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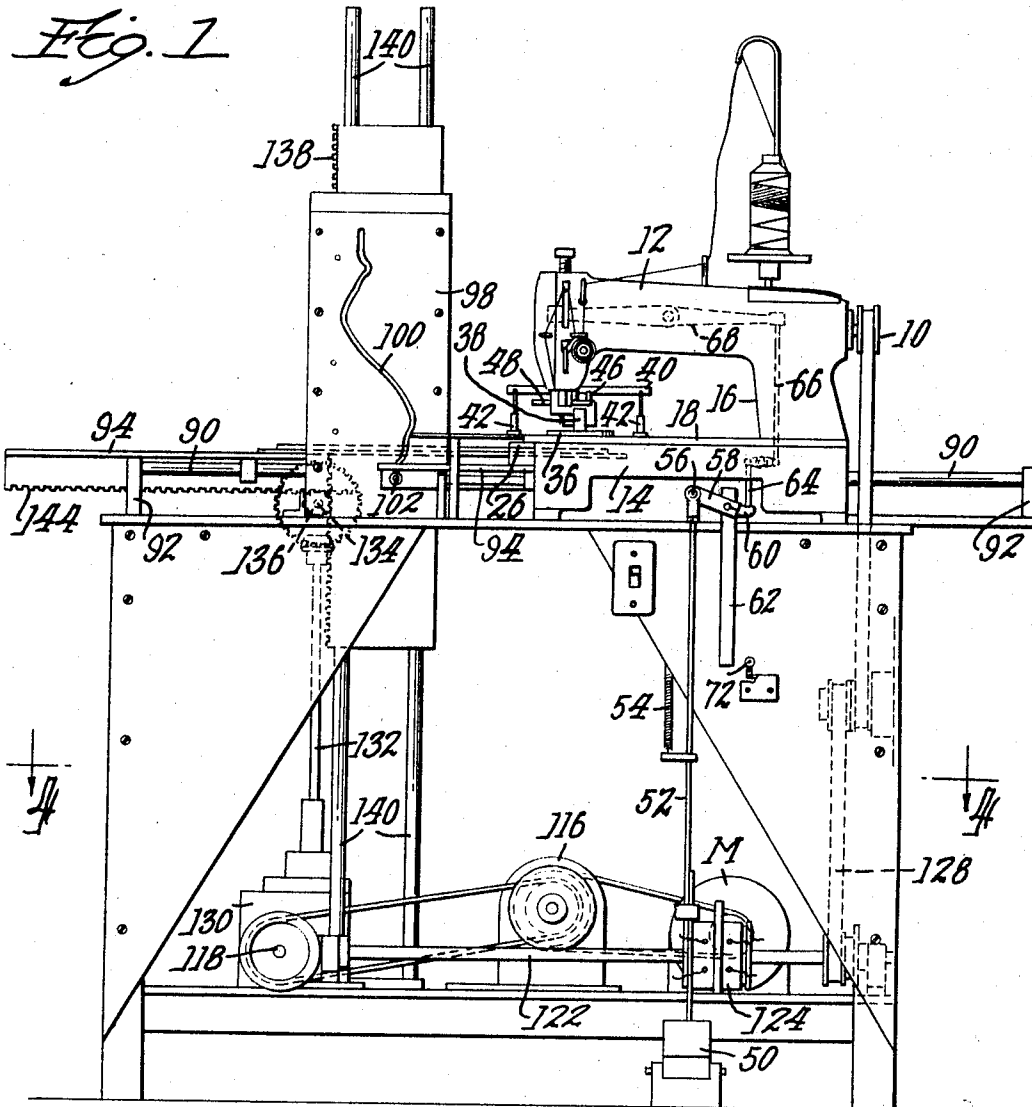
J. J. CHISHOLM ET AL

