

Sept. 9, 1952

A. KRAMER ET AL

2,609,769

AUTOMATIC PATTERN CONTROL FOR SEWING MACHINES

Filed March 27, 1948

5 Sheets-Sheet 1

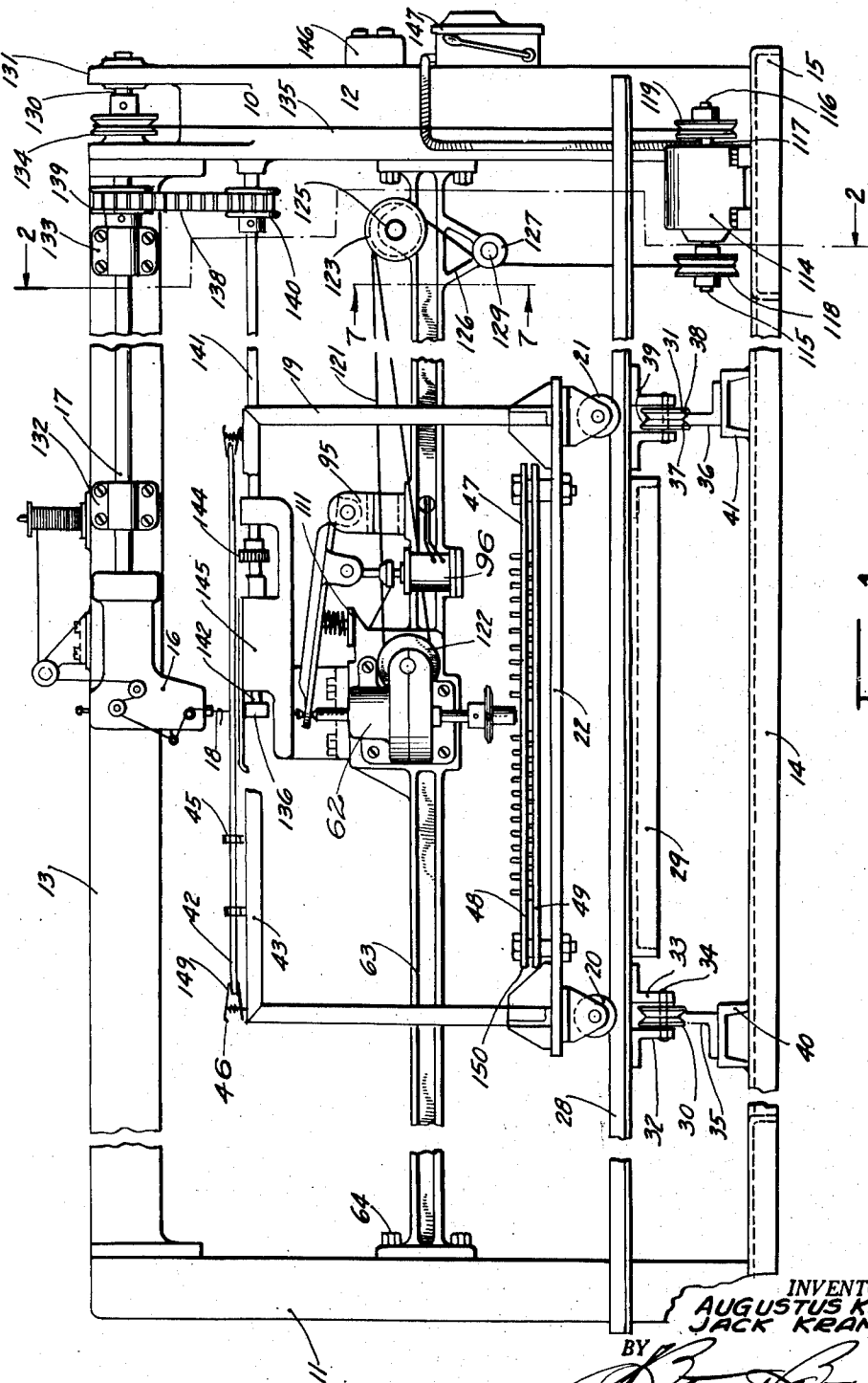


Fig. 1

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5 Sheets-Sheet 2

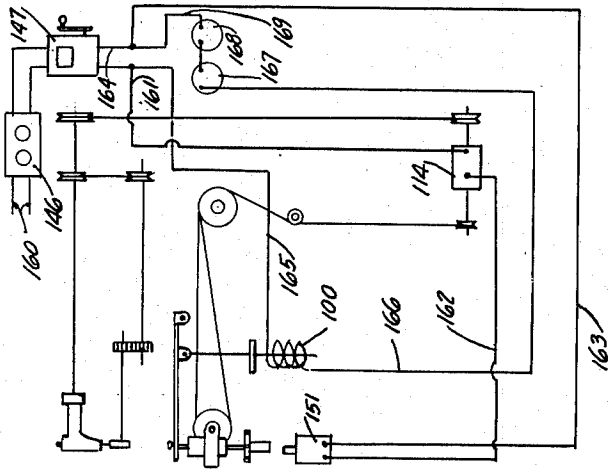


Fig. 11

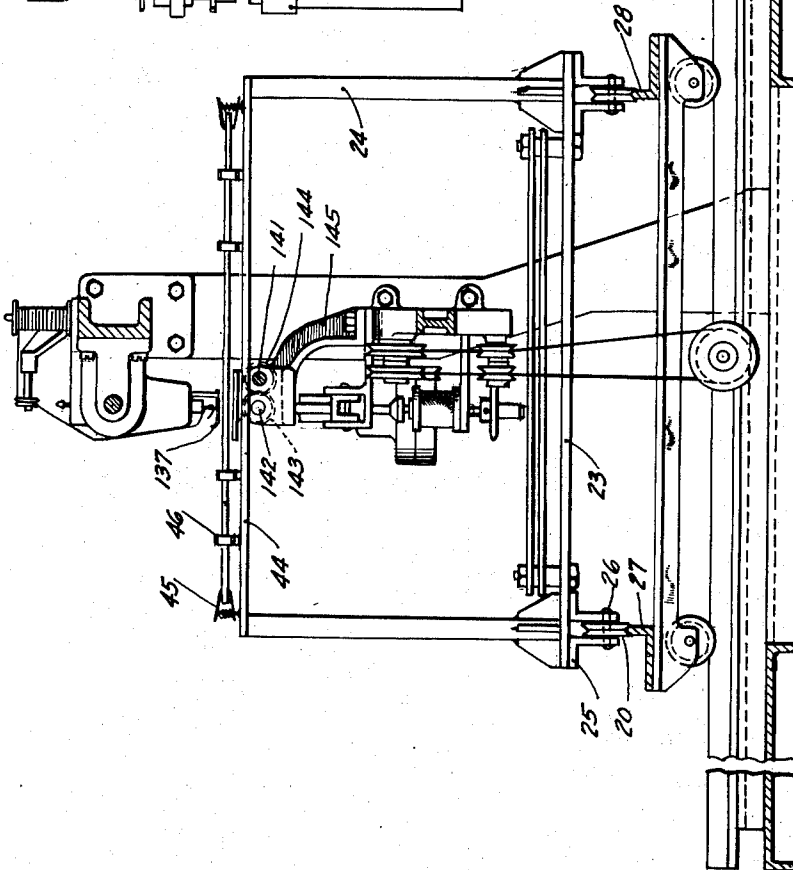


Fig. 2

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5 Sheets-Sheet 3

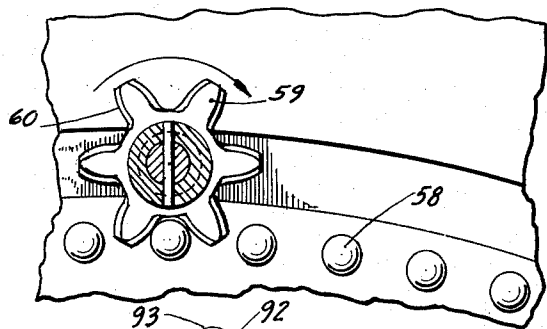


Fig. 5

