

Jan. 8, 1963

E. H. CONRAD

3,072,082

SCHIFFLI TYPE EMBROIDERY MACHINE

Filed May 19, 1960

7 Sheets-Sheet 1

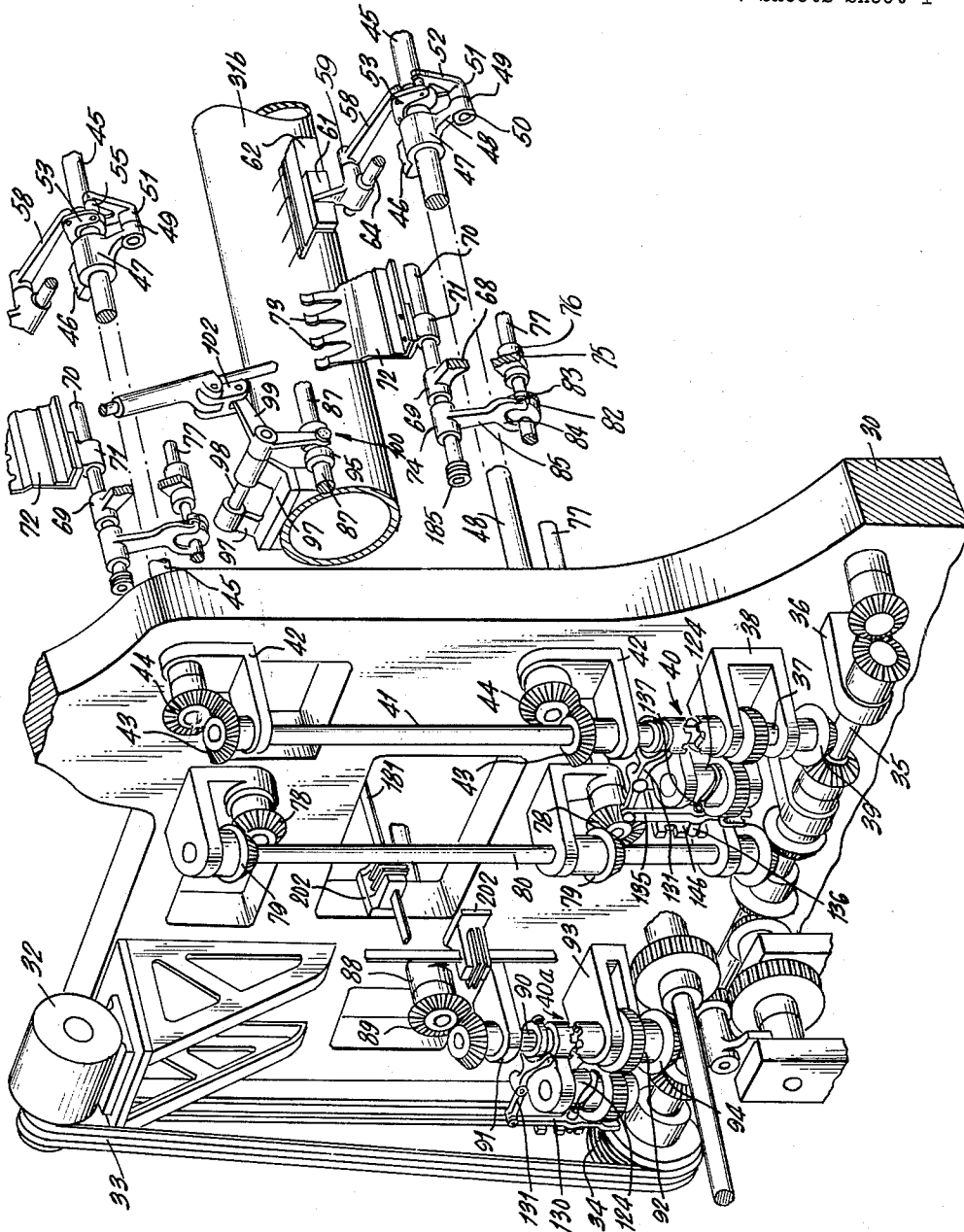


FIG. 1