3,448,706

VARIABLE REPETITIVE PATTERN SEWING MACHINE

Filed Nov. 21, 1966

Sheet 1 of 4



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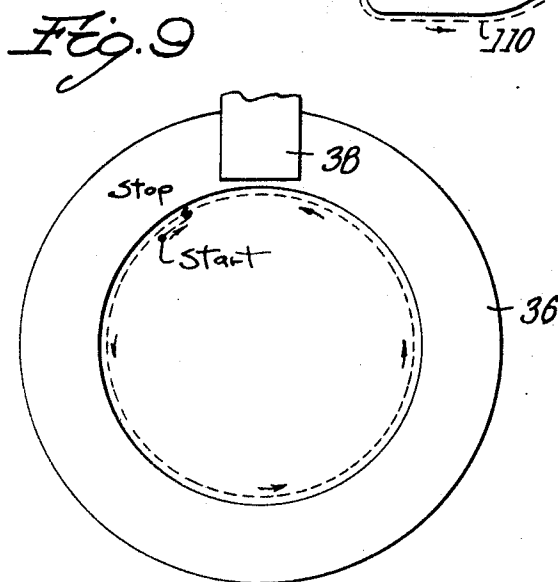
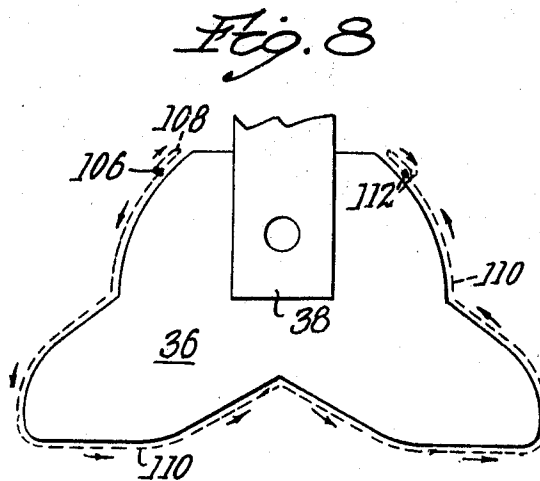
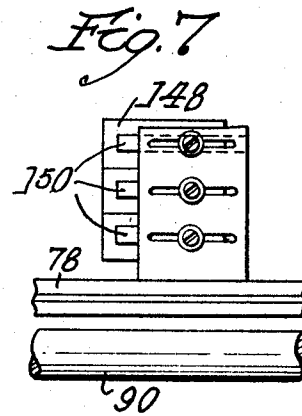
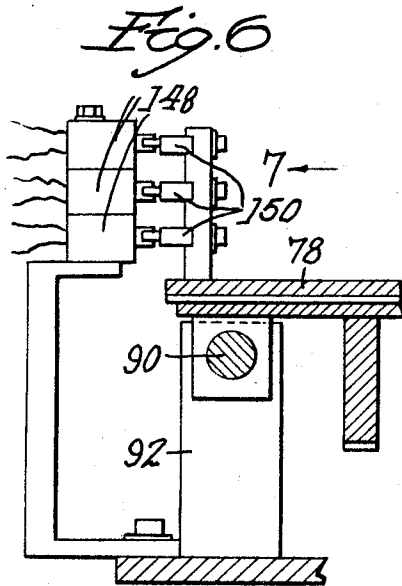
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VARIABLE REPETITIVE PATTERN SEWING MACHINE

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5 Claims

This invention relates to a repetitive pattern substantially automatically operated sewing machine. The principal object of the invention resides in the provision of a sewing machine of the class described by which any pattern, irregular or regular, may be sewn with a minimum of effort on the part of the operator, and in fact an unskilled operator can perform the sewing machine operation merely through the use of a foot treadle or some similar simply operated manually actuated means.

Another object of the invention resides in the provision of means whereby the pattern may be quickly and easily changed and this is done by the use of replaceable cams or templets or the like in conjunction with means for moving the work in relation to the needle, so that a repetitive but changeable pattern is sewn. Also, means is provided to stop the machine when the sewing cycle is finished so that the finished piece may be removed and a new piece put in position.

