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MAY 11, 1943.

BY A. P. C.

F. LUTZ
EDGE ORNAMENTATION FOR FABRICS AND IN
METHODS AND MACHINES FOR PRODUCING IT
Filed Sept. 8, 1939

Serial No.

293,903

6 Sheets-Sheet 1

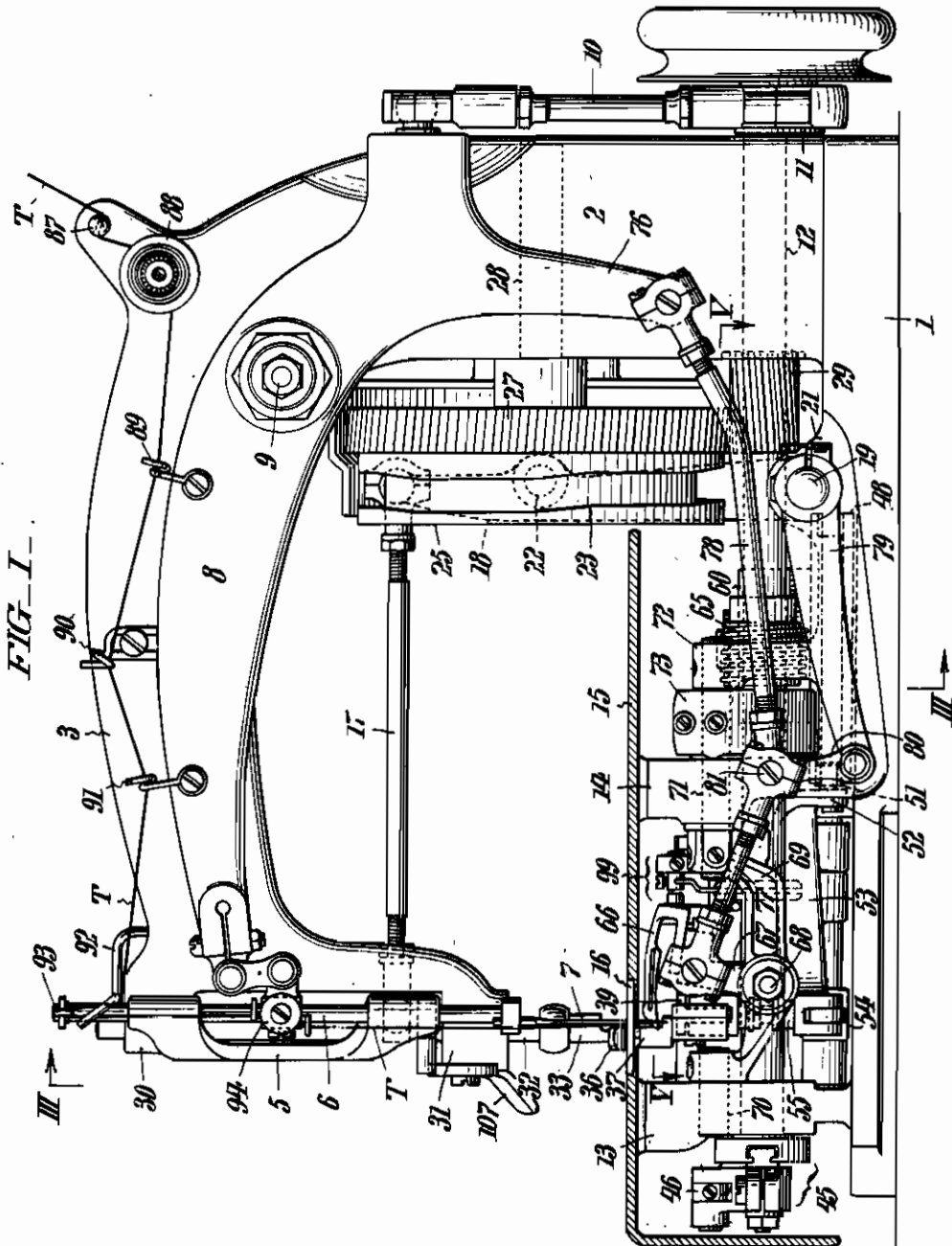


FIG. I.

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William Bree, Jr.

