Aug. 27, 1963 F. GEGAUF, JR 3,101,685

AUTOMATIC ORNAMENTAL SEWING MACHINE

Filed Jan. 8, 1962 5 Sheets-Sheet 1

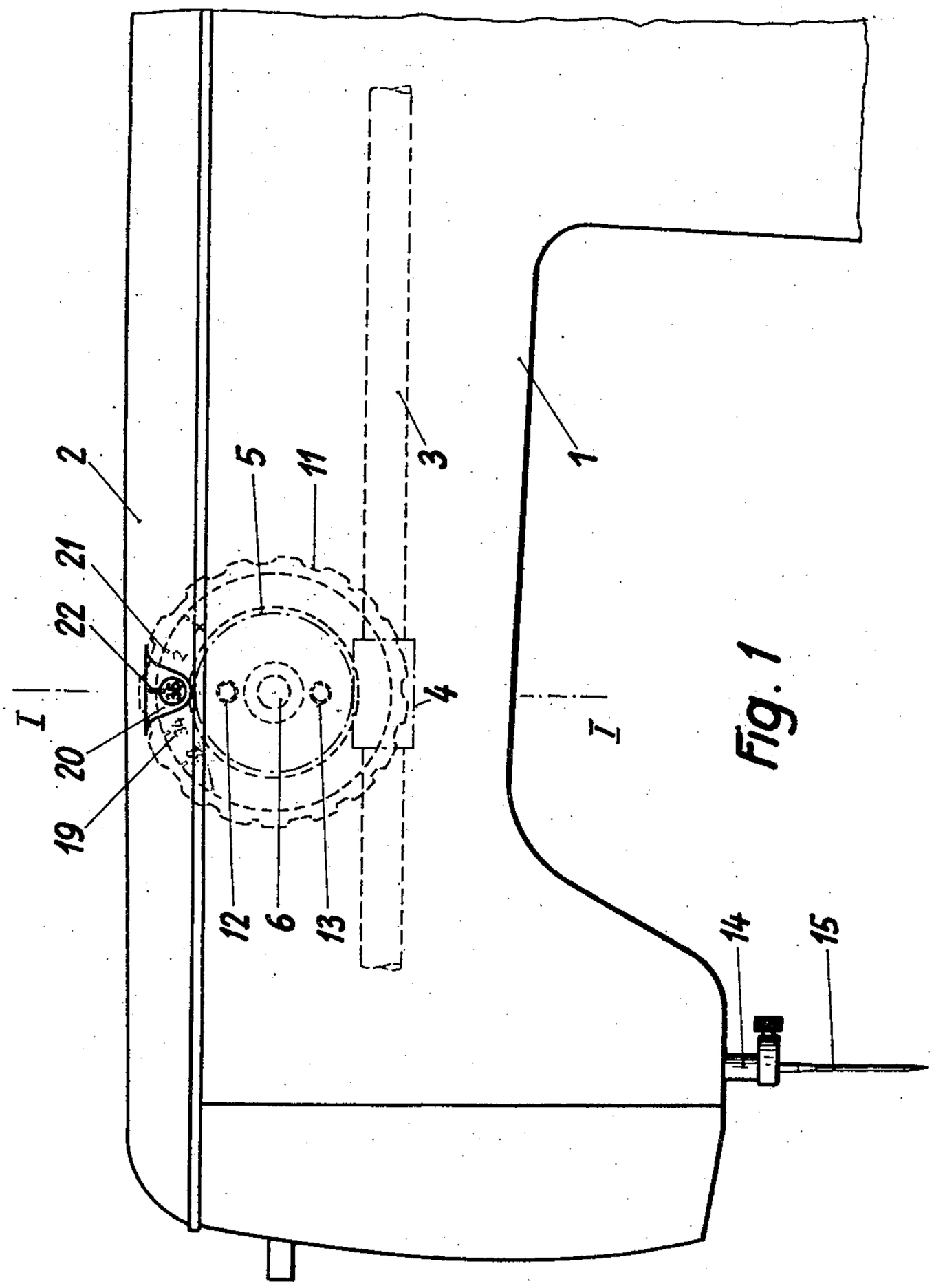

Fig. 1

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AUTOMATIC ORNAMENTAL SEWING MACHINE