The machine consists essentially of a fixed platen in cooperation with a fixed position needle, there being a movable presser foot or work hold-down device which is normally clamped to the platen but can be opened by the operator for the exchange of workpieces, in combination with means for moving said hold-down device in two directions in a single plane so as to cause the work to move universally in the plane relative to the needle in a desired pattern according to the conformation of the removable cams or templets. By this means not only is a non-skilled operator able to put out a high quantity of work but also the pieces are substantially exactly duplicated, without depending on hand guiding of the work.

Other objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawings in which:

FIG. 1 is a view in front elevation illustrating the machine which forms the invention;

FIG. 2 is a plan view thereof with part in section;

FIG. 3 is a view in side elevation looking in the direction of arrow 3 in FIG. 2, parts being in section;

FIG. 4 is a section taken on line 4—4 of FIG. 1;

FIG. 5 is a section on line 5—5 of FIG. 4;

FIG. 6 is a section on an enlarged scale taken on line 6—6 of FIG. 2;

FIG. 7 is a view in elevation looking in the direction of arrow 7 in FIG. 6;

FIG. 8 is an enlarged view of the pattern which is repetitively and automatically sewn according to the cams shown in FIGS. 1 and 2; and

FIG. 9 is a view showing a different pattern which comprises a completely continuous line of stitching.

In carrying out the present invention, a substantially conventional sewing head is utilized. Usually two threads will be used in the usual manner and the needle is reciprocated vertically in fixed position by the usual mechanism found in a sewing machine head but deriving power from a pulley 10, the sewing machine in general being indicated at 12 and being mounted in fixed position as for instance on a table or other support 14 as by means of a standard 16 or the like.

In FIG. 1 there is shown the thread supply needle, needle guides, etc., all as are found on a conventional machine

of the class described, and other necessary and pertinent parts as are well known may be provided.

Associated with the table 10 there is a platen or the like 18 which is mounted in fixed position thereon and which receives the needle in an appropriate opening therefor as usual.

As perhaps best seen in FIGS. 2 and 3, there is a novel presser foot or work hold-down arrangement which is mounted with respect to the platen 18 and which is adapted to be moved up and down to clamp or release a workpiece on the platen, the work being indicated for instance in FIG. 2 by the reference character W. This work hold-down comprises a support in the form of a rod or the like 20 which is pivoted at 22 to an upright support 24 on a table 26 and the arrangement also includes an arm 28 in fixed position on the table 26 upon which is mounted an upright rod 30 having a spring 32 thereon operating with adjustable pressure downwardly or rod 20. The rod 30 may be threaded and the spring 32 adjusted as by nuts 34 or the like. Thus the rod 20 is normally held in downwardmost position under adjustable spring pressure.

The presser foot may include a templet or like clamp member which is shown in FIGS. 2 and 8 and indicated by the reference character 36. This clamp member is mounted on a member 38 on a vertical plate 39 mounted to slide in a dovetail slide 41 on arm 28. The slide 39 has upstanding ears 43 and through a pin and slot connection is operated by bar 20 and moves therewith. Also mounted on the bar 20 as for instance on a cross member 40 are a pair of hold-down feet 42, 42 preferably one at each side of the clamp member 36, and it will be seen that these are adjustably mounted in apertures in the cross piece 40 and can be adjusted to a limited degree.