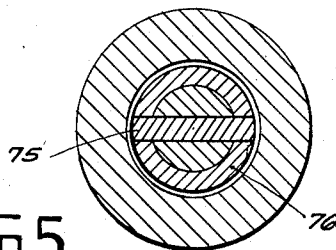


Fig. 6

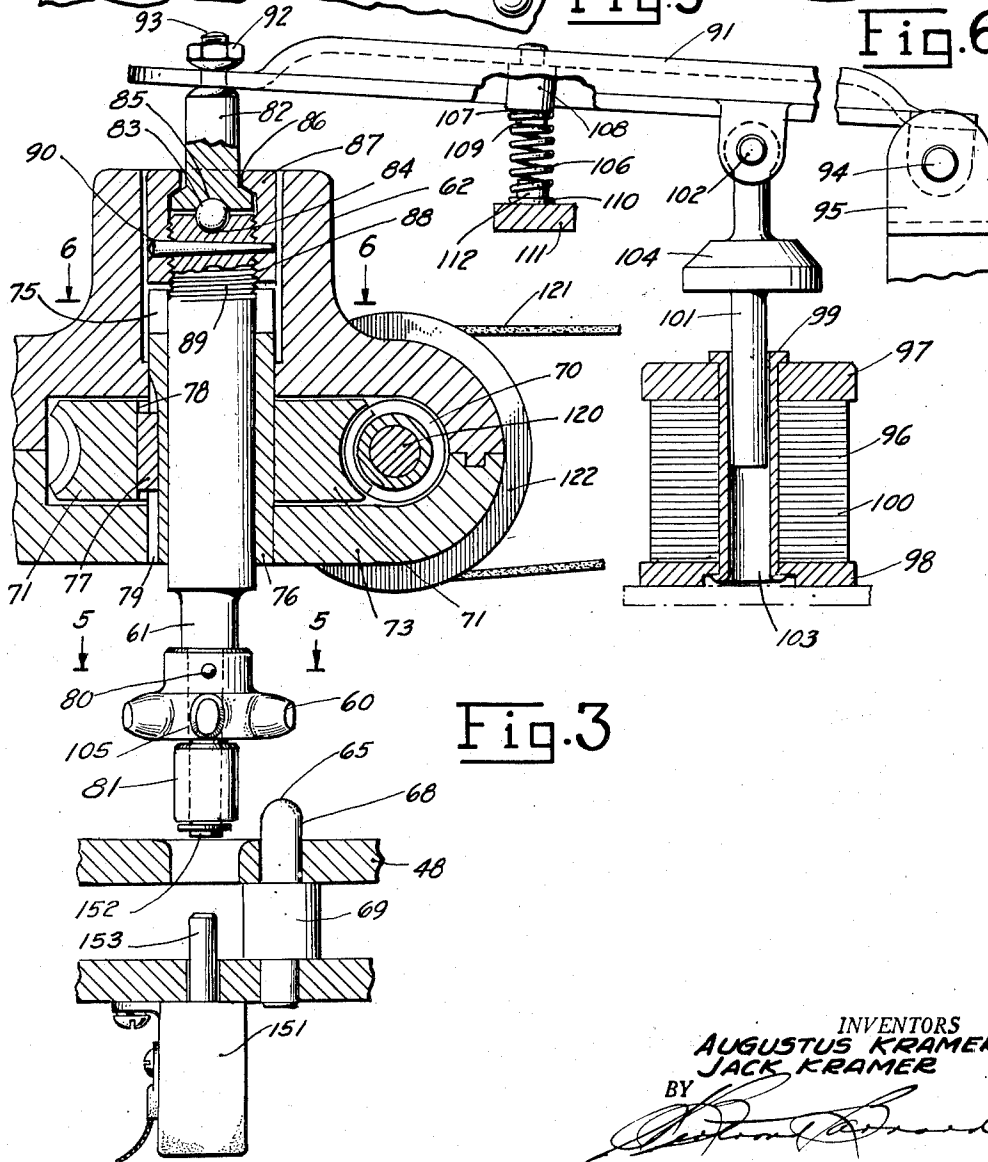
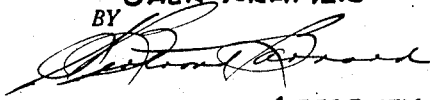


Fig. 3

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5 Sheets-Sheet 4

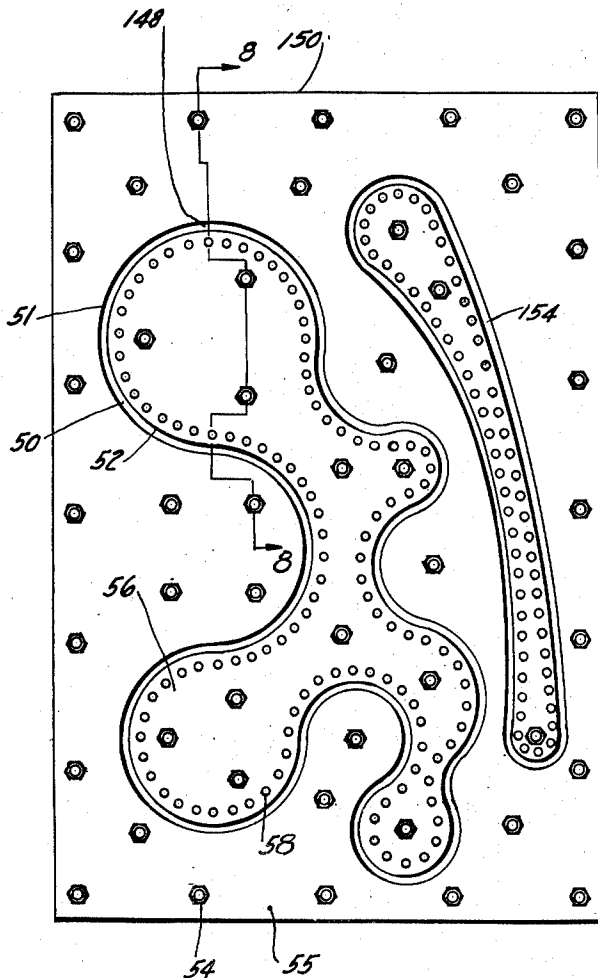


Fig. 4

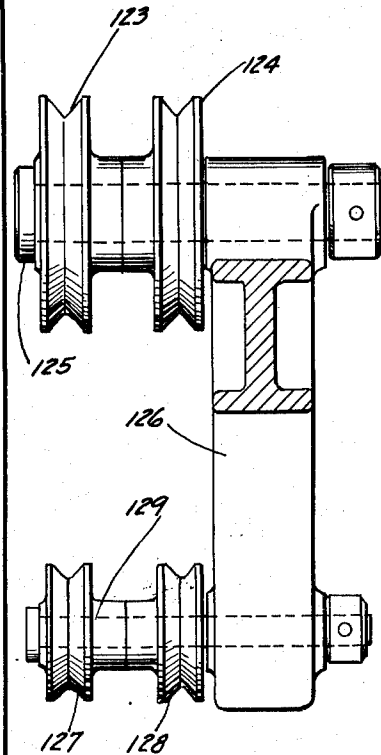


Fig. 7

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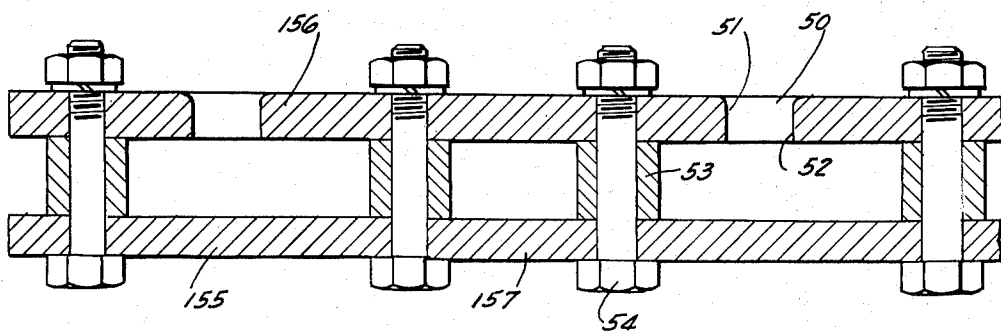
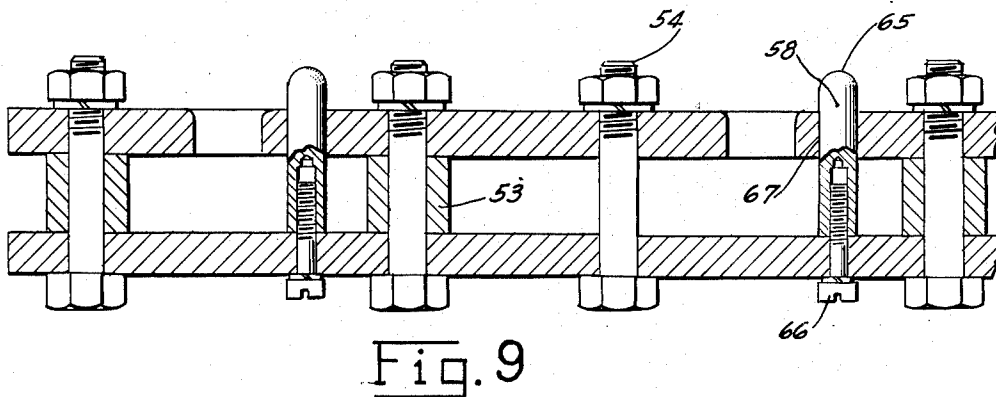
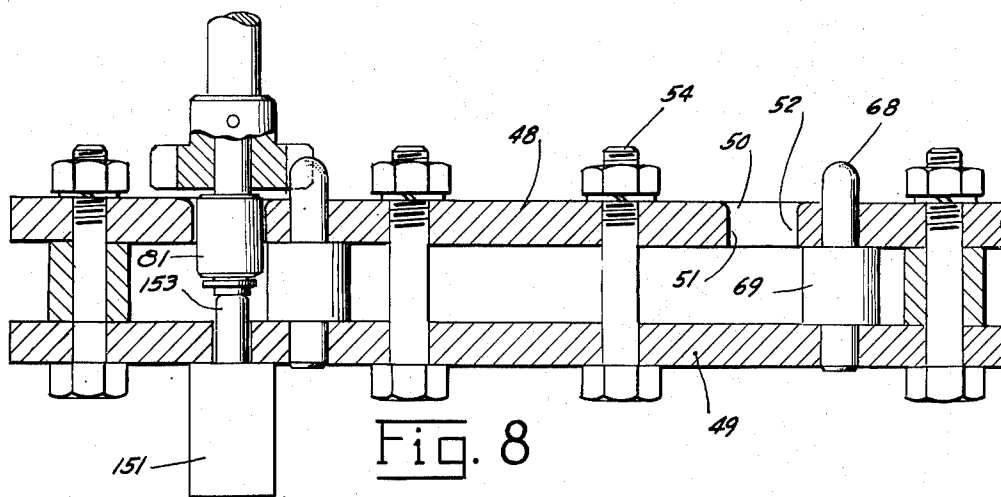
A. KRAMER ET AL