INVENTOR:
Frederick Lutz,
 BY *Paul Paul*
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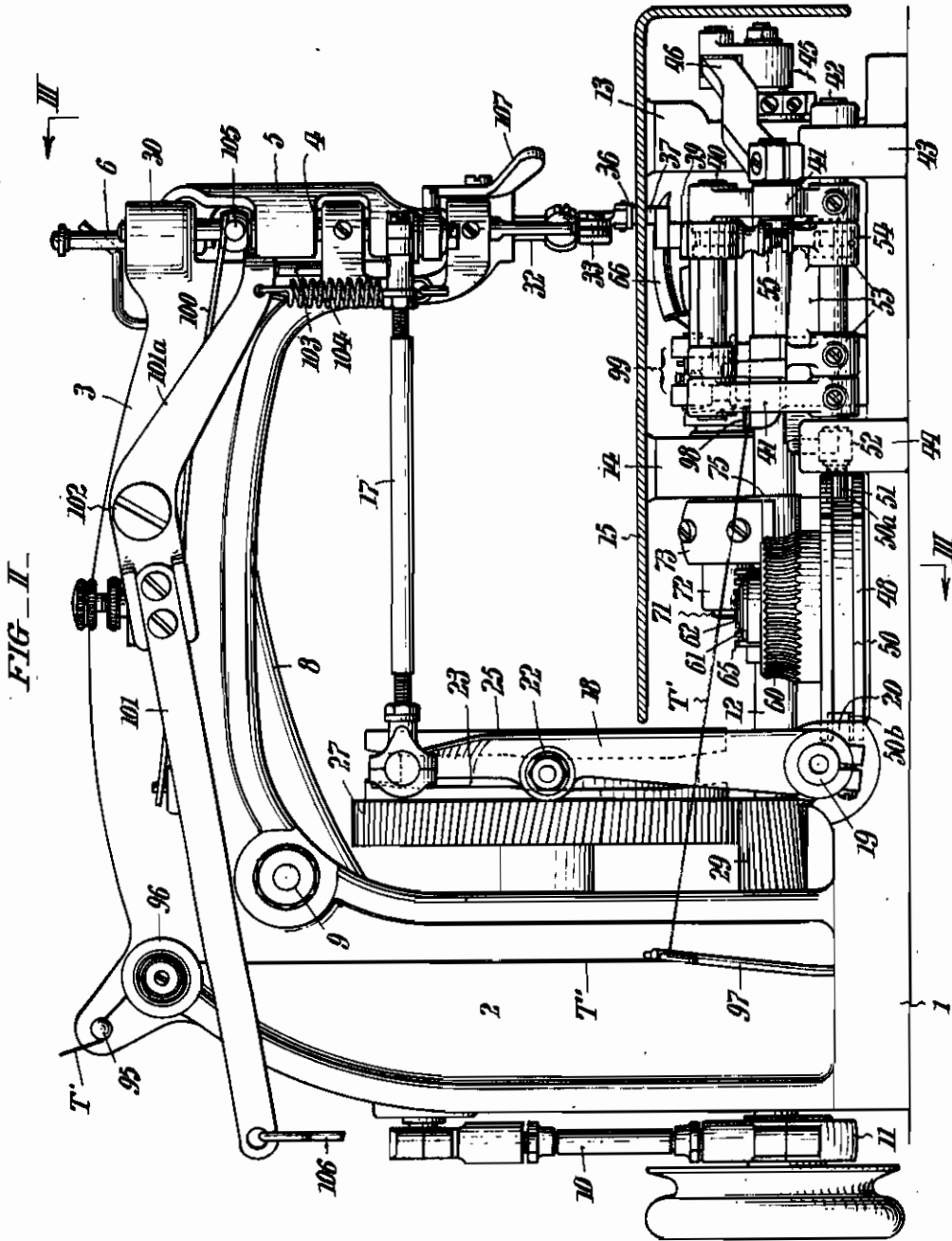