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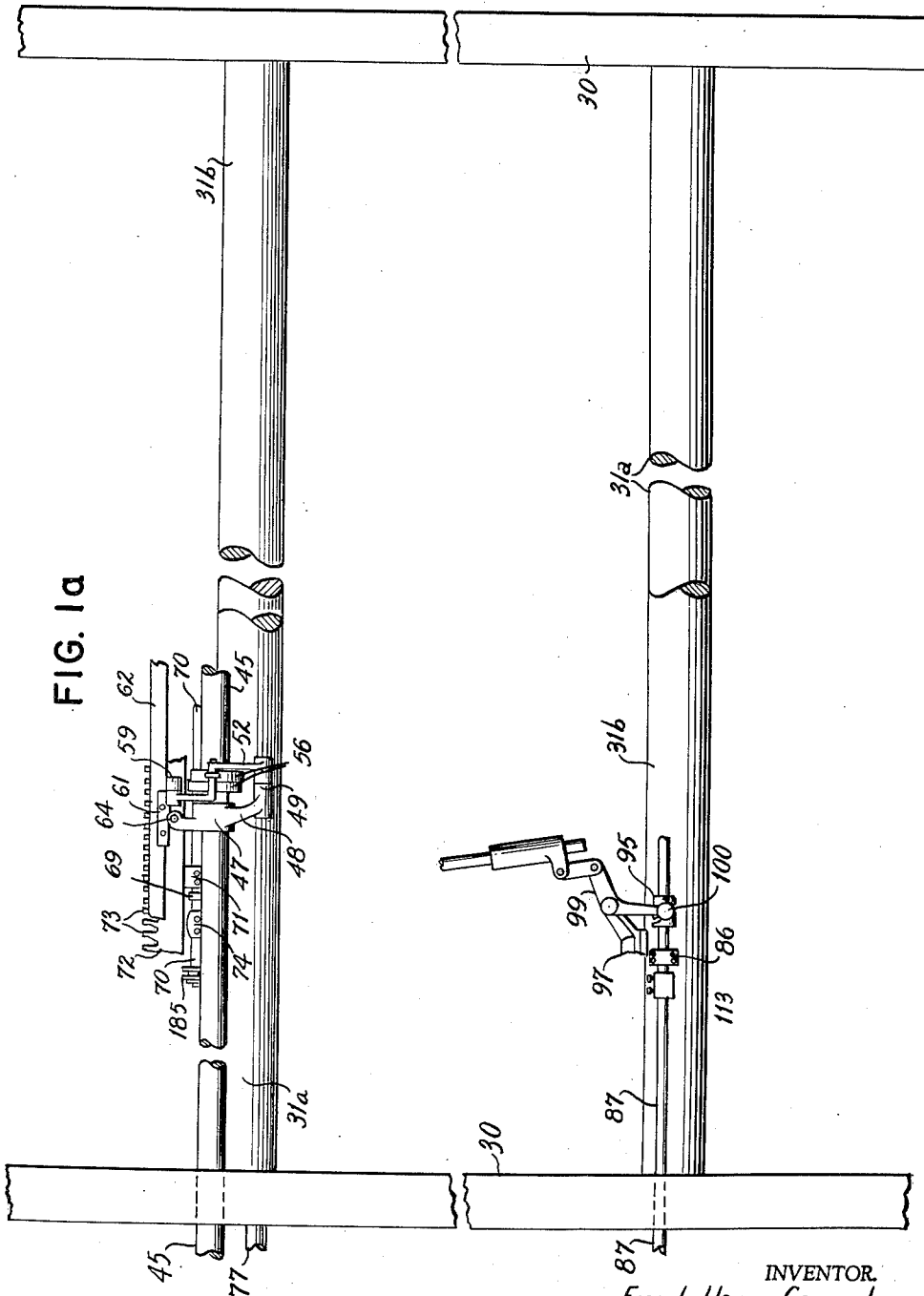
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SCHIFFLI TYPE EMBROIDERY MACHINE