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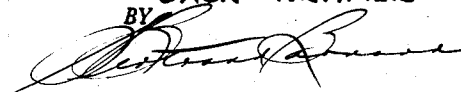
AUTOMATIC PATTERN CONTROL FOR SEWING MACHINES

Filed March 27, 1948

5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE

2,609,769

AUTOMATIC PATTERN CONTROL FOR
SEWING MACHINES

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Application March 27, 1948, Serial No. 17,504

21 Claims. (Cl. 112—118)

1

The present invention relates to sewing machines, and more particularly to an automatic pattern control for sewing machines of the type used for sewing patterns and other designs on tufted objects such as comforters, mattress tops, and the like.

The sewing or quilting machine, referred to, comprises essentially a fixed sewing machine head, mounted at or near the center of a large frame. A comforter, mattress top, or other object to be sewed is mounted near the top of the frame, below the sewing machine needle, in a movable structure, which is formed integral with or attached to a movable carriage, mounted on wheels, which are guided by tracks, or a similar device to enable the movable frame or carriage to be moved in any direction in the horizontal plane, following a slot in the pattern. The pattern, the upper plate of which has a design slot formed therein is supported in the lower frame of the carriage which is moved with relation to a fixed or rotating spindle, fitted into the pattern slot, the spindle being driven by a speed reducer, which is attached to the main frame, below the needle of the sewing machine, the stitches following a predetermined design precisely along the lines of the slot in the pattern, on the comforter or other object sewed.

While quilting and comforter machines, as such are old in the art, it has been necessary in most cases, where intricate designs are sewed, to hold the sewing machine head stationary and to move the comforter frame, or other object to be sewed manually, past the needle of the machine, to obtain the intricate patterns desired.

There have been a number of semi-automatic devices of various types built, to enable the object sewed to follow the lines of the pattern, without guidance or control by an operator. Many of these devices have been costly, excessively complicated, and have limited or controlled the range of designs feasible to such an extent, as to seriously limit the scope of the machine.

The principal object of our invention is to provide a machine for sewing designs on comforters, mattress covers or the like in which the object sewed automatically follows the lines formed in the pattern, without the necessity of manual control by an operator, after the sewing operation is started.

A further object is to provide an automatic or semi-automatic pattern control which will accurately reproduce designs on a comforter or similar object, with a minimum of manual control or attention by an operator.

2

A further object is to provide a pattern which is capable of reproducing a wide range and scope of designs, without imposing serious limitations on the pattern designer.

A further object is to provide a machine which once set up and adjusted, can be completely loaded, unloaded and kept in operation over sustained periods by a comparatively unskilled attendant.

A primary object of our invention is to reduce to a minimum the operator fatigue attendant upon continuous manual control of the pattern and the object sewed during the sewing operation.

A further object is to provide a machine and pattern control, in combination, in which the operator can convert the machine from automatic or semiautomatic operation to manual control, and back again to automatic control, at will, in a minimum of time, and with a minimum of interference with the sewing operation.

A further object is to provide a machine and pattern control device which are accurate and in which the design formed in the pattern is followed smoothly and uniformly without interruption or jerking.

Another object of our invention is to provide a machine and pattern control device in which the pattern proper can be made in a wide range of designs, at comparatively low cost, and will require little if any attention or repairs over long periods of sustained use.

The accompanying drawings, illustrative of one major embodiment of our invention, together with the description of the construction, method of adjustment and control thereof, will serve to clarify further objects, advantages and features of our invention, and the results attained therewith.

In the drawings:

Fig. 1 represents a front elevation of the complete machine, showing the frame on which the sewing machine head and the pattern control mechanism are mounted, also the moving carriage supporting the comforter or other object to be sewed and the pattern.

Fig. 2 is a vertical section, taken at 2—2 of Fig. 1, showing the movable carriage and the tracks supporting it in both directions, the sewing machine head, and the pattern control mechanism.

Fig. 3 represents a vertical section thru the pattern-control sprocket drive mechanism and the pattern, showing the relation between the pattern slot, the pattern follower, and the sprocket control pins, in the pattern. The lever and solenoid control mechanism for pressing the

pattern control sprocket into engagement with the pattern slot and the control pins are also indicated.

Fig. 4 represents a plan view of the pattern, showing the design guide slot and the sprocket control pins parallel to the design slot.

Fig. 5 is a horizontal section taken at 5—5, Fig. 3, showing the pattern control sprocket in its relation to the pattern slot, and the control pins.

Fig. 6 is a horizontal section, taken at 6—6, Fig. 3, showing the sprocket drive shaft and the key connecting the sprocket drive shaft to the worm gear shaft of the speed-reducer.

Fig. 7 is a vertical section, taken at 7—7, Fig. 1, showing the V-groove pulleys used to guide the circular belts, which drive the sprocket drive speed-reducer from the motor.

Fig. 8 represents a vertical section thru the pattern taken at 8—8, of Fig. 4, showing the method of supporting the pattern control pins between the upper and lower pattern plates, the bolts connecting the upper and lower pattern plates, and the automatic cut-out switch, controlled by the bottom of the sprocket shaft.

Fig. 9 is a vertical section thru the pattern, similar to Fig. 8, showing a modified method of attaching the sprocket control pins to the lower pattern plate, and the method of connecting and spacing the upper and lower pattern plates.

Fig. 10 is a vertical section thru a manual type of pattern, showing the pattern slots, the spacers and the bolts connecting the upper and lower pattern plates.

Fig. 11 represents a wiring diagram, showing the electrical connections of the various electrical drives and controls of the unit.

The quilting machine, as indicated in Figs. 1 and 2, comprises a frame, at the center of the top of which a sewing machine head is mounted.

A carriage, which is readily movable in both directions in the horizontal plane is mounted on two separate sets of wheels, which are fitted to two pairs of rails, the upper rails allowing the wheels to move longitudinally with relation to the frame, the upper rails in turn, being mounted on another set of wheels, which are fitted to a pair of rails mounted across the bottom of the frame, thus permitting the crosswise movement of the carriage.

The upper end of the movable carriage comprises an open frame, the sides of which support a plurality of clamps by means of which a comforter, mattress top, or other object to be sewed is suspended, immediately below and in constant engagement with the presser foot of the sewing machine head.

On the lower level of the carriage, a pattern consisting of two sheets of steel, or other suitable material, separated by spacers and bolted together, is mounted. The upper sheet has a formed slot, consisting of two accurate parallel lines cut in it, the lines following accurately the design to be sewed on the comforter or other object. Around one edge of the slot a plurality of equally-spaced pins are attached, the diameter and spacing of the pins being determined by the teeth in a sprocket, mounted on a shaft supported by a speed-reducer, which is attached to the center of the frame, below the needle of the sewing machine head. A pattern follower sleeve mounted on the sprocket shaft, below the bottom of the sprocket the diameter of which sleeve is slightly less than the width of the pattern slot is fitted into the pattern slot, to accurately control the movement of the pattern and the com-

forter or other object, with relation to the needle of the sewing machine head.

The sprocket, when rotated by the vertical shaft mounted in the speed reducer, which is driven by a continuous circular belt from the same motor which drives the sewing machine head, engages the pattern-control pins, spaced around the edge of the pattern slot, thus causing the carriage to follow the pattern slot and enabling the needle of the sewing machine to sew the parts of the comforter or other object along a line substantially identical with the line of the pattern slot.