Filed Jan. 8, 1962 5 Sheets-Sheet 2

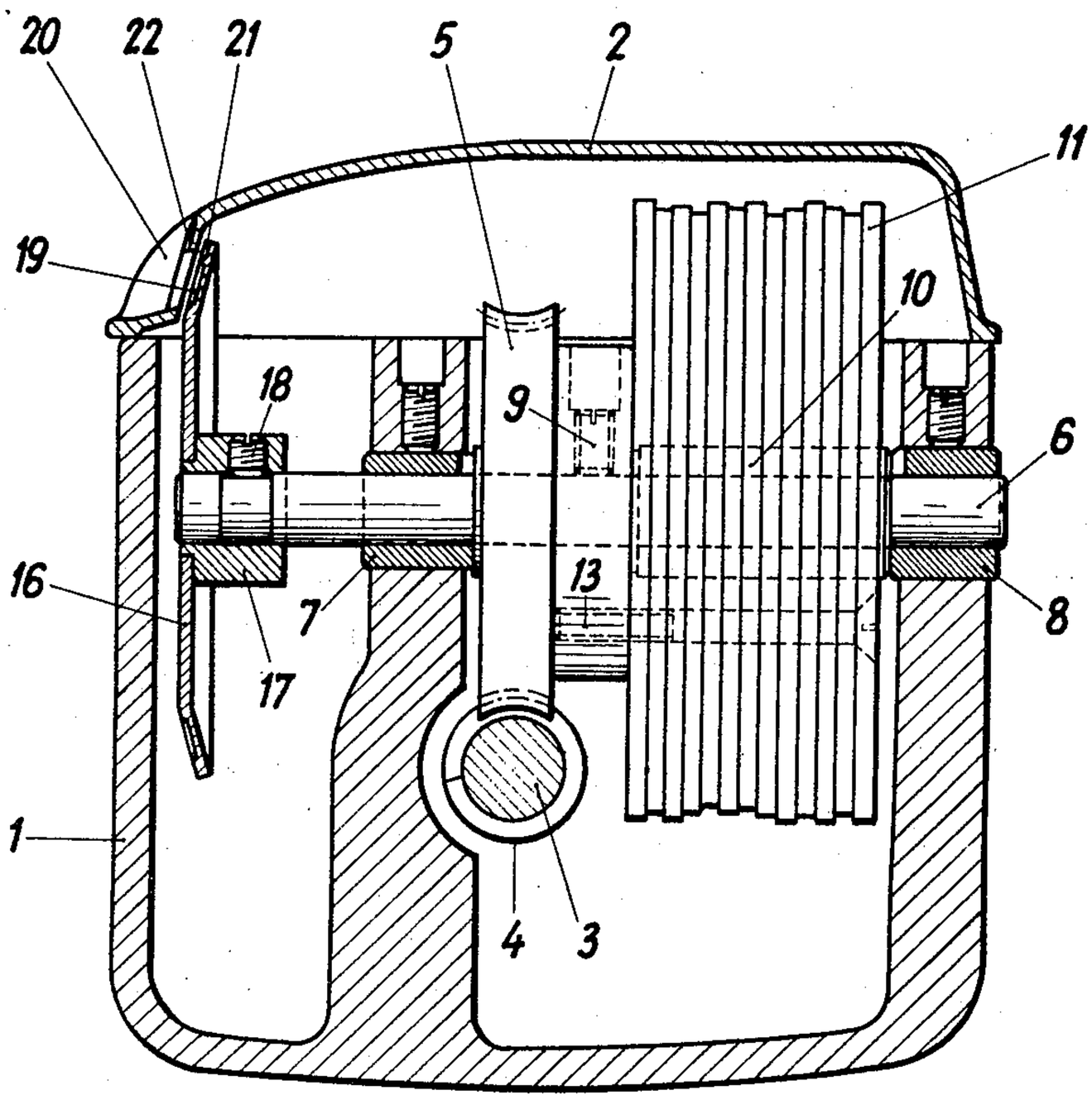

Fig. 2

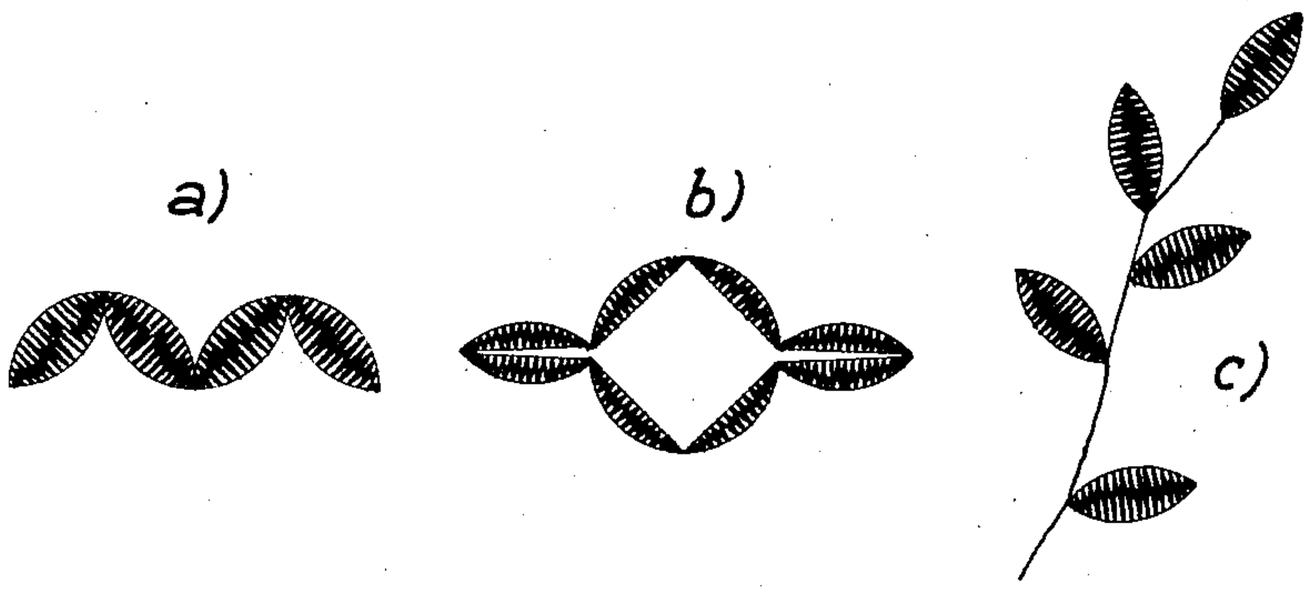