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7 Sheets-Sheet 2



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7 Sheets-Sheet 3

FIG. 2

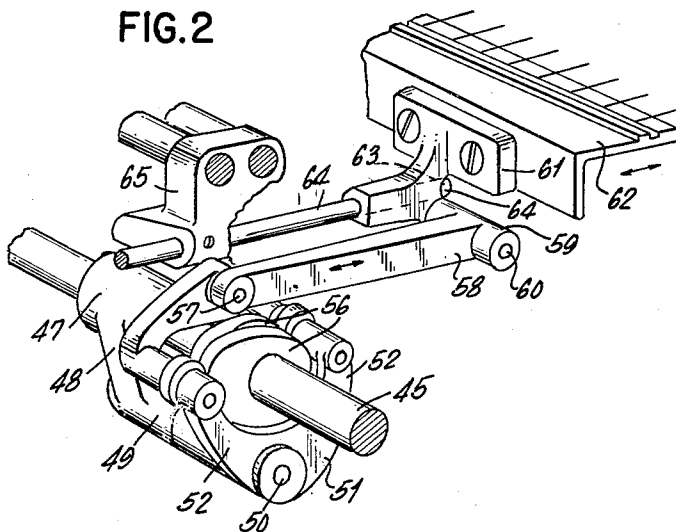


FIG. 4

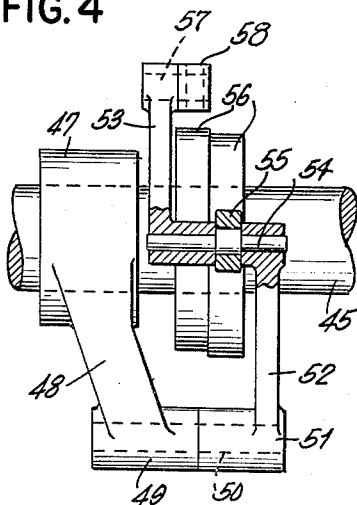
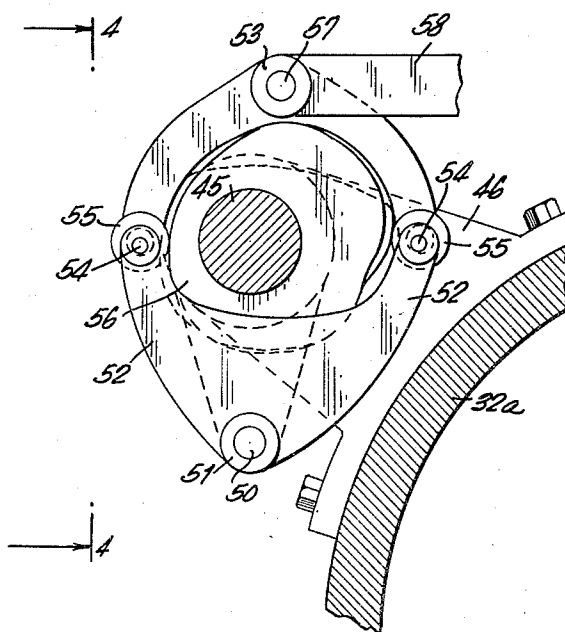