A solenoid mechanism, as indicated in Figs. 1 and 3 is mounted on a bracket supported by a cross-bar, attached to the main frame to press the pattern-follower shaft, and the sprocket mounted on it into engagement with the pattern slot and the control pins respectively, when the solenoid is energized.

If, at any time, the operator desires to go back over an unstitched portion of the pattern, the solenoid may be de-energized, entirely withdrawing the follower sleeve from engagement with the pattern slot, or the sprocket shaft may be raised only high enough to withdraw the sprocket out of engagement with the pins, and still leave the follower sleeve in contact with the pattern slot.

With the follower sleeve in contact with the slot, the operator may manually move the pattern to any point in the slot desired, and restitch a portion of the design, which may have been omitted due to a broken thread or for some other reason.

With the follower sleeve and the sprocket fully withdrawn from the pattern slot and the control pins respectively, the operator may manually move the pattern and carriage past the needle of the sewing machine to add an auxiliary design, or otherwise alter or modify the design sewed on the comforter.

As the motor drives the sewing machine head, and the pattern follower sprocket from opposite ends of the motor shaft, the rotation of the sprocket is synchronized with the operation of the sewing machine at all times.

It will be understood that the foregoing general description of the construction, operation and control of the automatic pattern-control sewing machine, and its various modifications, as well as the following detailed description are intended as explanatory of the invention and not restrictive thereof.

In the drawings, the same reference numerals designate the same parts throughout the various views, except where otherwise specified.

The machine, as indicated in Figs. 1 and 2, is mounted on a frame 10, consisting of two vertical side members 11 and 12, a longitudinal top member 13, and the base supports 14 and 15.

The sewing machine head 16 is attached to the free end of a tubular bracket 17 which is, in turn, attached to the top member 13 of the frame, the needle 18 being located at approximately the horizontal center of the frame.

The movable carriage 19 is mounted on four wheels 20 and 21, rotatably attached to the lower longitudinal and cross members 22 and 23 of the carriage frame 24 by means of individual brackets 25 and shafts 26, the wheels being either flat or grooved and fitted to two longitudinal rails 27 and 28, which are attached to the under-carriage 29, movably mounted above the base of the fixed frame.

The longitudinal rails 27 and 28 are, in turn, mounted on four wheels 30 and 31, each wheel

5

being rotatably attached to the rails by a pair of angle brackets 32 and 33, which are attached to the bottom of the longitudinal rails, the brackets supporting the axles 34 on which the wheels are mounted. The rail wheels, which are perpendicular to the carriage wheels 20 and 21 are also mounted on a pair of cross-rails 35 and 36, the tops of which are either flat, where flat wheels are used, or with the upper or track portion machined to form a pair of angular surfaces 37 and 38 to fit the V-shaped groove 39 formed at the rim of the wheels, as indicated in Figs. 1 and 2.

The cross-rails may be attached to the base members 14 and 15 of the frame by a pair of cross channels 40 and 41 or by any other suitable method.

The combination of carriage wheels 20 and 21, which permit the free movement of the carriage in the longitudinal direction, and the rail wheels 30 and 31, which permit the longitudinal rails and the carriage mounted on them to move across the frame, allow the movable carriage to be moved in any direction or combination of directions, in the horizontal plane, with a minimum of friction and effort, to follow a design pattern under the sewing machine head.

A comforter 42 comprising two sheets of fabric with a layer or layers of padding between them, or a mattress cover may be stretched between the longitudinal and side members 43 and 44 located at opposite sides of the carriage frame by means of a plurality of clamps 45 and 46, located at spaced intervals along the sides and edges of the comforter, or other object, or by other suitable means, below the needle 18 of the sewing machine head.

A pattern 47, constructed of two steel plates, an upper plate 48 and a lower plate 49 or other suitable sheet material, may be attached to the bottom cross and side members 22 and 23 of the carriage frame, as indicated in Figures 1 and 2.

A pattern guide slot 50, framed by two parallel edges 51 and 52, following the design desired, may be cut in the upper plate 48 of the pattern as indicated in Figs. 3, 4, and 8. The upper and lower plates 48 and 49 are uniformly spaced at the desired distance by a plurality of tubular spacers 53 mounted on the bolts 54, located at regular intervals around the edges of the pattern, Figs. 4 and 9 and at various points around the sections 55 and 56, into which the upper sheet of the pattern is divided by the cutting of the pattern slot 50.

Parallel to the slot 50 in the upper plate of the pattern, a line of pins 58 is located as indicated in Figs. 4 and 5, the center distance of the pins being substantially equal to the distance between the teeth 59 in the sprocket 60 which is mounted at the bottom of a shaft 61, rotatably suspended from a worm gear speed reducer 62 which is attached to a central longitudinal bar 63, the ends of which are attached to the vertical side members 11 and 12 of the frame, by means of bolts 64, or by other suitable methods.

The pin 58, the upper end of which may be rounded 65 to facilitate meshing with the teeth of the sprocket may be attached to the lower plate 49 of the pattern by means of a screw 66, the body of the pins being fitted to a line of holes 67 formed in the upper plate 48 of the pattern, parallel to the slot 50, as indicated in Fig. 9.

In an alternate construction, shown in Figs. 3

6

and 8 the pins 68 are each formed integral with a central spacer 69, which separates the upper and lower plates of the pattern, a plurality of bolts and nuts 54 being used to connect the two plates. The upper end of the pin 68 is also rounded 65 in the same manner as that of pin 58.

The speed reducer 62, shown in Figs. 1 and 3, is driven by a worm 70 which drives the horizontal worm wheel 71, both of which are rotatably mounted in the speed reducer housing 72 and housing cap 73, which are attached to the central bar 63 of the frame.

The shaft 61, at the lower end of which the sprocket 60 is mounted, is keyed at 75 to a tubular shaft 76, Fig. 6, which is mounted at the center of the worm wheel 71, and driven by a key 77 which is fitted to the keyways 78 and 79 in the worm wheel and hollow shaft respectively.

The sprocket 60 which is shown in detail in Figs. 3 and 5, is mounted at the bottom of the shaft 61, and pinned to the shaft by means of a pin 80. Below the sprocket 60 a hollow cylindrical pattern follower sleeve 81 is mounted on the sprocket shaft, the outer diameter of the follower sleeve being slightly smaller than the width of the slot 50, the follower sleeve sliding along the slot 50 and following the pattern contour when the sprocket teeth 59 move the control pins 58, attached to the upper plate of the pattern, thus sliding the pattern on the carriage wheels, along the rails in both directions.

Above the shaft 61 in the speed-reducer housing, a floating shaft extension 82 may be mounted, a ball 83 which fits into a pair of hemispherical grooves 84 and 85, formed at the top of the shaft and the bottom of the extension respectively, separating the shaft from the extension and allowing the extension to move angularly with relation to the shaft, within a hole 86 formed in a collar 87, which is attached to the upper end of the shaft 61, by means of the internal threads 88 which fit over the external threads 89 formed at the top of the shaft. The collar 87 is locked to the shaft by means of a taper pin 90 fitted to the collar and the shaft.

The sprocket 60 is moved into engagement with the pins 58 in the pattern by a solenoid-actuated mechanism shown in Fig. 3. The shaft extension 82 is attached to one end of a lever 91 by means of a nut 92, which fits the threads 93 on the upper end of the shaft extension. The opposite end of the lever is pivotally attached, by means of a pin 94, to a bracket 95 which is supported by the central bar 63 of the frame, and attached thereto.

A solenoid 96 comprising an upper disc 97, a lower disc 98, and a tubular spool 99 may be attached to the central bar 63 of the frame, the coil 100 being wrapped around the tubular spool to enable the solenoid to be energized. A shaft 101, the upper end of which is pivotally attached to the lever 91 by means of a pin 102, is mounted in an opening 103, in the center of the tubular spool.

When the solenoid coil 100 is energized by passing a current through it, the shaft 101 is drawn into the cylindrical opening 103 in the tubular section of the solenoid, thus moving the lever 91 through an angle about the pivot pin 94, and pressing the shaft 61 at the opposite end of the lever, downward, the follower sleeve 81 entering the pattern slot 50 and the sprocket teeth 59 engaging the pins, projecting above the upper pattern plate 48.

The downward movement of the solenoid shaft 191, when it is attracted by the solenoid coils is limited by a collar 104, attached to or formed integral with the shaft 101, the collar engaging the top of the upper disc 97 of the solenoid, thus limiting the downward movement of the shaft.

The lower ends of the teeth 59 of the sprocket are rounded, 105 to facilitate engagement with the pins 58 when the sprocket and shaft are pressed downward.

A spring 106, the upper end 107, of which, is pressed against a stud 108, attached to the lower surface of the lever 91, and centered by a pin 109, formed integral with the stud, restores the lever 91 and the sprocket shaft 61 to the position shown in Fig. 3, withdrawing the sprocket 60 and the pattern follower sleeve 81 out of engagement with the control pins and the pattern slot respectively, when the current in the solenoid coils is shut off. The lower end 110 of the spring 106 is supported by a bracket 111 attached to the central bar 63 and centered by a pin 112, mounted on the bracket 111.