Fig. 3

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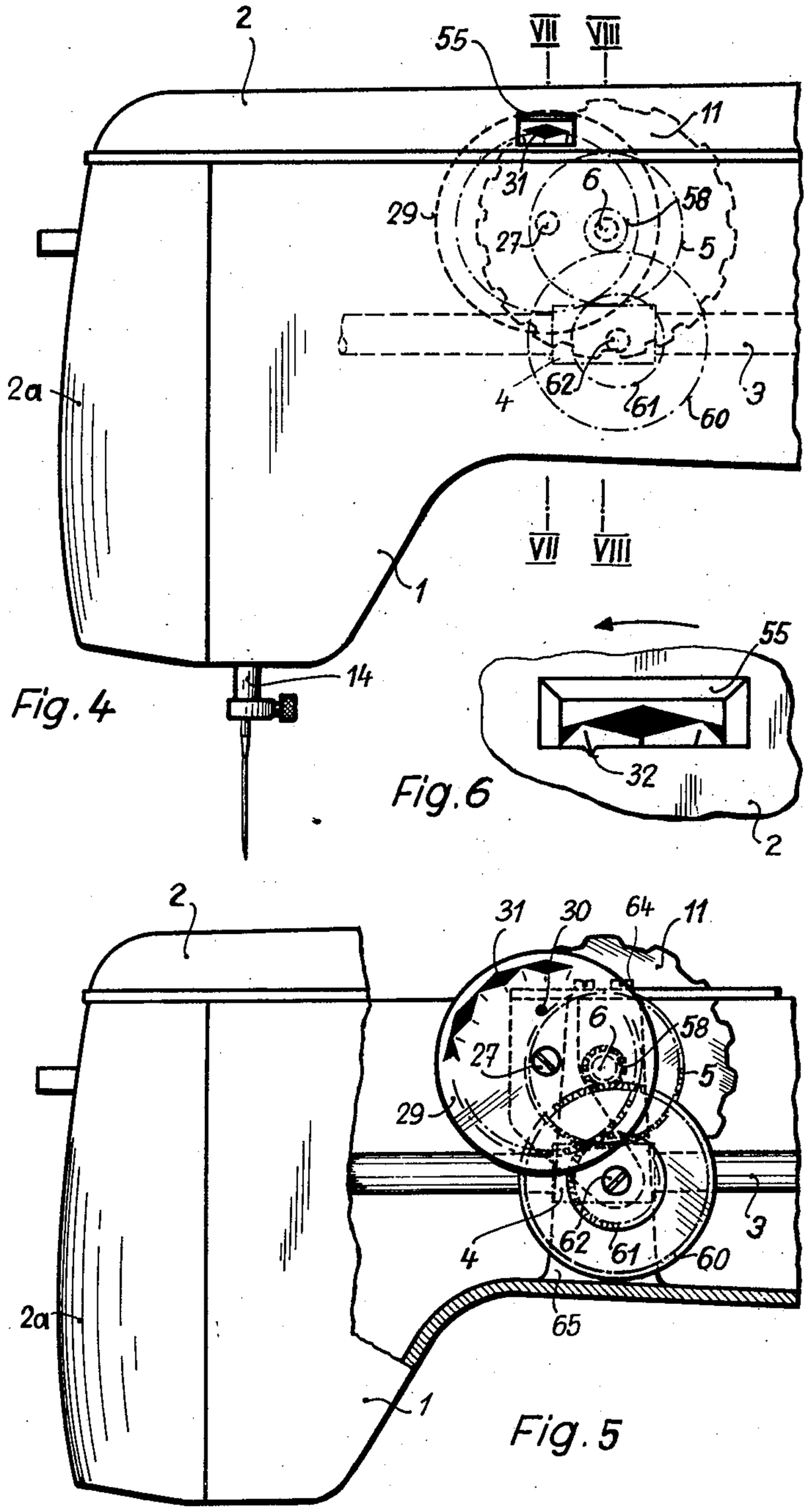

