also be constructed in any desired manner and are therefore not shown. Springs 7 and 7a are connected to bars 16 and 17, respectively, so that the transmission rocker arms 9 and 11 are normally urged towards the shaft 4 of the pattern cam disc assembly so far as the maximum deflection of the said devices permits.

Six scanning fingers 18 and 19 are journalled to swing freely on the spindles 14 and 15 respectively and on both sides of each of the six pattern cam discs is located, on the same level therewith, one each of the six scanning fingers 18 and 19 respectively. On the same level with each one of the scanning fingers 18 and 19, there are supporting fingers 20 and 21 which project radially from a hub 22 or 23 and are arranged in stepped relationship to one another circumferentially of each hub. The hubs 22 and 23 are rigidly connected to perpendicular spindles or shafts 24 and 25, respectively which in turn are journalled in the supporting plate 2 and are each connected to a knurled knob 26 and 27 respectively projecting beyond the arm 1. A locking device (not shown) locks each of the rotary knobs 26 and 27 and consequently, the hubs 22 and 23 in the position shown in FIGURE 1 and in all positions which differ from the position shown in FIGURE 1 by a whole multiple of the angle between adjacent supporting fingers 20 and 21 respectively. These are disposed in groups of six opposite each other at spaces of $\frac{1}{4}$ of 360° so that an empty place in an otherwise uniform series of supporting fingers 20 and 21 is provided on the hubs 22 and 23 respectively. The turning of the knob 26 or 27 which operate as change-over switches or the like setting means from one locking position to another has the result that the supporting finger 20 or 21, which at any instant is in abutment with the scanning fingers 18 and 19 associated therewith, is angularly displaced out of contact therewith and another supporting finger is brought into contact with the scanning finger associated therewith. In this way it is possible selectively to bring any one of the scanning fingers 18 or 19 into operation by its supporting finger 20 or 21 respectively, while in one position of each hub 22, 23, owing to the empty place in the otherwise uniform series of supporting fingers 20 and 21, there is no contact by a finger 20, 21 with any scanning finger 18 or 19.

The supporting of any scanning finger 18, 19 has the result that the latter, on the swinging out of its scanning

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end 28 or 29 under the influence of the pattern cam disc associated therewith, cannot swing unimpeded about the spindle 14 or 15. Instead it slides on a surface 30 or 31, as the case may be, on the supporting finger 20 or 21 associated therewith and adjusts, by way 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 or 19 associated therewith are effected merely about the spindle 14 or 15 without reacting on the transmission rocker arm 9 or 11. Therefore only the pattern cam disc, the scanning finger 18 or 19 of which co-operates with the supporting finger 20 or 21, is operative.

If, owing to the empty place in the series of scanning fingers 20 or 21, none of the scanning fingers 18 or 19 of a transmission rocker arm 9 or 11 is supported, none of the cam discs acts on the appropriate transmission rocker arm 9 or 11, since the latter can be swung out only as far as the maximum deflection of the device of the sewing machine connected therewith towards the pattern cam disc and even in this position, which is approximately the most remote, the scanning fingers 18 or 19, owing to the empty place on the roller 22 or 23, have sufficient space outside the area of the greatest curve radius. In this operative condition the appropriate device of the sewing machine can be locked by hand in any desired position over its entire range of adjustment.

Secured to the plate 2, by means of screws 32, 33, are bearing arms 34, 35, in which shafts 36, 37 are respectively journaled to rotate but are prevented from axial displacement. Both shafts 36 and 37 extend into bore 38 of a drum or roller 39, but although the shaft 36 is non-rotatably connected with 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 indicating cylinder 42 surrounding the roller 39 at a small distance therefrom.

Mounted by means of a set screw 43 on the shaft 36 is a helical gear wheel 44 while a similar helical gear 46 is mounted on the shaft 37, and is keyed thereto by a set screw 45.

The gears 44, 46 engage respectively with a helical gear wheel 47 on the shaft 24 and a helical gear wheel 48 on the shaft 25. In this manner angular displacement of the knobs 26 and 27, apart from the selection of a pattern cam disc already described above, effects rotation of the shafts 36 and 37 through the same angle of displacement of the knobs 26, 27 since the helical gear wheel transmissions 44—47 and 46—48 have the ratio 1:1, in each case.

The development of the drum or roller 39 shown in FIGURE 3 shows the seam formations in seam forming groups $l_0, l_1, l_2, l_3, l_4, l_5, l_6, b_0, b_1, b_2, b_3, b_4, b_5$, and b_6 , each group l_1 of which contains the seam formation capable of being sewn when switching the stitch position adjusting device to one of the pattern cam discs, that is to say, when adjusting this device to one of its possible cycle forms, and likewise each group b_1 contains the seam formation capable of being sewn with the adjustment of the stitch width adjusting device to one of its possible cycle forms. The stitch forming groups l_0 — l_6 form together a number of stitch-forming series which traverse the series of the group b_0 — b_6 . The series of the group b_0 — b_6 extend parallel to the axis of the roller 39 and to an indicator window 49 in the cover 50 of the machine casing. By turning the knob 26 used for changing over, any desired series out of the groups b_0 — b_6 can be brought into register with the indicating window 49, while the appropriate automatically controlled cycle is simultaneously adjusted for the stitch width adjusting device.