FIG. 3



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7 Sheets-Sheet 4

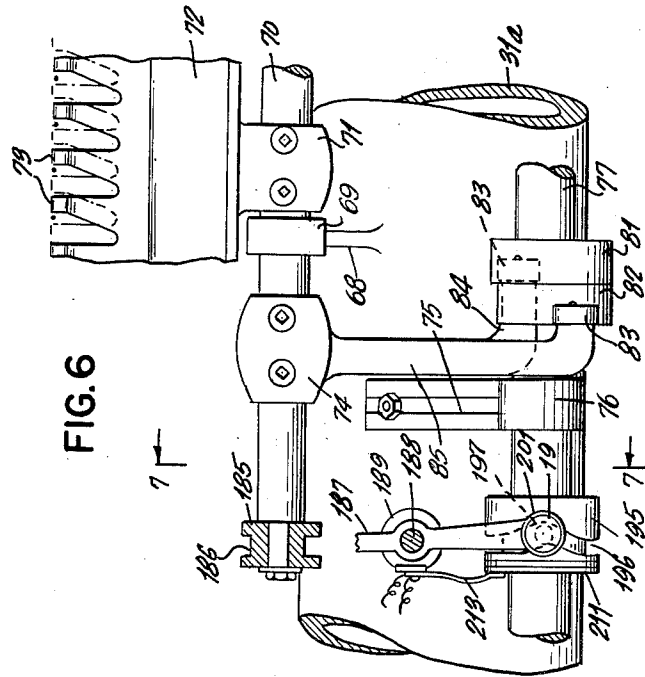


FIG. 6

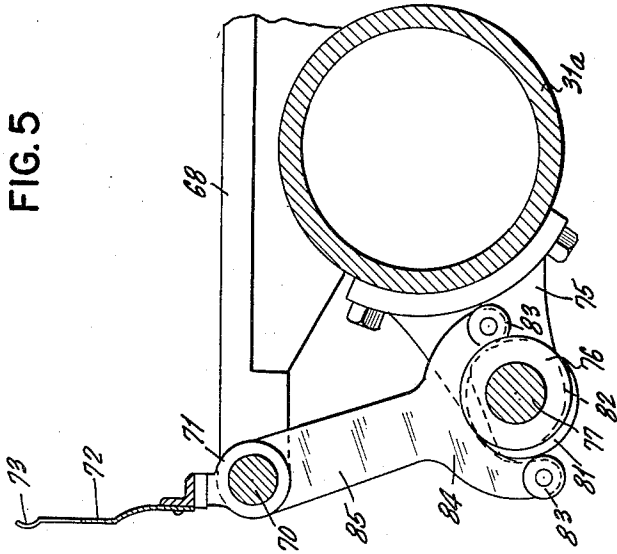


FIG. 5

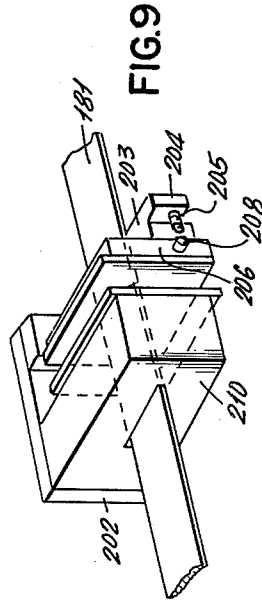
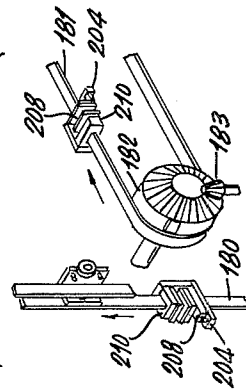


FIG. 9

FIG. 8



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SCHIFFLI TYPE EMBROIDERY MACHINE