FIG. II

WITNESSES:
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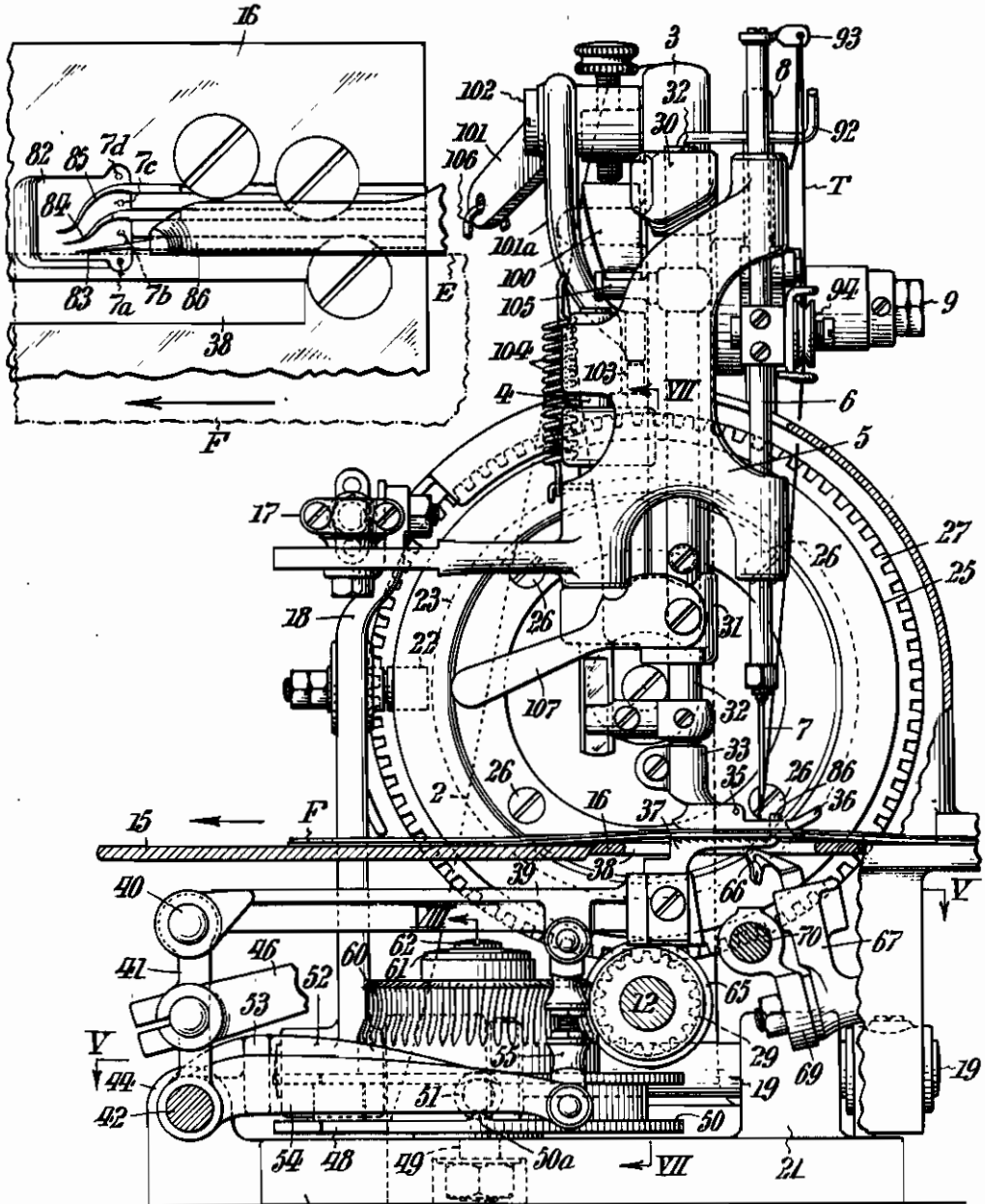
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FIG. IV

FIG. III



WITNESSES:
Herbert Fuchs
William Bell, Jr.

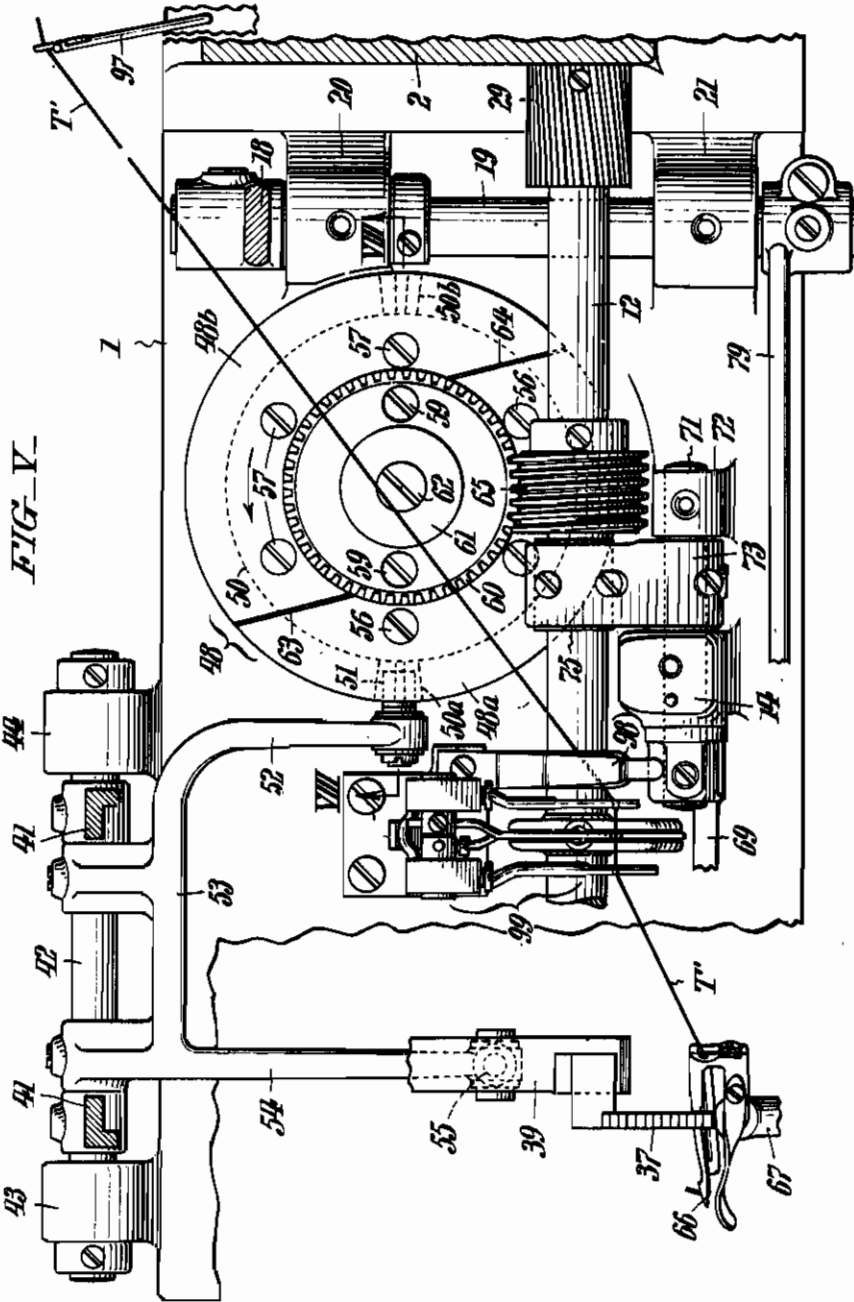
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WITNESSES:
Hubert Fuchs
William Bell, Jr.