Fig. 4

Fig. 6

Fig. 5

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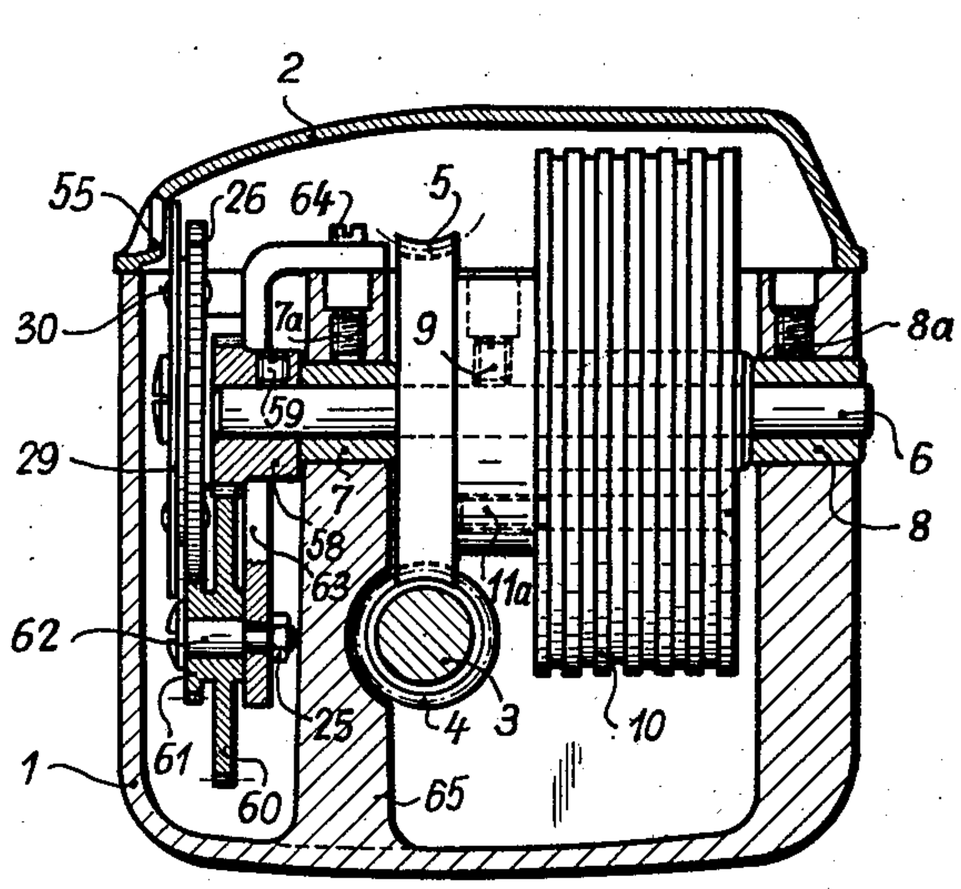