Filed May 19, 1960

7 Sheets-Sheet 5

FIG. 7

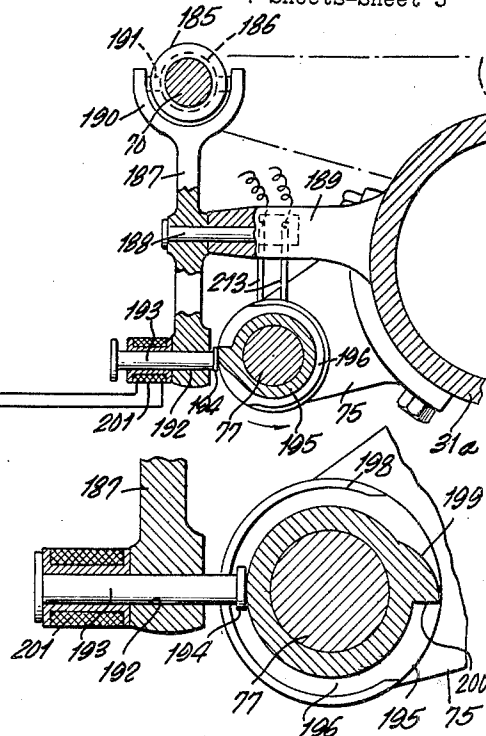
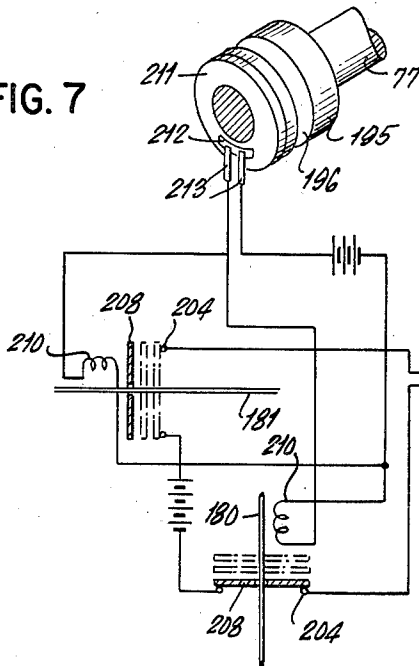


FIG. 10

FIG. 11

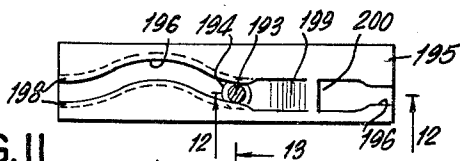


FIG. 12

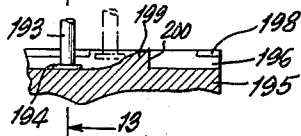


FIG. 19

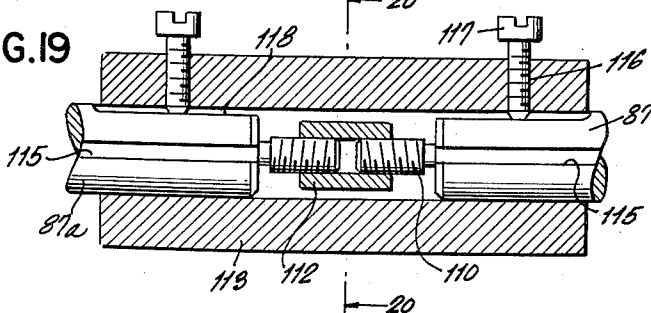


FIG. 13

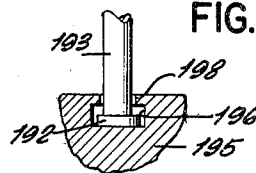


FIG. 20

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SCHIFFLI TYPE EMBROIDERY MACHINE