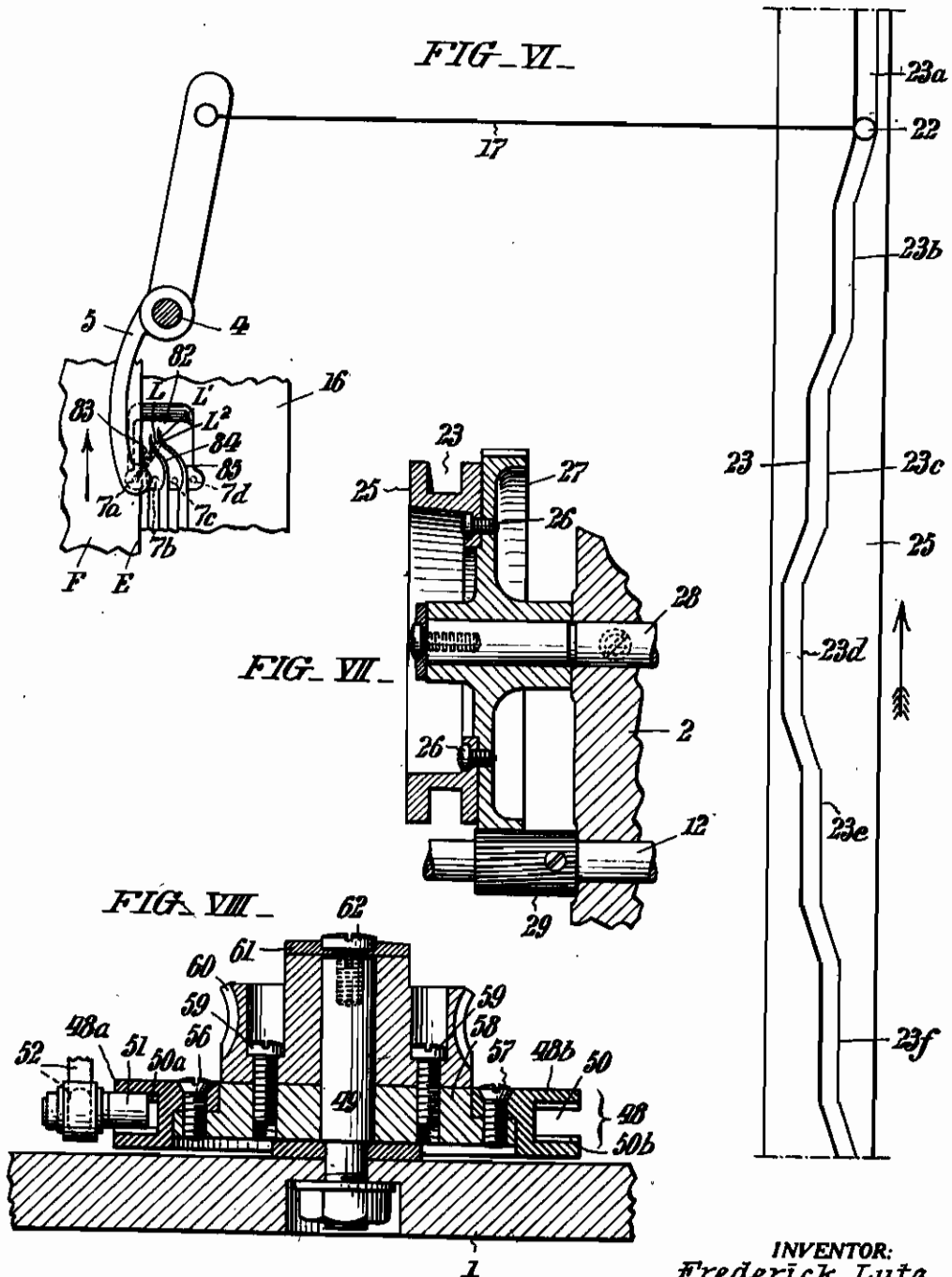
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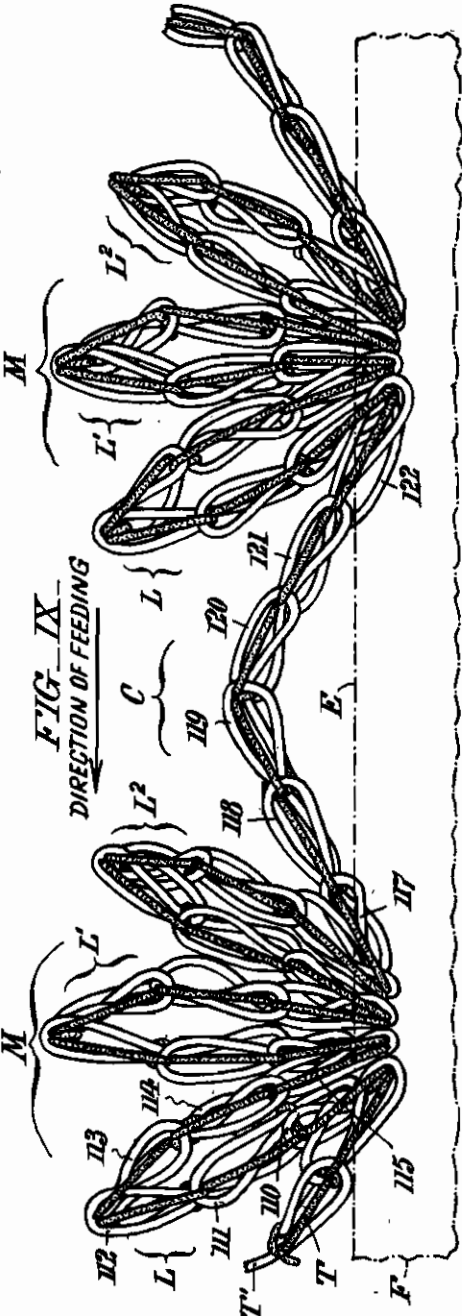