A motor 114 is mounted on the base support 15 of the frame, the projections 115 and 116 of the motor shaft 117 extending outward beyond the forward and rear end of the motor housing, a V-groove pulley 118 and 119 being mounted at the end of each shaft projection.

The worm shaft 120 of the speed reducer 62 is driven from the motor 114 by means of a circular belt 121, which passes over a V-pulley 122 attached to the worm shaft, then over a pair of idler pulleys 123 and 124, rotatably mounted on a shaft 125, supported by a bracket 126 attached to or formed integral with the frame central bar 63, thence over another pair of V-pulleys 127 and 128, rotatably mounted on a shaft 129 supported by the lower base of the bracket 126 as indicated in Figs. 1 and 7, from which the belt passes over the forward motor drive pulley 118.

The sewing machine head 16 is driven by a long shaft 130 which extends through the tubular bracket 17, and is rotatably supported by an extension 131 of the right-hand side member 12 of the frame. The tubular bracket 17, at the forward end of which the sewing machine head 16 is mounted, is attached to the longitudinal top member 13 of the frame by means of two brackets 132 and 133, bolted or otherwise attached to the top member 13. A V-groove pulley 134 mounted near the end of the sewing machine drive shaft 130 is connected by a circular belt 135 to the V-groove pulley 119, mounted at the rear end of the motor shaft.

As both the speed reducer, which drives the pattern-control sprocket shaft 61 and the sewing machine head drive shaft 130, are driven from the opposite ends of the motor shaft 117, the pattern movement and the sewing machine operation are kept in synchronism at all times.

The sewing machine shuttle 136 located below the presser foot 137 at the bottom of the sewing machine head, is driven from the sewing machine drive shaft 130 by a cleat belt 138, which connects a serrated pulley 139, mounted on the sewing machine drive-shaft to a similar serrated pulley 140, attached to one end of a long intermediate shaft 141, mounted below the needle level of the sewing machine head, Fig. 1. The shuttle shaft 142, which directly drives the shuttle is driven from the intermediate shaft 141, by a pair of gears 143 and 144, one of which is mounted at the right-hand end of the shuttle shaft, and the other attached to the left-hand

end of the intermediate shaft 141. The shuttle 136 and the shuttle drive-shaft 142 form a part of the conventional sewing machine head 16 mounted on the machine. The shuttle drive shaft 142, and the intermediate shaft 141, are rotatably supported by a bracket 145, attached to the central frame member 63, as indicated in Fig. 1.

A conventional type of starter switch 146 and a motor controller 147 may be mounted at the side of the vertical frame member 12 to start and regulate the motor.

Before the sewing operation is started, the movable carriage is moved so that the left-hand edge 148 of the pattern slot is in line with the pattern-follower sleeve 81, the left hand edge 149 of the comforter or other object being relatively in alignment with the left-hand edge 150 of the pattern.

When the solenoid coil 100 is energized, the left-hand end of the lever 91 and the sprocket shaft are drawn downward, the pattern follower sleeve 81 entering the pattern slot 50, and the sprocket teeth engaging the control pins 58, mounted on the pattern plate 48.

After the follower sleeve is in place in the slot 50 and the sprocket teeth 59 engage the adjacent pattern pins, the motor 114 is started, thus simultaneously starting the sewing machine shaft and the sprocket drive speed-reducer.

While it is preferable to press the pattern follower 81 into the pattern slot, and the sprocket teeth 59 into engagement with the control pins 58 while the sprocket shaft 61 is stationary, the solenoid coil 100 may be energized either simultaneously with, or after the motor is started, the sprocket teeth 59 engaging the control pins, while the shaft and sprocket are rotating. If the motor 114, is started slowly and the pattern slot carefully positioned below the sprocket and follower, the sprocket teeth will engage the control pins, thus starting the pattern and the object to be sewed in motion without clashing, due to the free movement of the carriage on the wheels and tracks.

As the sprocket is driven in a clockwise direction, arrow, Fig. 5, by the speed reducer and the motor 114, the sprocket teeth, in progressively engaging the control pins 58, move the pattern generally leftward, the pattern sleeve 81 accurately sliding along the pattern slot 50, thus synchronizing the movement of the comforter below the needle of the sewing machine head and the design on the pattern, the stitches closely following the design formed by the pattern slot 50 in the upper pattern plate.

Barring thread breakages, or stops for any other reason, the sewing operation continues until the pattern sleeve, after passing through the entire length of the pattern slot 50, returns to the starting point 148 at the left-hand edge of the slot.

At that point the current to the motor 114, driving the sewing machine head and the speed reducer, may be shut off either manually by the operator, or automatically by the addition of a cut-off micro-switch 151 which may be actuated by the lower end 152 of the sprocket shaft 61 when it engages the plunger 153 of the micro-switch. Either simultaneously therewith or immediately thereafter, the current to the solenoid coils 100 is shut off, the spring 106 raising the lever 91 and the sprocket shaft, until the sprocket is out of engagement with the pattern control pins 58.

Where an intricate pattern having one or more additional pattern slots 154 is used, as indicated in Fig. 4, the operation is repeated until the pattern follower 81 has completely traversed all of the pattern slots 50 and 154 in the upper plate 48 of the pattern, the needle 18 in the sewing machine head having sewed a seam in the comforter or other object following the lines of the combined pattern slots 50 and 154.

Where, after examination of the stitched comforter, or other object, it is found that some of the stitches have been improperly made, or omitted entirely, the operator may move the pattern slot 50 to the point below the defective portion, energize the solenoid coil 100, start the motor 114 and restitch the defective portion of the comforter or mattress top.

When the distance to be stitched is short, and automatic operation is not desired, the pattern sleeve may be kept in engagement with the pattern slot 50, with the sprocket withdrawn out of engagement with the control pins, and the pattern moved manually along the slot, the comforter stitching following the lines of the pattern.

Where a special pattern or special initials are desired on a comforter, or mattress top, the sprocket and the pattern sleeve may be withdrawn completely out of engagement with the slot and the pins respectively. The movable carriage may then be manually moved by the operator, either by eye, or following an auxiliary pattern, similar to the plain pattern 155, shown in Fig. 10, which may be mounted above the pattern 47, on the movable carriage, or in its place.

The plain pattern 155 shown in Fig. 10, is similar to the automatic pattern shown in Figs. 8 and 9, except that the control pins 58 and 68 have been eliminated.

The plain pattern, Fig. 10, is also constructed of two steel plates 156 and 157, pattern slots 50 and 154 being formed in the upper plate in the manner previously described. The upper and lower plates may be spaced at the desired distance by a plurality of tubular spacers 53, mounted on the bolts 54, spaced around the edges of the pattern plates, and at selected points in the sections 55 and 56, into which the upper plate 146, of the pattern is divided, so that all sections of the upper plate of the pattern are located at the same horizontal level, the height of the parallel edges 51 and 52 of the slots, matching one another.

The pattern follower 81, used with the plain pattern is similar to that shown in Fig. 3, and may be similarly mounted at the bottom of the shaft 61. When used with a plain pattern, the sprocket 60 may be omitted from the follower shaft, although it is preferable to leave it on the shaft so that the same pattern follower and shaft can be used interchangeably with the automatic patterns, shown in Figs. 8 and 9, and the plain pattern of Fig. 10.

Fig. 11 shows a specimen wiring diagram of the various portions of the apparatus, as well as a schematic drawing of the drives to the sewing machine and the sprocket drive speed reducer.

The current enters the starter switch 146 from the power line 160 after which it passes thru the motor controller 147, thence along the line 161 to the motor 114. One leg 162 of the line runs from the motor to the cut-out micro-switch 151, attached to the lower pattern plate. From the micro-switch, the return line 163 is connected to the line 164, which runs to the return terminal of the motor-controller, thence back to the starter switch, thus completing the main circuit.

A branch line 165 runs from the motor line 161 to the solenoid coil 100, from which the line 166 is connected to one terminal of an emergency switch 167.

A solenoid button 168 is connected in series with the return line 164 to the motor-controller, by a branch line 169, the other terminal of the button being connected to the opposite terminal of the emergency switch 167.

Two methods of starting the unit may be utilized:

In one method the solenoid coil 100 is energized by pressing the solenoid button 168, thus dropping the sprocket shaft downward, as previously described. The motor itself may be started by means of the starter switch 146 and the controller 147, thus driving the speed reducer and the sprocket shaft, also the sewing machine shaft, as hereinbefore described.

When the sprocket shaft returns to the starting point in the slot 50, as indicated in Figs. 2, and 8, the bottom of the shaft 61, presses against the plunger 153, of the micro-switch 151, thus shutting off the power to the motor and the solenoid coil, simultaneously stopping the sewing machine and the sprocket shaft, and permitting the spring to withdraw the pattern follower and the sprocket out of engagement with the slot 50 in the pattern, and the pattern pins (58) respectively, as previously indicated.