Filed May 19, 1960

7 Sheets-Sheet 6

FIG. 21

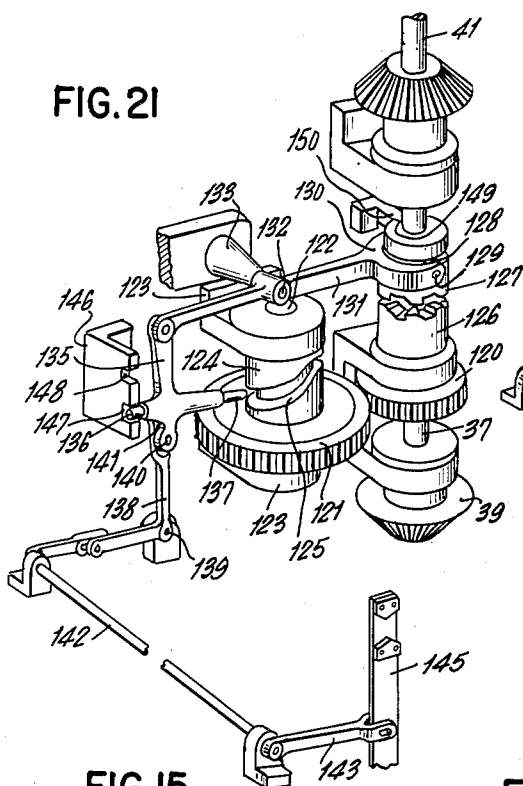


FIG.15

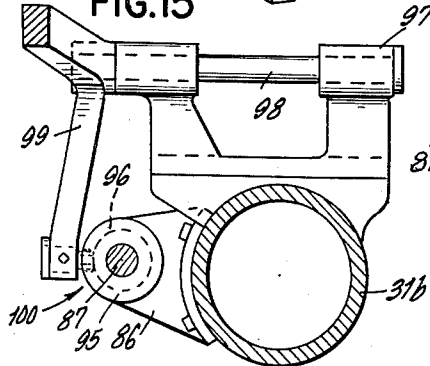


FIG.16

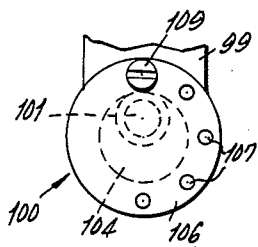


FIG.17

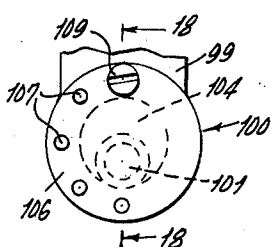


FIG. 14

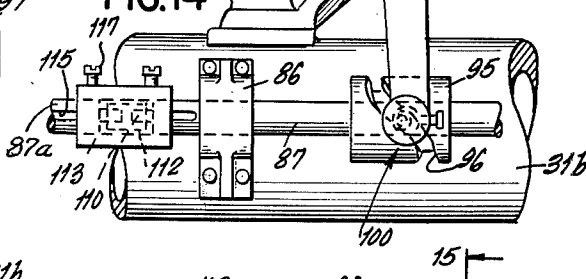
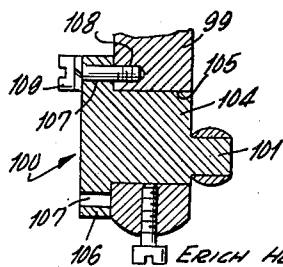


FIG.18



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SCHIFFLI TYPE EMBROIDERY MACHINE