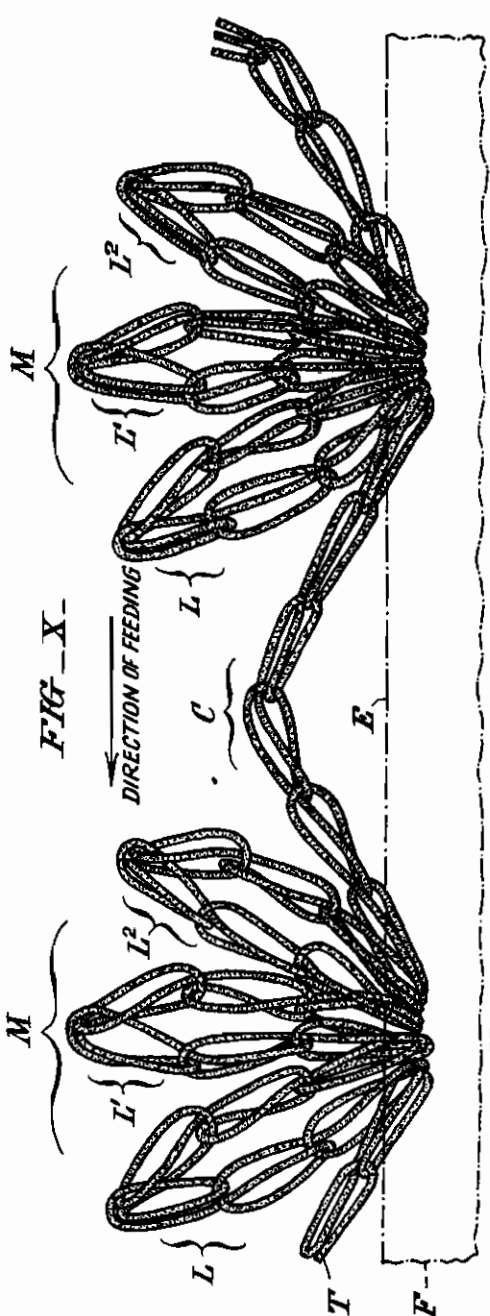
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6 Sheets-Sheet 6