In the other method, the motor may be started by means of the starter switch 146 and the controller 147 in the conventional manner, after which the solenoid switch 168 may be closed, thus pressing the sprocket shaft 61 downward, the pattern follower 81, entering the pattern slot 50, the sprocket teeth entering into engagement with the pattern pins 58, and starting the pattern in motion.

In this method of starting care must be exercised in dropping the pattern follower into the pattern slot, and the sprocket into engagement with the pattern pins, to avoid injury to the pins and pattern slot by the rotating sprocket.

Under normal operating conditions the current may be shut off by the micro-switch 151, located at the end of the pattern slot 50, or by shutting off the motor starter switch.

The solenoid 96 may be placed in one of several positions, to directly or indirectly press the sprocket shaft downward, so that the pattern follower sleeve may enter the pattern slot, and the sprocket teeth engage the pattern control pins. In place of the solenoid, a hydraulic mechanism, or a fully mechanical apparatus may be substituted to accomplish the same purpose, without altering the essentials of the operations. Full automatic or semi-automatic controls may be provided on the main motor, and the solenoid to time and regulate the operation of the sewing machine so that the operation of the needle starts after the follower sleeve is dropped into engagement with the pattern slot, and the teeth in the sprocket engage the pattern control pins.

An automatic control may also be provided, so that if for any reason the thread in the needle breaks, or becomes entangled, the motor switch would be automatically cut off and the solenoid de-energized so that the sewing machine would stop, and the follower sleeve would be simultaneously withdrawn from the pattern slot, thus arresting the movement of the pattern. In this manner the sewing operation may be restarted at the point where it left off, after the needle is rethreaded, and the follower sleeve and sprocket restored into engagement with the pat-

tern slot and the control pins respectively, at approximately the point in the pattern slot from which they were removed.

Various modifications of the pattern construction may be made without altering the essentials of operation of the mechanism hereinbefore described.

In place of the single motor belted to the sewing machine drive-shaft, and the worm shaft of the speed reducer, individual, electrically-synchronized motors may be mounted on both the sewing machine head and the speed reducer, thus electrically-synchronizing the movement of the sewing machine and the speed reducer, driving the sprocket shaft.

It would also be possible to utilize variable-speed D. C. motors and electronically convert from A. C. to D. C. by using thyatron tubes, or a similar method.

It will, accordingly, be appreciated that the automatic pattern control for sewing machines herein described, has new and useful constructional and operational features offering distinct advantages over machines of the conventional type. It will, moreover, be understood that the foregoing description of the construction, operation and the results attained with the machine and the pattern mechanism, in their various modifications, is illustrative, and that various changes can be made therein, without departing from the essentials of the invention which is, rather, defined by the appended claims.

What we claim as new and desire to secure by Letters Patent, is:

1. A pattern for guiding fabric objects under a sewing machine comprising two plates, the upper plate having a plurality of design slots cut there-thru, a plurality of pins passing thru the upper plate, parallel to one edge of each of said design slots, a clear gap being provided between the exposed sections of adjacent pins, means connecting the sections of the upper plate to the lower plate, means attaching the pins to one of said plates, and means separating the sections of the upper plate from the lower plate.

2. A pattern for guiding fabric objects under a sewing machine comprising two plates, the upper plate having a plurality of design slots cut there-thru, a plurality of pins passing thru the upper plate, parallel to one edge of each of said design slots and in spaced relation thereto, means for attaching said pins to the lower plate, means connecting the sections of the upper plate to the lower plate, and a plurality of spacers of substantially equal height separating the sections of the upper plate from the lower plate.

3. A pattern for guiding fabric objects under a sewing machine comprising two plates, the upper plate having a plurality of design slots cut there-thru, a plurality of pins passing thru the upper plate, parallel to one edge of said design slots and in spaced relation thereto, a plurality of spacers formed integral with said pins, separating the sections of the upper plate from the lower plate, said spacers being of substantially equal height, and means connecting the sections of the upper plate to the lower plate.

4. A pattern for guiding fabric objects under a sewing machine comprising two plates, the upper plate having a plurality of design slots cut there-thru, a plurality of pins passing thru the upper plate, parallel to one edge of said design slots and in spaced relation thereto, means for attaching said pins to the lower plate, a plurality of bolts connecting the sections of the

upper plate to the lower plate, and a plurality of spacers of substantially equal height mounted on said bolts, separating the sections of the upper plate from the lower plate.

5. A fabric sewing machine comprising a frame, a sewing machine head attached to said frame, a carriage movably mounted with relation to said frame, means for guiding the longitudinal movement of said carriage, means for guiding the transverse movement of said carriage, supports for a fabric object mounted near the top of said carriage under the needle of said sewing machine, a pattern attached to said carriage substantially parallel to the plane of said supports, a plurality of design slots formed in the upper portion of said pattern, rotating means substantially in alignment with the needle of said sewing machine mounted above said pattern, a rotating pattern follower driven by said rotating means, fitting the design slots in said pattern, and a plurality of spaced pins projecting beyond the upper surface of said pattern, parallel to one edge of each of the design slots, means attaching the pins to the pattern, a toothed sprocket mounted on said rotating means, concentric with the pattern follower, said sprocket engaging the pins to move the carriage along the design slots, the needle sewing a seam substantially in accordance with the design slots in said pattern, said follower and sprocket being readily removable from the design slots and the pins, respectively, at any point along said slots, in a plane substantially perpendicular to the pattern, without disturbing the lateral position of the follower and the rotating means.

6. A fabric sewing machine comprising a frame, a sewing machine head attached to said frame, a shaft driving said machine rotatably supported by said frame, a carriage movably mounted with relation to said frame, means for guiding the longitudinal movement of said carriage, means for guiding the transverse movement of said carriage, supports for a fabric object mounted near the top of said carriage under the needle of said sewing machine, a pattern attached to said carriage substantially parallel to the plane of said supports, the upper portion of said pattern having a plurality of design slots formed therein, rotating means supported by said frame substantially in alignment with the needle of said sewing machine, a motor mounted in the base of said frame, means for simultaneously driving the sewing machine drive shaft and said rotating means from said motor, a rotating pattern follower, driven from said rotating means, fitting the design slots in said pattern, and a plurality of equally spaced pins projecting beyond the upper surface of said pattern, parallel to one edge of each of the design slots, and in spaced relation thereto, means attaching the pins to the pattern, a toothed sprocket mounted on said rotating means, concentric with the pattern follower, said sprocket engaging the pins to move the carriage along the design slots, the needle sewing a seam substantially in accordance with the design slots in said pattern, said follower and sprocket being readily removable from the design slots and the pins, respectively, at any point along said slots, in a plane substantially perpendicular to the pattern, without disturbing the lateral position of the follower and the rotating means.

7. A fabric sewing machine comprising a frame, a sewing machine head attached to said frame, a shaft driving said machine rotatably supported by said frame, a carriage movably mounted with re-

lation to said frame, means for guiding the longitudinal movement of said carriage, means for guiding the transverse movement of said carriage, supports for a fabric object mounted near the top of said carriage under the needle of said sewing machine, a pattern attached to said carriage substantially parallel to the plane of said supports, the upper portion of said pattern having a plurality of design slots formed therein, a speed reducer supported by said frame, a rotatable shaft depending from said speed reducer, substantially in alignment with the needle of said sewing machine, a motor mounted in the base of said frame, means for simultaneously driving said sewing machine drive shaft and said speed reducer from said motor, a rotating pattern follower attached to said speed reducer shaft, fitting the design slots in said pattern, and a plurality of substantially cylindrical pins projecting beyond the upper surface of said pattern, parallel to one edge of each of the design slots, means attaching the pins to the pattern, a toothed sprocket mounted on said rotatable speed reducer shaft, concentric with the pattern follower, said sprocket engaging the pins to move the carriage along the design slots, a clear gap being provided between the exposed portion of adjacent pins, the needle sewing a seam substantially in accordance with the design slots in said pattern, said sprocket and follower being manually removable from the design slots and the pins respectively, in a direction parallel to the pin axis, without disturbing the lateral position of the follower and the rotatable speed reducer shaft.