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7 Sheets-Sheet 7

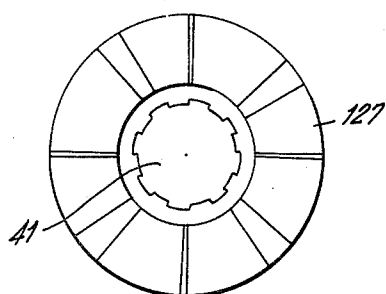


FIG. 25

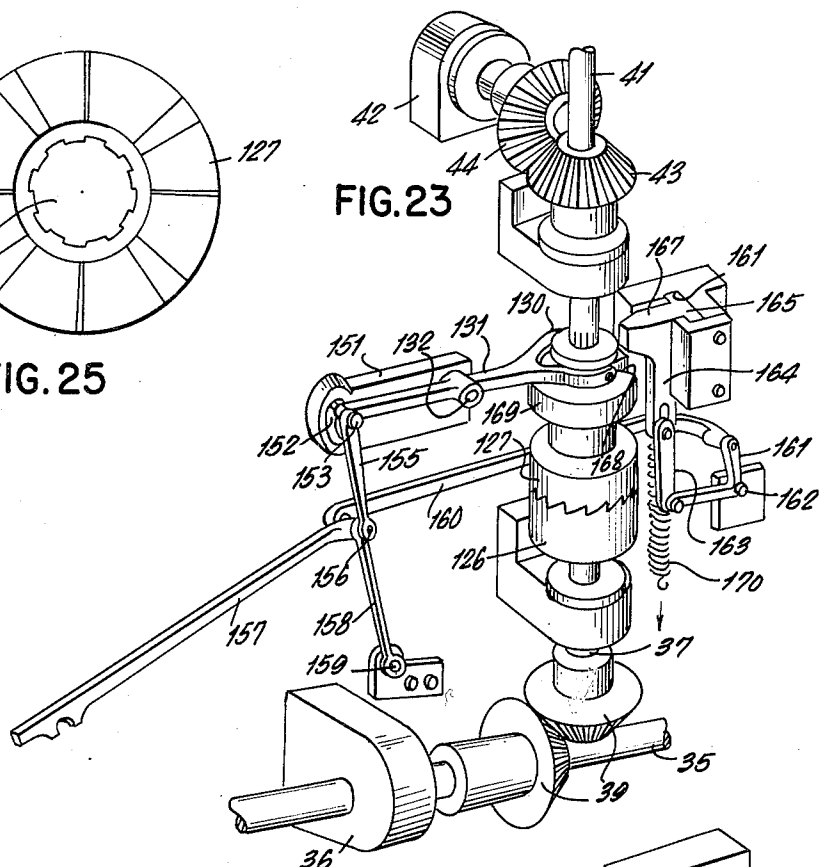
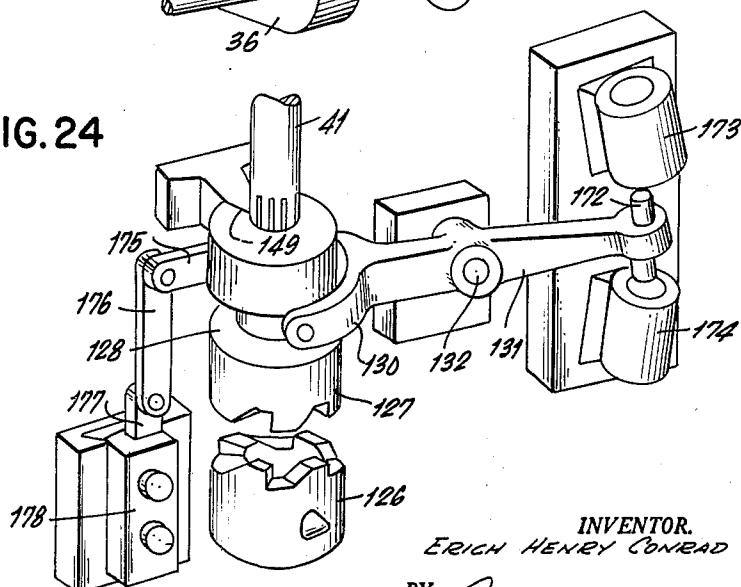


FIG. 23

FIG. 24



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1

3,072,082

SCHIFFLI TYPE EMBROIDERY MACHINE

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Filed May 19, 1960, Ser. No. 30,173

29 Claims. (Cl. 112-85)

The present invention relates to a Schiffli embroidering machine, and especially to a Schiffli embroidering machine in which large number of needles and associated shuttles arranged in one or more horizontal rows are simultaneously operated and whose operation is automatically controlled by a perforated pattern. The application is a companion to my co-pending application Serial No. 18,438, filed March 29, 1960.