WITNESSES:
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ALIEN PROPERTY CUSTODIAN

EDGE ORNAMENTATION FOR FABRICS AND IN METHODS AND MACHINES FOR PRO- DUCING IT

Frederick Lutz, Stuttgart/W., Wuerttemberg,
Germany; vested in the Alien Property Custodian

Application filed September 8, 1939

This invention relates to edge ornamentation for fabrics, and it is also concerned with methods and machines for producing such ornamentation.

The chief aim of my invention is to make possible the production of ornamentation edging which is characterized by spaced design figures each consisting of one or more loop projections respectively composed of chain stitches whereof the first and the last stitches only pass through the fabric and penetrate it at the same point, and in which the figures are connected by stitch chains, which, except for the first and last stitches, are free of the fabric edge. This objective I attain as hereinafter more fully disclosed, through provision in connection with sewing machines of improved mechanism for governing the stitch forming and feeding elements and of improved means for controlling the stitches in such a way during their formation as to determine production of ornamentation characterized as above.

Another aim of my invention is to provide in a sewing machine having the above attributes, for the ready interchange of the parts of the mechanism for governing the stitch forming and feeding means, so that the machine may be arranged to predetermine variations in the ornamentation produced.

Other objects and attendant advantages will appear from the following detailed description of the attached drawings, wherein Fig. I is a view partly in front elevation and partly in longitudinal section, of a sewing machine conveniently embodying my invention.

Fig. II is a view of the machine partly in rear elevation and partly in longitudinal section.

Fig. III is a cross sectional view of the machine taken as indicated by the angled arrows III—III in Figs. I and II.

Fig. IV is a fragmentary detail view in plan of the throat plate of the machine drawn to a larger scale.

Fig. V is a horizontal section taken as indicated by the angled arrows V—V in Figs. I and III, with portions of the machine removed or broken away and others in section.

Fig. VI is a diagrammatic view showing how the needle of the machine is shifted to different position incident to the formation of the edging.

Figs. VII and VIII are fragmentary sectional views taken as respectively indicated by the arrows VII—VII and VIII—VIII in Figs. III and V.

Fig. IX is a diagrammatic view on an enlarged scale showing ornamental edging produced with two threads; and

Fig. X is a view like Fig. IX of generally similar ornamental edging formed from a single thread.

Except as hereinafter specifically pointed out, the sewing machine herein illustrated is generally like that featured in U. S. Patent No. 1,919,852 granted to me on July 25, 1933, having a base or bed 1 with a standard 2 at one end thereof supporting an overhanging arm 3. Fulcrumed to swing about a vertical axis 4 at the outer or distal end of the arm 3 is a yoked lever 5 in which a bar 6 is confined for axial reciprocation, said bar having a needle 7 removably secured in its lower end. The needle bar 6 is actuated by a lever 8 which swings about a stud 9 on the overhanging arm 3, and which is oscillated, through a strap rod 10, by an eccentric 11 on the drive shaft 12 of the machine. As shown, the shaft 12 is suitably journaled at its front end in a pillar 13 rising from the base 1, and at its rear end in the standard 2, said pillar also serving, in conjunction with a post 14, to sustain the work support 15 of the machine into which the throat plate 16 is set. The needle bar carrying yoke lever 5 is oscillated about its vertical fulcrum axis 4 through the medium of a horizontal link 17 from a vertical arm 18 affixed to a transverse rock shaft 19 which is journaled in bearings 20 and 21 afforded by the base 1 adjacent the standard 2. Intermediate its ends the arm 18 carries a roller 22 which engages the circumferential groove 23 of a vertically arranged cam disk 25. In accordance with my present invention, the groove 23 of the cam 25 is formed with a series of laterally spaced steps or dwells 23a, 23b, 23c, 23d, 23e, and 23f, see Fig. VI, whereof the purpose will be later on explained. As shown in Figs. I, II and VII, the cam disk 25 is removably secured by screws 26 to a gear wheel 27 which is free to revolve about a horizontal shaft 28 secured against rotation in the standard 2 at an elevation above the shaft 12, and which meshes with a driving pinion 29 on the last mentioned shaft. Slidably guided in bearing lugs 30 and 31 at the free end of the frame arm 3 is a presser bar 32 with a shank member 33 (Fig. III) at its lower end whereto is pivoted at 35, a presser foot 36. The feeding mechanism of the machine includes a feed dog 37 whereof the toothed portion operates through a slot 38 in the throat plate 16 to coact with the presser foot 36 in advancing the fabric F which is to be ornamented. The feed dog 37 is secured, with capacity for vertical adjustment, to a transversely extending horizontal feed bar 39 whereof the rear end is pivotally connected to a pin 40 carried between the upper ends

of vertical rocker arms 41 which are secured to a rock shaft 42 having journal support at opposite ends in the lugs 43 and 44 on the base 1, see Figs. II, III and V. The feed bar 39 receives its horizontal feed movements from an adjustable crank member 45 (Fig. I) at the outer end of the shaft 12, with which crank member one of the rocker arms 41 is connected by means of a horizontal link 46 (Figs. I, II, and III).