8. A fabric sewing machine comprising a frame, a sewing machine head attached to said frame, a shaft driving said machine rotatably supported by said frame, a carriage movably mounted with relation to said frame, means for guiding the longitudinal movement of said carriage, means for guiding the transverse movement of said carriage, a plurality of supports for a fabric object mounted near the top of said carriage under the needle of said sewing machine, a pattern attached to said carriage substantially parallel to the plane of said supports, the upper portion of said pattern having a plurality of design slots formed therein, a plurality of pins attached to said pattern plate, parallel to said design slots and in spaced relation thereto, rotating means supported by said frame substantially in alignment with the needle of said sewing machine, a sprocket driven by said rotating means operatively engaging said pattern pins to move the pattern and carriage along the design slots, means moving said sprocket in a plane parallel to the pin axis, into selective engagement with said pins, a motor mounted in the base of said frame, means for simultaneously driving said sewing machine drive shaft and said rotating means from said motor, a rotating pattern follower, driven from said rotating means, fitting the design slots in said pattern, and a plurality of substantially cylindrical pins projecting beyond the upper surface of said pattern, said pins being parallel to one edge of the design slots, and in spaced relation thereto, means attaching the pins to the pattern, a toothed sprocket mounted on said rotating means, concentric with the pattern follower, said sprocket engaging the pins to move the carriage along the design slots, the needle sewing a seam substantially in accordance with the design slots in said pattern, said follower and sprocket being readily removable from the design slots and the pins respectively, at any point along said slots, in a plane substantially

parallel to the pattern pins, without disturbing the lateral position of the follower and the rotating means.

9. A fabric sewing machine comprising a frame, a sewing machine head attached to said frame, a shaft driving said machine rotatably supported by said frame, a carriage movably mounted with relation to said frame, means for guiding the longitudinal movement of said carriage, means for guiding the transverse movement of said carriage, supports for a fabric object mounted near the top of said carriage under the needle of said sewing machine, a pattern attached to said carriage substantially parallel to the plane of said supports, the upper portion of said pattern having a plurality of design slots formed therein, a plurality of substantially cylindrical, equally spaced pins attached to said pattern, parallel to said design slots and in spaced relation thereto, a clear gap being provided between the exposed portion of adjacent pins, a speed reducer supported by said frame, a rotatable shaft depending from said speed reducer, substantially in alignment with the needle of said sewing machine, a sprocket driven by said speed reducer operatively engaging said pattern pins to move the pattern and carriage along the design slots, a motor mounted in the base of said frame, means for simultaneously driving said sewing machine drive shaft and said speed reducer from said motor, and a rotating pattern follower attached to said speed reducer shaft concentric with said sprockets, the follower fitting the design slots in said pattern, the needle sewing a seam substantially in accordance with the design slots in said pattern, said sprocket and follower being manually removable from the design slots and the pins respectively, in a direction parallel to the pin axis, without disturbing the lateral position of the follower and the rotatable speed reducer shaft.

10. A fabric sewing machine comprising a frame, a sewing machine head attached to said frame, a shaft driving said machine rotatably supported by said frame, a carriage movably mounted with relation to said frame, means for guiding the longitudinal movement of said carriage, means for guiding the transverse movement of said carriage, means adapted to support a fabric object mounted near the top of said carriage under the needle of the sewing machine, a pattern attached to said carriage, substantially parallel to the plane of said support means, said pattern comprising two plates, separated by spacers, the upper plate having a plurality of design slots cut therethru, a plurality of substantially cylindrical pins passing thru the upper plate of said pattern, parallel to one edge of said design slots and in spaced relation thereto, a speed reducer supported by said frame, a rotatable shaft depending from said speed reducer, substantially in alignment with the needle of said sewing machine, a sprocket mounted on said shaft, the teeth in said sprocket engaging the pattern pins to move the pattern and the movable carriage along a path following the design slots, means moving said sprocket in a plane parallel to the pin axis, into selective engagement with said pins, a pattern follower mounted on said shaft, fitting the design slots in said pattern plate, the exposed end of each of said pins being rounded to readily clear the teeth of the sprocket, when the sprocket is moved into the operating position, means for driving said sewing machine shaft and said speed reducer, and

15

means for co-ordinating the rotation of the sewing machine drive-shaft with the speed reducer, said sprocket and follower co-operating to move the fabric object under the needle of the machine, the needle sewing a seam substantially following the design slots in the pattern, said sprocket and follower being readily removable from the design slots and the pins respectively, in a direction parallel to the pin axis, without disturbing the lateral position of the follower and the rotatable speed reducer shaft

11. A fabric sewing machine comprising a frame, a sewing machine head attached to said frame, a shaft driving said machine rotatably supported by said frame, a carriage movably mounted with relation to said frame, means adapted to support a fabric object mounted near the top of said carriage under the needle of the sewing machine, a pattern attached to said carriage, substantially parallel to the plane of said support means, said pattern comprising two plates, separated by spacers, the upper plate having a plurality of equally spaced design slots cut therethru, a plurality of pins passing thru the upper plate of said pattern, parallel to one edge of said design slots and in spaced relation thereto, a speed reducer supported by said frame, a rotatable shaft depending from said speed reducer, substantially concentric with the needle of said sewing machine, a sprocket mounted on said shaft, the teeth in said sprocket engaging the pattern pins to move the pattern and the movable carriage along a path following the design slots, a pattern follower mounted on said shaft, fitting the design slots in said pattern plate, means moving said pattern follower and sprocket into engagement with the design slots and pattern pins respectively, in a plane perpendicular to the pattern plates, the exposed end of each of said pins being rounded to readily clear the teeth of the sprocket, when the sprocket is moved into the operating position, means for driving the sewing machine shaft and the speed reducer, and means for co-ordinating the rotation of the sewing machine drive-shaft with the speed-reducer, said sprocket and follower co-operating to move the support means with relation to the needle of the machine, the needle sewing a seam, substantially following the design slots in the pattern plate, said sprocket and follower being manually removable from the design slots and the pins respectively, in a direction perpendicular to the pattern plates, without disturbing the lateral position of the follower and the rotatable speed reducer shaft.

12. A fabric sewing machine comprising a frame, a sewing machine head attached to said frame, a shaft driving said machine rotatably supported by said frame, a carriage movably mounted with relation to said frame, means adapted to support a fabric object mounted near the top of said carriage under the needle of the sewing machine, a pattern attached to said carriage, substantially parallel to the plane of said support means, said pattern comprising two plates, separated by spacers, the upper plate having a plurality of design slots cut therethru, a plurality of substantially cylindrical pins passing thru the upper plate of said pattern, parallel to one edge of said design slots and in spaced relation thereto, the space between the exposed ends of adjacent pins being clear, a speed reducer supported by said frame, a rotatable shaft depending from said speed reducer, substan-

16

tially concentric with the needle of said sewing machine, a sprocket mounted on said shaft, the spacing of the teeth in said sprocket being substantially equal to the spacing of the pattern pins, the teeth in said sprocket engaging the pattern pins to move the pattern and the movable carriage along a path following the design slots, a pattern follower mounted on said shaft, fitting the design slots in said pattern plate, means moving the follower and sprocket into engagement with the design slots and the pattern pins, respectively, in a plane substantially perpendicular to the pattern plates, a motor mounted on said frame, means for driving said sewing machine shaft and said speed reducer from said motor, and means for co-ordinating the rotation of the sewing machine drive-shaft with the speed-reducer, said sprocket and follower co-operating to move the support means with relation to the needle of the machine, the needle sewing a seam, substantially following the design slots in the pattern plate, said sprocket and follower being readily removable from the design slots and the pins respectively, in a direction perpendicular to the pattern plates, without disturbing the lateral position of the follower and the rotatable speed reducer shaft.

13. A fabric sewing machine comprising a frame, a sewing machine head attached to said frame, a shaft driving said sewing machine rotatably supported by said frame, a carriage movably mounted with relation to said frame, means for guiding the longitudinal movement of said carriage, means for guiding the transverse movement of said carriage, supports for a fabric object demountably attached to the frame of said carriage, under the needle of the sewing machine, a pattern attached to the carriage, substantially parallel to the fabric object, said pattern comprising two plates separated by spacers, the upper plate having a plurality of design slots cut therethru, a plurality of equally spaced pins passing thru the upper plate of the pattern, parallel to one edge of said design slots and in spaced relation thereto, a rotatable shaft mounted above the pattern, substantially concentric with the needle of the sewing machine, a sprocket mounted on said shaft, the spacing of the teeth in said sprocket being substantially equal to the spacing of the pattern pins, the teeth in said sprocket engaging the pattern pins to move the pattern and the movable carriage along a path following the design slots, a pattern follower mounted on said shaft, fitting the design slots in said pattern plate, means moving said pattern follower and sprocket into engagement with the design slots and the pattern pins respectively, in a plane perpendicular to the pattern plates, means for driving said sewing machine shaft and sprocket shaft, and means for co-ordinating the rotation of the sewing machine drive shaft with the sprocket shaft, said sprocket and follower co-operating to move said supports with relation to the needle of the sewing machine, the needle sewing a seam, substantially following the design slots in the pattern plate, said sprocket and follower being readily removable from the design slots and the pins respectively, in a direction perpendicular to the pattern plates, without disturbing the lateral position of the follower and the rotatable shaft.