The bar 20 extends somewhat forwardly of the cross piece 44 as at 46. A rod or bar 48 is generally located underneath this extension 46 and is utilized to lift the same, member 36 and presser feet 42 upwardly against the action of spring 32 to allow the workpiece W to be inserted and removed. This is accomplished conveniently e.g. by means of an operator actuated foot treadle or the like 50. Any means may be used for accomplishing this purpose but in the present case the treadle 50 is provided with and actuates a rod 52 having a hold-down spring 54, FIG. 1, so that it is normally in down position. The rod 52 is pivotally connected at 56 to a short link 58 having a lifter nose 60 thereon as well as a switch-operating bar 62. When the treadle 50 is moved down, it moves the rod 52 down and the link 58 and the switch-operating bar 62 in a counter-clockwise direction. At the same time it acts upon a member 64, by nose 60, in turn connected to a member 66 to operate a beam 68 which is connected to the bar 48 and is adapted to lift the same when the rod 52 is moved downwardly. The springs 54 and 32 return the parts to their normal, down, workholding position and the described operation of the foot treadle is only to release the presser foot construction so as to release the work W, and it will be seen that this operation is completely under the control of the operator.

In its counterclockwise motion, the lever 62 brushes past a one-way operating switch operator 72 which does not accomplish anything when moved clockwise; but when the free-ended switch-operating lever 62 returns to its normal position, which is shown in FIG. 1, it operates the switch-operator 72 to put in motion the sewing machine operation. Thus it will be seen that the operator releases the already finished work, inserts a new piece of work, and removes his foot from the treadle 50, whereupon the machine will operate in a manner to be described until a limit or knock-off switch operates to stop the machine at the end of the sewing cycle, whereupon the opera-

tion can be repeated. The mechanism which is indicated at 74 in FIG. 3 is part of the sewing apparatus and needle guide and forms no part of the present invention.

The table 26 is reciprocable on rods 76, see the arrow on table 26 in FIG. 3, and this motion of course moves the clamp member 36 and the hold-down feet 42 and the piece of work therewith, so that the work is seen to slide on the platen 18 although the platen itself is fixed as is the position of the needle. This motion is accomplished by means of a removable and replaceable cam plate 78 having a track as for instance at 80 and a cam follower at 82 mounted on a support 84 which is connected to table 26. The cam moves back and forth in the direction of the arrow at 86 by means to be described and it will be seen therefore that table 26 must move on the rods 76 and is reciprocated thereon by and according to the shape of the cam track.

The rods 76 are mounted on rods 90, 90 which are located at a right angle with respect thereto, the rods 90, 90 being in turn conveniently mounted on fixed supports 92, 92. The rods 90 carry a table 94 so that they can be and are movable together in a direction at right angles to the direction of motion of the table 26 and this is accomplished by a cam 98 having a cam track 100, a cam follower 102, the cam follower 102 being mounted with respect to table 94 so as to move it as cam 98 reciprocates in a vertical direction, see FIG. 1. Therefore it will be seen that depending upon the two cam tracks, the pattern of the motion of the workpiece is accurately controlled and as the needle operates to sew upon it, a repetitive pattern is provided. As an illustration of this repetitive pattern, the clamp member 36 is provided but this member has nothing to do with the shape of the stitching path. It is provided as shown in FIG. 8 in order to achieve the best support of the cloth as it is moved.

Assuming that the end of the cycle is at the position 106 in FIG. 8 and the machine has started, the first motion actually is a back-and-forth motion to provide a tack as at 108 and then the work is moved in a pattern to perform the irregular line of stitching which is indicated at 110. The end of the operation is illustrated at 112 where there is also the tack similar to that at 108 and then the operation is automatically stopped with of course the needle in its upwardmost position.

The operator then removes the finished work above described and inserts a new blank, whereupon the operation is repeated but now in the opposite direction from 112 to 106 and this reversal of operation is indicated by the arrows in FIG. 8. By the use of a clamp member which is made according to the pattern of the stitching, in combination with the hold-down feet 42, 42, there is no chance for the cloth to ruffle in any way during the operation.

As shown in FIG. 9, any kind of pattern can be provided in any shape and also it can be made to be continuous as shown by the legends "Stop" and "Start" in FIG. 9. Ovals, squares, rectangles, etc. may be sewn, depending upon the cams as well as open-ended U-shaped members as for pockets, etc.