The mechanism for imparting the up and down or lift movements to the feed dog 37 is similar to that featured in U. S. Patent Number 2,103,478 granted to me on December 28, 1937. As shown, it includes a horizontally-arranged rotary disk 48 which is mounted for free rotation about a stud 49 (Fig. VIII) rising from the base 1. The circumferential groove 50 of the cam 48 is engaged by a roller 51 on the short arm 52 of a horizontal yoke 53 secured to the shaft 42, see Figs. II, III and V. The other or longer arm 54 of the yoke 53 is connected by a short adjustable vertical link 55 to the feed bar 39 near the swinging end of the latter, see Figs. III and V. In accordance with my present invention, the groove 50 of the cam 48 is formed at diametrically opposite points with vertical offsets 50a and 50b for a purpose also later on set forth. As shown in Figs. V and VIII, the cam 48 is composed of two sections 48a and 48b which are secured by means of screws 56 and 57 to a center or core plate 58 rotatively free on the stud 49. In turn, secured in axial relation to the cam 48 by screws 59, is a worm wheel 80. A washer 61 secured by a screw 62 engaging axially into the top of the stud 49, serves as a means to hold the cam 48 and the worm wheel 80 down in place on said stud. It is to be particularly noted from Fig. V that the cam 48 is split along tangential lines 63, 64 in order that its sections 48a and 48b may be readily removed edgewise from the machine for convenience of interchanging them for others when desired or required. The worm wheel 80 is driven in the direction shown by the arrow in Fig. V by an intermeshing worm 85 affixed to the shaft 12.

Arranged to cooperate with the needle 7 beneath the work support 15 is a four motion thread carrying looper 68 which is supported in a holder 67. The looper 68 receives its loop taking and shedding movements by swinging of the holder 67 about a lateral stud projection 88 on a cradle rocker 69, which, at one end is secured to a trunnion 70 having journal support in the web 13, and which at the other end is secured to a trunnion shaft 71 extending through the post 14 and a bearing lug 72 somewhat to the right of said post in Figs. I and V. Affixed to the trunnion shaft 71 in the interval between the post 14 and the bearing lug 72 is an arm 73 whereof the swinging end is forked to engage over a rotary eccentric cam 75 on the shaft 12, see Figs. I and V. The connections just described constitute the means whereby needle avoiding movements are imparted to the looper 68. As shown in Fig. I, the needle actuating lever 8 has a downward extremity 76 with which the looper holder 67 is coupled by a pair of serially arranged links 77 and 78 whereby loop taking and shedding movements are induced in the element 68. To the end of the rock shaft 19 opposite to that occupied by the vertical arm 18, is secured a horizontal arm 79 (Fig. I), which, through a short vertical link 80, is coupled with a common pivot 81 connecting the links 77 and 78, whereby the operative position of the looper 68 is changed to

correspond with changes in the position of the needle 7 under the influence of the rotary cam 25.

In accordance with my present invention, the throat plate 16 is provided within its needle hole 62, with three laterally-spaced stitch fingers 83, 84, and 85 which extend in the direction of feeding (indicated by the arrows in Fig. IV in the intervals between the four dwell positions 7a, 7b, 7c and 7d determined for the needle by the rotary cam 25. The fingers 83-85 are all curved toward the edge of the fabric F which is held to a straight line path so as to travel in the illustrated instance in a line between the position 7a for the needle and the finger 83, by means of a guide member 88 adjustably secured to the top of the work support 15. The finger 83 nearest the fabric edge is curved but slightly, while the other two fingers 84 and 85 are more pronouncedly curved so that their ends are brought very close to the fabric edge. The fingers 84 and 85 are moreover reversely curved sharply at their ends for a reason which will presently be explained.

The machine is provided as usual with a suitable means for controlling the needle thread which is designated in Figs. I and III by the letter T. The needle thread T passes from a suitable source of supply (not illustrated) through a fixed guide eye 87, then between a pair of tensioning disks 88 on the frame arm 3, then through an eye 89 on the needle arm 8, then through another fixed eye 90 on the frame arm, then through another eye 91 on the needle arm, then under a fixed guide member 92, then through an eye 93 at the top of the needle bar 8, and finally through a second tensioning device 94 on the needle bar from whence it passes directly to the eye of the needle 7. As a consequence of this arrangement, the needle thread T is taken up each time that the needle bar 8 rises to pull up the previously formed stitch. The looper thread designated T' is drawn from a separate source of supply (not illustrated) and passes first through a fixed eye 95 on the frame arm 3, then through a disk tension 96, then through a fixed eye 97 on the base 1 (Figs. II and V), then through a spring pinch tension 98, then through a rotary take up 99 of a well-known construction operated from the shaft 12, and finally to the eye of the looper 68.