14. A fabric sewing machine comprising a frame, a sewing machine head attached to said frame, a shaft driving said sewing machine rotatably supported by said frame, a carriage mov-

ably mounted with relation to said frame, means for guiding the longitudinal movement of said carriage, means for guiding the transverse movement of said carriage, means adapted to support a fabric object demountably attached to the frame of said carriage, under the needle of the sewing machine, a pattern attached to the carriage, substantially parallel to the fabric object, said pattern comprising two plates separated by spacers, the upper plate having a plurality of design slots cut therethru, a plurality of substantially cylindrical pins passing thru the upper plate of the pattern, parallel to one edge of said design slots and in spaced relation thereto, means attaching the pins to one of said plates, means connecting the sections of the upper plate to the lower plate, a rotatable shaft mounted above the pattern, substantially concentric with the needle of the sewing machine, a sprocket mounted on said shaft, the spacing of the teeth in said sprocket being substantially equal to the spacing of the pattern pins, the teeth in said sprocket engaging the pattern pins to move the pattern and the movable carriage along a path following the design slot, a pattern follower mounted on said shaft, fitting the design slots in said pattern plate, electrically controlled means moving said pattern follower and sprocket into engagement with the design slots and the pattern pins respectively, in a direction substantially parallel to the pin axis, the exposed end of each of said pins being rounded to clear the sprocket teeth, when the sprocket is moved into the operating position, a motor mounted on said frame, means for driving said sewing machine shaft and sprocket shaft from the motor, and means for synchronizing the rotation of the sewing machine drive shaft with the sprocket shaft, said sprocket and follower co-operating to move the support means with relation to the needle of the sewing machine, the needle sewing a seam, substantially following the design slots in the pattern plate, said sprocket and follower being readily removable from the design slots and the pins respectively, in a direction parallel to the pin axis, without disturbing the lateral position of the follower and the rotatable shaft.

15. A fabric sewing machine comprising a frame, a sewing machine head attached to said frame, a shaft driving said sewing machine rotatably supported by said frame, a carriage movably mounted with relation to said frame, clamps adapted to support a fabric object demountably attached to the frame of said carriage, under the needle of the sewing machine, a pattern attached to the carriage, substantially parallel to the plane of said clamps, said pattern comprising two plates separated by spacers, the upper plate having a plurality of design slots cut therethru, a plurality of pins passing thru the upper plate of the pattern, parallel to one edge of said design slots and in spaced relation thereto, a rotatable shaft mounted above the pattern, substantially concentric with the needle of the sewing machine, a sprocket mounted on said shaft, the spacing of the teeth in said sprocket being substantially equal to the spacing of the pattern pins, the teeth in said sprocket engaging the pattern pins to move the pattern and the movable carriage along a path following the design slots, a pattern follower mounted on said shaft, fitting the design slots in said pattern plate, means for placing said pattern follower and sprocket into engagement with the design slots and the pattern pins re-

spectively, a motor driving said sewing machine shaft and sprocket shaft, means for synchronizing the rotation of the sewing machine drive shaft with the sprocket shaft, and a plurality of switches mounted on the pattern, each switch being in alignment with a point in the respective design slot, said switch automatically shutting off the power to the motor when the design slot has been traversed by the pattern follower.

16. A fabric design sewing machine comprising a frame, a sewing machine head, attached to said frame, a shaft driving the sewing machine, rotatably supported by said frame, a carriage movably mounted with relation to said frame, means adapted to support a fabric object demountably supported near the top of said carriage under the needle of the sewing machine, a pattern attached to said carriage, substantially parallel to the plane of said support means, said pattern comprising two plates, the upper plate having a plurality of design slots cut therethru, a plurality of pins passing thru the upper plate, parallel to one edge of said design slots and in spaced relation thereto, a plurality of spacers formed integral with said pins, separating the sections of the upper plate from the lower plate, said spacers being of substantially equal height, means connecting the sections of the upper plate to the lower plate, a rotating shaft mounted between the pattern and the fabric object, substantially concentric with the needle of the sewing machine, a pattern follower fitting the design slots in said pattern mounted on said shaft, a sprocket mounted on said shaft, the spacing of the teeth in said sprocket being substantially equal to the spacing of the pattern pins, said sprocket teeth engaging the pattern pins to move the pattern and the movable carriage along a path following the design slot in the pattern plate, means for placing said pattern follower and sprocket into engagement with the design slot and the pattern pins respectively, means for driving the sewing machine shaft and the sprocket shaft, means for co-ordinating the rotation of the sewing machine drive-shaft with the sprocket shaft, said sprocket and follower co-operating to move the support means with relation to the needle of the sewing machine, the needle sewing a seam substantially following the design slots in the pattern plate.

17. A fabric design sewing machine comprising a frame, a sewing machine head attached to said frame, a shaft driving the sewing machine, rotatably supported by said frame, a carriage movably mounted with relation to said frame, means for guiding the longitudinal movement of said carriage, means for guiding the transverse movement of said carriage, clamps adapted to support a fabric object demountably supported near the top of said carriage under the needle of the sewing machine, a pattern attached to said carriage, substantially parallel to the plane of said clamps, said pattern comprising two plates, the upper plate having a plurality of design slots cut therethru, a plurality of substantially cylindrical pins projecting above the upper plate of the pattern, said pins being parallel to one edge of the design slot, and in spaced relation thereto, means attaching the pins to one of the pattern plates, a clear gap being provided between the exposed ends of adjacent pins, a plurality of spacers separating the sections of the upper plate from the lower plate, said spacers being of substantially equal height, means connecting the sections of the upper plate to the

lower plate, a rotating shaft mounted between the pattern and the fabric object, substantially concentric with the needle of the sewing machine, a sprocket mounted on said shaft, the spacing of the teeth in said sprocket being substantially equal to the spacing of the pattern pins, the teeth of the sprocket engaging the pattern pins, to move the pattern and the carriage along the design slots, a pattern follower fitting the design slots in said pattern mounted on said shaft, electrically controlled means moving said pattern follower into engagement with the design slots, in a plane parallel to the pin axis, means for driving the sewing machine shaft and the pattern follower shaft, means for co-ordinating the rotation of the sewing machine drive-shaft with the pattern follower shaft, said pattern follower guiding the movement of the clamps with relation to the needle of the sewing machine, the needle sewing a seam substantially following the design slots in the pattern plate, said sprocket and follower being readily removable from the design slots and the pins, respectively, in a direction parallel to the pin axis, without disturbing the lateral position of the follower and the rotating shaft.

18. A fabric design sewing machine comprising a frame, a sewing machine head attached to said frame, a shaft driving the sewing machine, rotatably supported by said frame, a carriage movably mounted with relation to said frame, clamps adapted to support a fabric object demountably supported near the top of said carriage under the needle of the sewing machine, a pattern attached to said carriage, substantially parallel to the plane of said clamps, said pattern comprising two plates, the upper plate having a plurality of design slots cut therethru, a plurality of pins passing thru the upper plate, parallel to one edge of said design slots and in spaced relation thereto, means for attaching said pins to the lower plate, a plurality of bolts connecting the sections of the upper plate to the lower plate, a plurality of spacers of substantially equal height mounted on said bolts, a rotating shaft mounted between the pattern and the plane of the clamps, substantially concentric with the needle of the sewing machine, a pattern follower fitting the design slots in said pattern mounted on said shaft, a sprocket mounted on said shaft, the spacing of the teeth in said sprocket being substantially equal to the spacing of the pattern pins, said sprocket teeth engaging the pattern pins to move the pattern and the movable carriage along a path following the design slots in the pattern plate, means for placing said pattern follower

and sprocket into engagement with the design slots and the pattern pins respectively, means for driving the sewing machine shaft and the sprocket shaft, means for co-ordinating the rotation of the sewing machine drive shaft with the sprocket shaft, said sprocket and follower co-operating to move the carriage and clamps with relation to the needle of the sewing machine, the needle sewing a seam substantially following the design slots in the pattern plate.

19. A pattern for guiding fabric objects under a sewing machine, comprising two plates, the upper plate having a plurality of design slots cut therethrough, a plurality of pins passing through the upper plate, parallel to one edge of each of said design slots, and in spaced relation thereto, means attaching said pins to one of the plates, a clear gap being provided between the exposed portions of adjacent pins, and means connecting the sections of the upper plate to the lower plate.

20. A pattern for guiding fabric objects under a sewing machine, comprising two plates, the upper plate having a plurality of design slots cut therethrough, a plurality of substantially cylindrical pins passing through the upper plate, parallel to one edge of said design slots, and in spaced relation thereto, means attaching said pins to one of the pattern plates, a clear gap being provided between the exposed portions of adjacent pins, and means connecting the sections of the upper plate to the lower plate.

21. A pattern for guiding fabric objects under a sewing machine, comprising two plates, the upper plate having a plurality of design slots cut therethrough, a plurality of substantially cylindrical, equally-spaced pins passing through the upper plate, parallel to one edge of each of said design slots, and in spaced relation thereto, the exposed end of each of said pins being rounded, means attaching said pins to the lower plate, and a plurality of bolts connecting the sections of the upper plate to the lower plate.

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