The transparent indicating cylinder 42 which can be

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turned by the knob 27 acting as a change-over switch, and a development of which is shown in FIGURE 4, is provided with diagonal indicating marks 51, each of which is associated with the stitch-forming group l_1 and when it appears under the indicating window 49 in the cover 50 the seam formation of the associated group l_1 capable of being sewn is indicated when the knob 27 is in this position of adjustment. At the same time, the stitch position adjusting device is simultaneously adjusted to the appropriate automatic control cycle.

The indicating 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 intersection point of the seam formation group b_1 and l_1 , with which the sewn seam formation is associated.

The seam forming groups b_0 and l_0 each correspond to the position of the knobs 26 and 27 in which, owing to the empty place in the otherwise uniform series of supporting fingers 20 or 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 point of intersecting b_0 and l_0 is indicated by the word "off" which indicates to the operator the switched-off position of the entire automatic control device.

The embodiment shown in FIGURES 5—9 is a variation of that in FIGURES 1—4 where the automatic control is provided by three devices on the sewing machine which influence the seam formation. The basic construction corresponds to that shown in FIGURES 1 and 2, and for this reason is not dealt with hereinafter in greater detail as far as the identical parts are concerned.

Differing however from the construction illustrated in FIGURES 1 and 2 two transmission rocker arms 111 and 153 are now provided on the pin 113, instead of a single transmission rocker arm, each with a draw bar 117 and 154 and a spindle 115 and 155 for the scanning fingers 119 and 156. On the transmission rocker arm 111 there are only four scanning fingers 119 (see FIGURE 6) and for this reason the hub 123 also carries only four supporting fingers 121 which are relatively separated by angles of $\frac{1}{5}$ of 360° . In this way an empty place is again produced in an otherwise regular series of supporting fingers 121.

The knob 127 connected to the shaft 125 accordingly has five locking positions (four for the working positions of the four supporting fingers 121 and one for the empty position on the hub 123). Accordingly the indicating cylinder 143 driven from the shaft 125 by way of the helical gear wheels 148 and 146 has only five diagonal indicating marks 151 (FIGURE 9). The stitch position adjusting device controlled by the transmission rocker arm 111 and the draw bar 117 can therefore be adjusted only to four different automatically controlled pattern discs or—when the control is switched off—by hand to a fixed value.

While the knob 127, the helical gear wheels 148 and the hub 123 are rigidly connected to the shaft 125, a roller 157 is mounted to rotate loosely on the shaft 125. The roller 157 carries two supporting fingers 158 and an operating arm 159 which is connected by way of a link 160 to a switch lever 161. The latter is pivotally journaled about a spindle 162 on the supporting plate 102 and engages by means of a locking device (not shown) in three positions, one of which is indicated in full lines in FIGURE 5 while the two others are shown in chain dotted lines. In the two outer positions of the switch lever 161 one of the two supporting levers 158 is in the operative position in each case, i.e. in abutment with the scanning finger 156 associated therewith. In the center position of the switch lever 161 both scanning fingers 156 are unsupported, the device controlled by the transmission rocker arm 153, which in the em-

bodiment illustrated is the device for changing the material feed, is available for hand adjustment.

Journalled on the inside cover 150, below the indicating window 149, is a slide 164, which is constructed in the manner of a comb with five teeth or pointers 163, the slide having slots 166 in which pins 165 of the cover 150 engage. When the cover is in position the switch lever 161 engages in a recess 167 of the slide 164 and during its displacement into any of its three operative positions, it displaces the slide into three corresponding indicating positions and the pointer 163 into three adjacent positions registering with a window 151 in the cylinder 142.

In the development of the seam formation roller 139 shown in FIGURE 8 the group characteristics of the seam formation are illustrated instead of the seam formations which in reality exist. Apart from the seam forming group l_1 and b_1 shown in the embodiment of FIGURES 1-4, which have the same meaning as in FIGURE 8 but wherein merely the number of the groups l_1 is reduced from seven to five the seam formations are arranged in three other groups which traverse the groups b_1 and l_1 . All the seam formations which in FIGURE 8 have the reference t_0 are associated with one of these three groups, those bearing the reference t_1 are associated with the second group and those which bear the reference t_2 with the third group. The indication of a group t_0 , t_1 or t_2 is effected by the slide 164 provided with the five indicators 163 in agreement with the three switch positions of the switch lever 161. The indication of the group t_0 is effected, if neither of the two supporting fingers 158 is in the operative position, i.e. when the device for the changing of the material feed is free for hand adjustment, which is when the automatic feed mechanism is switched off. The groups t_1 and t_2 contain the seam formations which can each be sewn in any given cycle of the automatic feed control mechanism.