For convenience of lifting the presser foot 36 in opposition to a leaf spring 100 (Fig. II) which acts on the presser bar 32, the machine is provided with a lever 101 which is fulcrumed intermediate its ends on a pivot stud 102 projecting laterally from the frame arm 3. The end of the short arm 101a of the lever 101 is normally held down in contact with a fixed stop 103 on the frame arm 3 by a helical tension spring 104 and underreaches a lateral stud projection 105 on the presser bar 32. The lever 101 is connected through a link rod connection 106, with an operating foot treadle, not illustrated. By means of the latch shown at 107 in Figs. I-III, the presser foot 36 may be locked in raised position when necessary or desired.

The operation of the machine is as follows: Assuming the fabric F to be stationary and the needle 7 in the position 7a in Fig. IV which is determined by the step 23a of the cam 25, see Fig. VI. In making its first reciprocation, the needle 7 passes through the fabric F immediately inward of the edge E, (which as hereinbefore described, is directed by the guide) and as a consequence of its coaction with the looper 66, a stitch 110 (Fig. IX) is formed. As the cam 25

rotates in the direction of the arrow in Fig. VI, the needle is moved laterally to the position 7b by the step 23b of said cam, and in making its succeeding reciprocation passes down through the interval between the fingers 83, 84 beyond the edge of the fabric, with the result that the stitch 110 is completed over the finger 83 and a new stitch 111 (Fig. IX) is formed. As the cam 25 rotates further, the needle is brought to the position 7c by the step 23c and reciprocated in the interval between the fingers 84, 85 with completion of the stitch 111 over the finger 84 and the formation of another new stitch 112. Upon further movement of the cam 25, the needle is brought to the position 7d by the step 23d and is reciprocated beyond the finger 85 with attendant completion of the stitch 112 over said finger and the formation of another new stitch 113. During the completion of the instant rotation of the cam 25, the direction of lateral needle shifting is reversed as the roller 22 successively passes through the step 23e (which corresponds to step 23c) and the step 23f (which corresponds to step 23b) and finally re-enters the step 23a, with attendant positioning of the needle successively in the positions 7c, 7b and 7a and formation of the stitches 113, 114 and 115 over the fingers 85, 84 and 83. In this excursion of needle shifting, a flat loop L of six chain stitches is formed, whereof the first and last stitches 110 and 115 pass through the fabric at the same point. Through two more needle excursions in precisely the same manner, the fabric F still stationary, additional loops L' and L² are formed with the first and last stitches of each passing through the fabric at the same point as the first and last stitches of the first loop L as clearly shown in Fig. IX. Due to the complemental curving of the stitch fingers 83-85 and taking up on the needle and looper threads T, T' incident to stitch formation, the chain stitch loops L, L' and L² are caused to shift toward the edge of the fabric as shown in Fig. VI, but are detained by the reversely curved ends of the fingers 84, 85. As a consequence of this control, it will

be seen that the individuality of the loops L-L² is preordained. During the next rotation of the cam 25 after completion of the three loops L-L², a chain C of six stitches 117, 118, 119, 120, 121 and 122 is produced. However, just before the formation of the last stitch 122 of this chain C, the fabric F is shifted by momentary lifting of the feed dog 37 through actuation of the yoke member 53 by one of the rises 50a, 50b of the rotary cam 48, so that the said last stitch 122 is caused to penetrate the fabric at a point further along the edge of the latter as clearly shown in Fig. IX, with the intermediate loops of the chain entirely free of the fabric edge. By the shift of the fabric F as just explained, the loops L-L² are pulled off and away from the stitch fingers 83-85, the edge ornamentation resulting from repetitions of the above cycle. Upon release, the flat loops L-L² constituting the unit figure M of the design take radial positions relative to the point at which the fabric is penetrated by the needle and thus create a sunburst effect as shown in Fig. X, wherein the needle thread T has been stippled so that it may be readily distinguished from the looper thread T'. The throw of the feed dog 37 is preferably so adjusted as to determine breaking of each chain C at the middle with its two segments extending radial to the centers of the two adjacent figures M which it connects.

By changing the number of steps in the rotary cam 25, the number of stitch fingers, the number of rises in the cam 48, and/or the ratio of the gears 27, 29 and 60, 65, it will be evident that considerable variation may be had in the design of the ornamentation.

As a further alternative, by substituting a spreader for the thread carrying looper 66, it is possible to produce designs such as shown in Fig. X with the needle thread T alone. How the latter change may be effected will be readily understood by those familiar with the operation and use of sewing machines without the need of separate illustration or further explanation.

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