Fig. 7

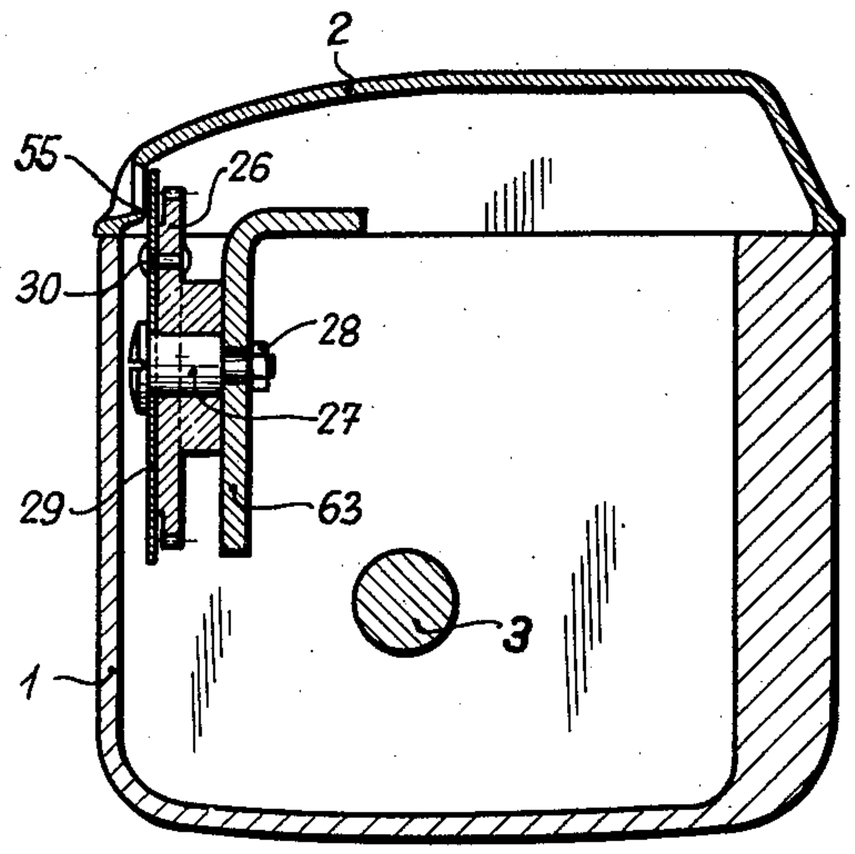

Fig. 8

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AUTOMATIC ORNAMENTAL SEWING MACHINE