FIGURE 10 shows the arrangement of the stitch forming groups on the development of the roller 239 in accordance with the third embodiment of the invention. The mechanical construction of the roller corresponds substantially to that in FIGURES 1-3, and is therefore not shown. The difference lies solely in the feature that the transmission rocker arm 9 is replaced by two transmission rocker arms one having four and the other two scanner fingers (similarly to the transmission rocker arms 11 and 153 of the second embodiment). On the other hand, the six supporting fingers for the total of six scanning fingers of these two transmission rocker arms replacing the one are rigidly connected to a single shaft and can thus be actuated by a single knob similar to the knob 26 of the first embodiment.

The arrangement according to FIGURE 10 thus represents a combination of the first and second embodiments since, as in the first embodiment it is only necessary to operate two change-over switches in the form of the two knobs and in the second embodiment the material feed, in addition to the stitch position and stitch width, can also be controlled, viz. from the transmission rocker arm by the two scanner fingers, while the rocker arm with the four scanner fingers serves to control the stitch width.

Thus an arrangement of the stitch forming groups is obtained as shown in FIGURE 10, the stitch forming group b_3 containing for example all the stitch formations in whose field, according to FIGURE 10, the sign b_3 is contained. The group b_3 is shown for example shaded in FIGURE 10 for greater clarity.

When the groups b_0 or l_0 or t_0 is indicated, the automatic stitch width or stitch position or material feed control is switched off. As shown by the arrangement of the groups in FIGURE 10, it is not possible in this construction to control the stitch width and feed simultaneously automatically; this disadvantage is compensated however by the simplified form of construction in comparison with that of FIGURES 5-9.

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 in a limiting sense.

We claim:

1. Indicating means for a zig-zag sewing machine of the type comprising a plurality of different stitch guiding means adapted in combination to selectively produce different ornamental patterns and setting means for said guiding means including changeover switches or the like, said indicating means including a plurality of indicating devices each operatively connected with one of said setting means and adapted to be moved thereby in unison with the particular guiding means associated therewith, markings on one said indicating device and movable therewith relative to another of said indicating devices, said other indicating device having markers adapted to register with and expose said markings one at a time to reflect the symbol for the pattern setting obtained by cooperation of two said guiding means to which said indicating devices are connected, said devices being in the form of drums arranged one inside the other, said markings being arranged in seam formation groups circumferentially of one said drum and said markers being in the form of windows disposed in steps and longitudinally of the other said drum.

2. Indicating means for a zig-zag sewing machine of the type comprising a plurality of different stitch guiding means adapted in combination to selectively produce different ornamental patterns and setting means for said guiding means including changeover switches or the like, said indicating means including a plurality of indicating devices each operatively connected with one of said setting means and adapted to be moved thereby in unison with the particular guiding means associated therewith, markings on one said indicating device and movable therewith relative to another of said indicating devices, said other indicating device having markers adapted to register with and expose said markings one at a time to reflect the symbol for the pattern setting obtained by cooperation of two said guiding means to which said indicating devices are connected, said devices being in the form of drums arranged one inside the other, said markings being arranged in seam formation groups circumferentially of one said drum and said markers being in the form of windows disposed in steps and longitudinally of the other said drum, and an indicating window common to coinciding positions of said markings and said markers, and said drums being rotatable in response to operating of said setting means.

3. Indicating means for a zig-zag sewing machine of the type comprising a plurality of different stitch guiding means adapted in combination to selectively produce different ornamental patterns and setting means for said guiding means including changeover switches or the like, said indicating means including a plurality of indicating devices each operatively connected with one of said setting means and adapted to be moved thereby in unison with the particular guiding means associated therewith, markings on one said indicating device and movable therewith relative to another of said indicating devices, said other indicating device having markers adapted to register with and expose said markings one at a time to reflect the symbol for the pattern setting obtained by cooperation of two said guiding means to which said indicating devices are connected, said devices being in the form of drums arranged one inside the other, said markings being arranged in seam formation groups circumferentially of one said drum and said markers being in the form of windows disposed in steps and longitudinally of the other said

drum, each said setting means including a shaft and a plurality of setting fingers spaced equally around said shaft with one empty position between two of said fingers constituting the inoperative position of said pattern setting means.

4. Indicating means for a zig-zag sewing machine of the type comprising a plurality of different stitch guiding means adapted in combination to selectively produce different ornamental patterns and setting means for said guiding means including changeover switches or the like, said indicating means including a plurality of indicating devices each operatively connected with one of said setting means and adapted to be moved thereby in unison with the particular guiding means associated therewith, markings on one said indicating device and movable therewith relative to another of said indicating devices, said other indicating device having markers adapted to register with and expose said markings one at a time to reflect the symbol for the pattern setting obtained by cooperation of two said guiding means to which said indicating devices are

connected, said devices being in the form of drums arranged one inside the other, said markings being arranged in seam formation groups circumferentially of one said drum and said markers being in the form of windows disposed in steps and longitudinally of the other said drum, said guiding means including stitch location, stitch width and one other stitch formation control means and said markings on said drum including several groups of seam formation series arranged in intersecting groups.

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