The motion of the cam plates may be derived in any way desired but as shown in the present instance a reversible motor M is provided which through a speed regulator at 116 drives a shaft 118. The shaft 118 is driven in both directions by means of a conventional reversing clutch 120 controlled by the limit switches to be described, whereas a shaft 122 is turned in one direction only as shown by the arrow on it through appropriate gearing which forms no part of the present invention. There is a magnetic brake 124 provided in order to assist in stopping the action of the needle as required by an adjustable timing cam 126 so that the needle operation will stop only when the needle is up and out of engagement with the platen and work. In general the shaft 122 drives a belt 128 which by any kind of train desired drives pulley 10 in order to operate the sewing machine head.

The shaft 118 drives an indexing unit which is a commercial device and indicated at 130 and this drives shaft 132 which drives a horizontal shaft 134 in turn driving a gear 136 in mesh with a rack 138 attached to the cam plate 98 and moving it up and down on the rods 140. At the same time shaft 134 drives a gear 142 in mesh with a rack 144 attached to cam plate 78 and thus the two cam plates derive their reciprocal motion although they are provided with limit switches which cause them to stop at both ends of the limit of motion for the reversal operation which has been above described.

The switch at 72 starts motor M by means of a solenoid A, see FIG. 4, having a core C actuating a switch D; and it also releases the magnetic brake by the same motion. The limit switch which may be conveniently placed as for instance shown in FIG. 2 at 148 and is operated by operators 151, 152, causes the solenoid B to operate in the opposite direction to cause actuation of a switch F to apply the magnetic brake and to stop the motor with the needle up. The exact point of operation of this switch is controlled by the timing cam 126, FIG. 5.

The indexing device 130, which as stated is a commercial device, causes the shaft 132 to operate intermittently, i.e., steps, because of course the cams move only when the needle is not in engagement with the work, i.e., when it is up. When the needle is down in engagement with the work, both cams are simultaneously stopped. Of course it is also important as described above to have the operation at the finish of the cycle stop only with the needle in its up position so that the finished work can be easily extracted and the new piece put in position.

It will be seen that this invention provides an automatic repetitive pattern sewing machine which is easily changed by the use of different cams and therefore a long run of exactly similar, repetitive pieces can be sewn by anyone merely by operating the treadle, taking out the finished workpiece and inserting a new workpiece. No sewing experience is necessary and in fact an unskilled operator is all that is necessary to operate the machine. Not only is the quantity of the work increased over hand-guided work, but the quality of the work is also improved for the reason that every line of stitching is an exact replica of the others.

What we claim is:

1. A sewing machine comprising a fixed platen for the work, a sewing head including a fixed position needle and thread supply therefor for cooperation with said platen, means to operate the needle, a presser foot, means mounting said presser foot for motion to and from the platen to hold a workpiece thereto,

means mounting the presser foot for motion in any direction in a single plane to move the workpiece held to said platen commensurately therewith in any direction in a single plane thereon, said presser foot mounting means comprising a table movable rectilinearly, and means mounting the table and movable rectilinearly at an angle to the path of motion of the table,

and a pair of removable and replaceable rectilinearly movable cams moving the table and thereby the presser foot in a predetermined pattern according to the contour of said cams, the presser foot moving the workpiece relative to the needle in said pattern, whereby the pattern is made variable by replacement of the cams by cams of different contour.

2. The sewing machine of claim 1 wherein each cam has a cam track and there being a cam follower for each cam track, one cam follower being connected to the table and the other cam follower to the table mounting means.

3. The sewing machine of claim 1 including means to move the cams rectilinearly in a step-by-step relation in-between strokes of the needle.

4. The sewing machine of claim 1 including means to move one cam substantially horizontally and the other cam substantially vertically.

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5. The sewing machine of claim 1 including means to move one cam substantially horizontally and the other cam substantially vertically, the horizontally movable cam actuating the table.

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