Filed Jan. 8, 1962 5 Sheets-Sheet 5

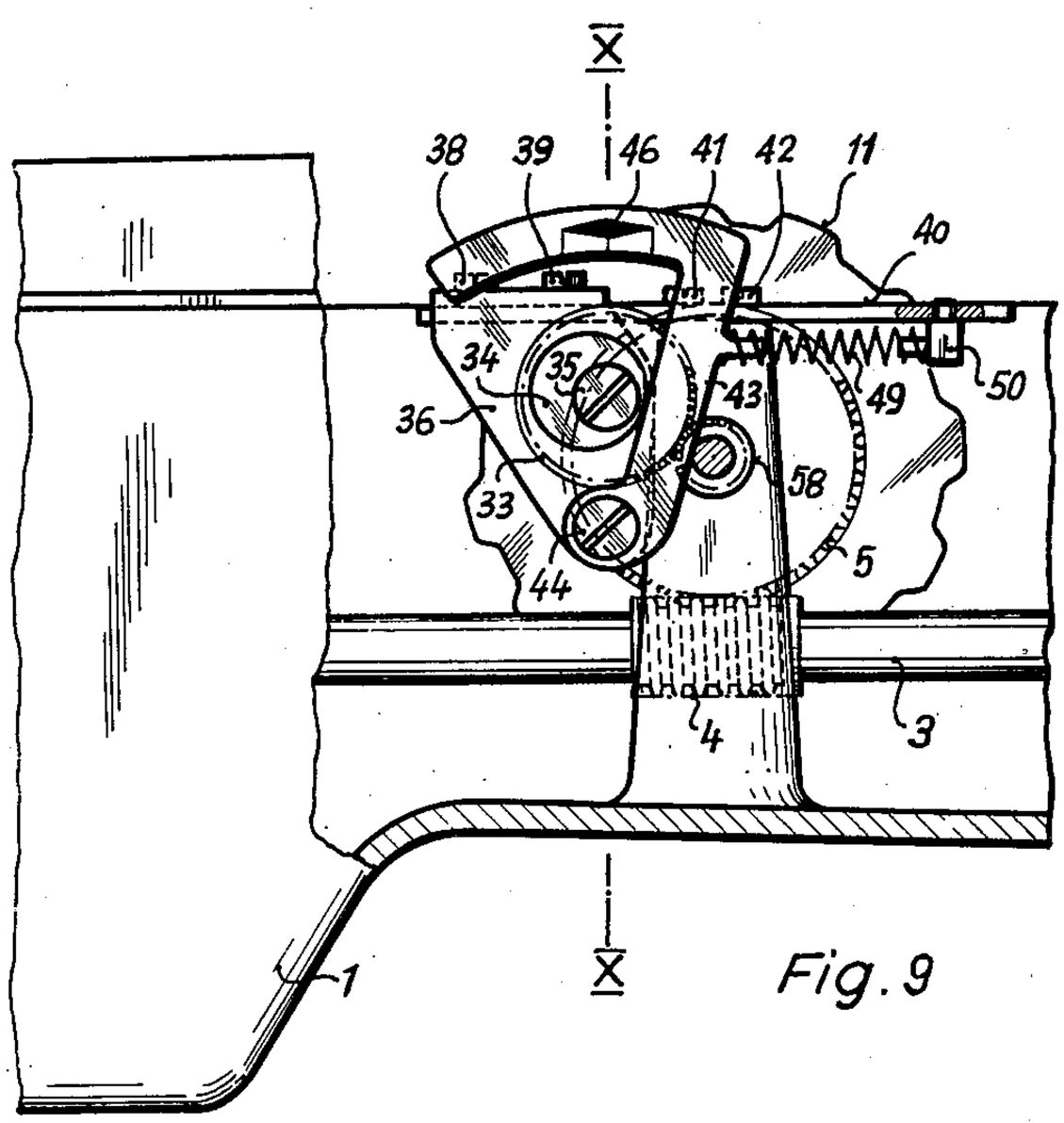

Fig. 9

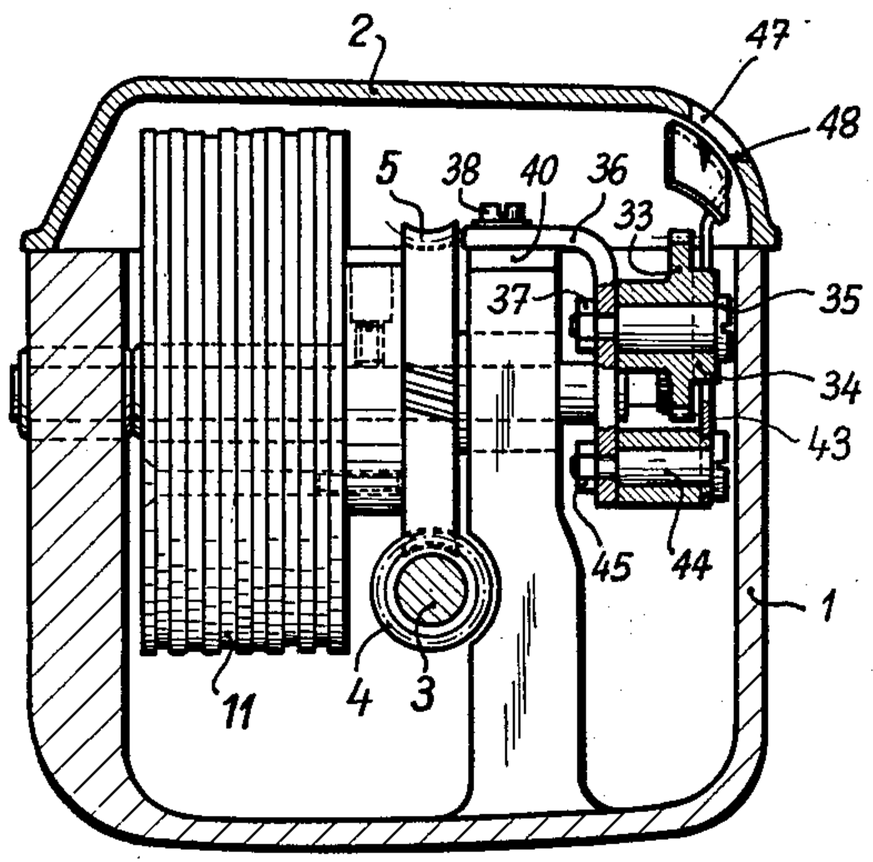

Fig. 10

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3,101,685
AUTOMATIC ORNAMENTAL SEWING MACHINE

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Claims priority, application Switzerland Jan. 12, 1961
5 Claims. (Cl. 112—158)

It is an object of the present invention to provide an automatic ornamental sewing machine in which it will be possible to always positively ascertain the last stitch of an ornamental pattern.

With automatic sewing machines of known kind it happens often when ornamental embroideries and designs are carried out, that at the end of stitching an ornamental pattern the direction of feed for the material has to be changed, and it is difficult for the operator to recognize the end of the ornamental pattern by observing the individual needle stitches. In most cases a pattern is not completely finished or sewing is continued too long and a number of stitches of the next following ornamental pattern is added thereto. This frequently results into an inexact and unpleasant work in spite of the great attention and labor spent by the operator.

In order to overcome this drawback, the ornamental sewing machine according to the invention comprises one or more control cams from which the various ornamental stitches are derived, and a scale adapted to be driven in dependency of the drive of the cam or cams, said scale being provided with at least one pattern mark permitting to ascertain the last stitch of each ornamental pattern.

The scale can be mounted on the cam shaft and provided along its edge with as many numbers as there are stitches required for a complete ornamental pattern. These numbers are visible in a reading orifice as fixed mark.

The scale also may be driven by a reduction gear so that the number of revolutions of the cam discs is a whole multiple of the number of revolutions of the driving member connected to the scale; the said whole multiple is equal to the number of passages of the scale mark corresponding to an ornamental pattern relatively to the fixed mark, for one revolution of the cam disc. The scale mark in this case preferably is a schematized ornamental pattern. When the scale is rotatably moved, it carries a number of ornamental pattern marks along its periphery corresponding to the ratio of reduction, for example in the case of a reduction ratio of 1:12 there are provided twelve ornamental pattern marks. When the scale is driven to oscillate to-and-fro, then the reduction ratio may be 1:2 and the number of passage of ornamental patterns past the fixed mark is also two. The fixed mark may be provided at a reading orifice behind which moves the scale. The reading orifice is of such size that at least one entire schematized ornamental pattern or the scale mark corresponding to the pattern becomes visible. The ratio of reduction is of such a value that the time of observation is long enough to enable an easy observation of the scale mark even at highest sewing speeds, which forms a great advantage for the operator when making embroideries in ornamental pattern shape.

The present invention will now be described in more detail with reference to the accompanying drawings illustrating, by way of example, two preferred embodiments of the invention, and in which:

FIGURE 1 is a fragmentary view in elevation of the sewing machine arm with a reading aperture for the rotating stitch number scale;

FIGURE 2 is a section along the line I—I of FIGURE 1 drawn to a larger scale;

FIGURE 3 shows various ornamental stitch patterns carried out with a change in direction, namely (*a*) with a single change in the direction of the material feed, (*b*) with multiple change in the direction of the material feed, (*c*) a design of ornamental stitching;

FIGURE 4 is a fragmentary view in elevation of a sewing machine arm having a reading aperture of the rotating pattern scale according to a modification of the invention;

FIGURE 5 is a fragmentary view in elevation showing the reduction gear and the rotating scale;

FIGURE 6 represents a view of the reading aperture drawn to a larger scale;

FIGURE 7 is a section according to the line VII—VII of FIGURE 4;

FIGURE 8 is a section according to the line VIII—VIII of FIGURE 4;

FIGURE 9 is a fragmentary view in section of a sewing machine arm according to further modification having an oscillatory pattern scale;

FIGURE 10 is a section according to line X—X of FIGURE 9.

Referring to FIGURES 1 and 2, the hollow arm **1** of a sewing machine is covered by a closure lid **2**. A shaft **3** extending through the interior of the arm **1** carries a helical pinion **4** driving a helical wheel **5**. By means of a screw **9** the wheel **5** is fixed to a shaft **6** which is supported in two bearings **7** and **8** mounted in the arm **1**. The hub **10** of the wheel **5** carries a plurality of cams **11** rigidly connected thereto by screw **12** and **13**. Each of the cams **11** is shaped on its circumferential surface so as to produce a certain ornamental pattern. Each individual cam **11** coacts with a feeler, not shown, to operate in known manner a stitch width connecting link, also not shown, and the movement of this latter is transmitted to the needle bar **14**, carrying the needle **15** by means of a linkage not shown. A scale **16** is arranged on the forward end of the shaft **6**. This scale is fixed to a hub **17** which in turn is fastened to the shaft **6** by a set screw **18**. The figures **19** on the scale **16** appear in a reading aperture **20** of the lid **2** of the arm **1**. A graduation mark **21** is associated with each figure on the scale. A fixed graduation mark **22** is provided on the reading aperture **20**. When the movable graduation mark **21** associated with each figure is disposed exactly underneath the fixed graduation mark **22**, the figure which is readable underneath in the particular moment corresponds to the number of the needle stitches of an ornamental pattern. Scale figures 2 to 36 appear on the scale in the example, since the machine requires 36 needle stitches for sewing a single ornamental pattern.

When the machine is ready to operate and an ornamental design according to FIGURE 3(*a*) is sewed, the direction of the material feed must be changed at each end of each particular ornamental pattern; this is brought about in that the needle is left pinned in the material at the end of the ornamental pattern, then the sewing foot

is released and the material is turned into the proper direction. In order to find out whether this change in direction is carried out at the correct point of the ornamental pattern, the machine is stopped while the operator simultaneously observes the scale through the reading aperture 20 and brings the machine to standstill as soon as the graduation mark 21 of the figure 36 is located underneath the fixed graduation mark 22 provided on the reading aperture 20. The ornamental pattern according to FIGURE 3(*b*) is sewed in similar manner. Several changes in the direction of the material feed are necessary in this case. The various ornamental patterns of a design according to FIGURE 3(*c*) are sewed in the same manner.

The construction previously described can naturally be subjected to many modifications. Thus, the reading aperture can be disposed at a different point according to the arrangement of the control cams. Moreover, it is possible instead of using a rotating scale which is separate of the control cams to provide an ornamental stitch cam itself with a scale. Finally, the scale may be arranged at a different location than the one shown, thus e.g. at the outside of the machine case and the scale may be driven from the shaft 6 by the intermediary of gear wheels or other suitable means. It is also possible to reciprocate the scale by suitable means, for example by a cam or a crank drive.

In the modifications according to FIGURES 4 to 8, the front end portion 1 of a sewing machine arm is provided with a cover lid 2*a* at its end, from which the switch button of the not represented illuminating light projects. The top of the arm is closed by a lid 2 provided with a reading aperture 55. The needle bar 14 projecting downwardly from the head of the arm 1 is moved in known manner by a crank drive not shown. The shaft 3 within the arm carries a helical pinion 4 meshing with the helical wheel 5 which drives the plurality of cams 11. The helical wheel 5 and the cams 11 are secured to each other by the screw 11(*a*) (FIGURE 7), and fixed to the shaft 6 by the set screw 9. The shaft 6 is mounted in the bearing sleeves 7 and 8 which are maintained against rotation by set screws 7(*a*) and 8(*a*). A pinion 58 is fixed by a screw 59 to the front end of the shaft 6 of the control cams. The pinion 58 drives a gear wheel having two gear crowns 60 and 61, fixed to a stationary pin 62 carried by a supporting plate 63, secured by means of two screws 64 to a column 65 of the arm 1. The pin 62 is formed as a journal screw fixed to the nut 25 to the plate 63. The gear wheel 61 drives a further wheel 26 also fixed by a journal screw 27 and nut 28 to the plate 63. A scale 29 is riveted by a rivet 30 to the gear wheel 26. The scale is provided with schematized patterns 31 which are visible in the reading aperture 55 during the revolution of the wheel 26. Near one end of the aperture 55 a mark 32 is provided for indicating the end of a stitched pattern.

The described mechanism operates in the following manner:

When the sewing machine is operated by any conventional means not shown, the cam unit 11 is rotated by the helical pinion 4 and the wheel 5. A feeler or cam follower, not shown, transmits the impulses according to the shape of an individual cam to the oscillating link, not shown, which in turn transmits the movements to the oscillating frame of the needle. During the sewing operation the pinion 58 on the shaft 6 drives the reduction gearing 60, 61, 26 and thus turns the scale 29 behind the reading aperture, so that the operator with the aid of the mark 32 can observe the development of the pattern and at the same time the sewing work, even at high sewing speed.

In the modification according to FIGURES 9 and 10, the pinion 58 drives a gear wheel 33 which is integral with an eccentric 34. The gear wheel 33 is mounted

on a journal screw 35 secured to a supporting plate 36 by means of a nut 37. The supporting plate 36 is fixed by two screws 38 and 39 to an adjusting plate 40. This plate is screwed to the arm 1 by means of two screws 41 and 42. A scale lever 43 is mounted by means of a journal pin 44 and nut 45 on the supporting plate 36. The scale lever 43 is provided with a schematized pattern 46 which appears in the reading aperture 47 after each stroke of the to-and-fro oscillatory motion of the lever. At one end of the reading aperture there is provided a mark 48. The scale lever 43 is urged against the eccentric 34 by means of a pressure spring 49. The spring bears with one end against a counter bearing 50 on the plate 40.

The operation of the above described modification differs from that of FIGURES 4 to 8 in that the ornamental pattern 46 on the oscillatory scale lever 43 moves to-and-fro in the reading aperture, corresponding to two passages of the pattern per revolution of the cam. Upon sewing, the lever 43 is moved by the eccentric 34, the spring 49 ascertaining the permanent operative connection between the lever 43 and the eccentric. The speed of oscillation of the lever 43 is small so that the operator can easily observe the motion of the schematized pattern and the sewing work, also at high sewing speed.

In both exampes according to FIGURES 4 to 8 and FIGURES 9 and 10, means are provided to adjust the scale with the schematized pattern with respect to the mark of the reading apertures, in accordance with the motion of the control cams.

Obviously, the described mechanisms may be modified, for example the reduction gear can be so arranged that the scale and the reading aperture may be situated at any other convenient place of the sewing machine. The driving means, for example a chain, must actuate the scale so that this latter moves in synchronism with the control cam discs. Further, the scale lever can be positively driven by the eccentric when the lever is fork-shaped and engages the eccentric at diametrically opposite points thereof.

I claim:

1. In an ornamental sewing machine having a housing and a plurality of rotary control cams for controlling the action of the sewing machine to sew ornamental patterns, a device for indicating the progress of the action of the sewing machine in sewing ornamental patterns comprising a driven shaft on which the control cams are adapted to be mounted, an indicator scale movable relative to said housing and having at least one indicator means thereon corresponding to the pattern to be sewn, a mark fixed with respect to said housing and past which said indicator scale and indicator means thereon is movable, and reduction gear means coupled between said driven shaft and said indicator scale for driving said indicator scale so that one complete indicator means moves past said mark for each complete revolution of said driven shaft, and said reduction gear means reduces the rotation of said indicator shaft to 1/nth the number of revolutions of said driven shaft, where *n* is a whole number, whereby when the end of said indicator means on said indicator scale reaches said mark, the control cam has completed one revolution and a complete pattern has been sewn.

2. A device as claimed in claim 1 in which said indicator scale is movable in only one direction relative to said housing, and there are *n* said indicator means on said indicator scale, whereby the end of an indicator means is opposite the mark after each revolution of said driven shaft.

3. A device as claimed in claim 1 in which said indicator scale is reciprocable relative to said housing, there is only one indicator means on said indicator scale, and said reduction gear means comprises means for converting rotational movement into reciprocal movement for reciprocating said indicator scale relative to said housing.

4. A device as claimed in claim 1 in which said housing has a viewing opening therein having a size corresponding to the size of said indicator means, and said mark being on the housing adjacent said opening.

5. A device as claimed in claim 4 in which said viewing opening is elongated and said mark is adjacent the end of said viewing opening toward which said indicator scale moves.

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