Embroidering machines of the character described, as heretofore made, have their primary driving means consist of a series of massive cams mounted on a shaft driven by a motor. These cams actuate the several rods or bars mounting the needles, the goods presser fingers, and the shuttles, which are operatively associated with such cams by means of rocker arms or levers. As explained in my said co-pending application, Schiffli embroidering machines of the prior art are subject to excessive vibrations and distortions; a factor which limits, both, the speed of operation of such machines and the accuracy of the embroidered stitches formed thereon.

It is the principal object of the present invention, therefore, to provide Schiffli embroidering machines of the character described with a primary driving mechanism that is rotationally, directly connected to the several shafts actuating the needles, goods presser fingers and shuttles of the apparatus, thus eliminating cams and levers from such primary driving mechanism, to thereby greatly reduce vibration and distortion and to make possible much higher speed of operation and much greater stitch accuracy at such higher speeds.

It is another object of the present invention to provide Schiffli embroidering machines of the character described with novel, more accurate and more precise pattern-controlled means for activating and de-activating the needle and the shuttle-moving mechanisms of the machine, and capable of performing its functions at relatively high speeds with maximum accuracy and a minimum of vibration.

With Schiffli embroidering machines of the prior art, serious problems have been encountered in the formation of elongated, diagonal stitches because such stitches generally were disposed across the fingers of the goods presser which engaged against the stitch threads before the stitch was completed and prevented the tensioning of the stitch thread, thereby producing loose and ragged-looking stitches that detracted from the appearance of the embroidered design and were apt to snag and ravel.

It is, therefore, another object of the present invention to provide Schiffli embroidering machines of the character described in which the goods presser fingers will at no time impinge against the stitch-forming threads, thereby making possible the production of embroidery in which the diagonal, long stitches are more accurately and uniformly produced, in substantial conformity to the relatively vertical and horizontal stitches made on the machine.

It is still another object of the present invention to provide Schiffli embroidering machines of the character described having means for shifting the presser fingers during the formation of diagonal stitches, to thereby improve the accuracy and uniformity of such stitches and their general conformity to the vertical and horizontal stitches formed by the apparatus.

It is a further object of the present invention to provide Schiffli embroidering machines of the character described in which the shuttles may be adjusted to vary the

2

length of the shuttle stroke and its timing with reference to the needle movement.

It is a still further object of the present invention to providing Schiffli embroidering machines of the character described wherein various adjusting means of the apparatus are disposed for ready accessibility for quick and easy adjustment.

The foregoing and other objects and advantages of the Schiffli embroidering machine of the present invention will become more readily apparent to those skilled in the art from the embodiment thereof shown in the accompanying drawings, and from the description following. It is to be understood, however, that such embodiment is shown by way of illustration only, to make the principles and practice of the invention more readily comprehensible, and without any intent of limiting the invention to the specific details therein shown.

In the drawings:

FIG. 1 is a fragmentary, perspective, foreshortened, more or less schematic representation of an embroidering machine embodying the present invention;

FIG. 1a is a more or less diagrammatic, longitudinally-foreshortened, and partly broken away elevational view, from the needle side of the apparatus, illustrating the arrangement of a needle-moving mechanism, a goods presser bar moving mechanism, and the shuttle moving mechanism; the first two mechanisms being represented by a single unit mounted on the upper of the front tie bars, for clarity of illustration;

FIG. 2 is an enlarged, fragmentary, perspective view illustrating one needle bar-actuating unit of the embroidering machine of the present invention;

FIG. 3 is an enlarged, fragmentary, sectional view of the cam for driving the needle bar mechanism shown in FIG. 2; looking from the right end;

FIG. 4 is a view taken on line 4-4 of FIG. 3; partly broken away to show structural details;

FIG. 5 is a fragmentary, enlarged, sectional view showing the goods-presser actuating mechanism of the invention and the mounting thereof;

FIG. 6 is a fragmentary, partly sectional view taken along line 6-6 of FIG. 5, illustrating part of the goods-presser shifting mechanism;

FIG. 7 is a section taken along line 7-7 of FIG. 6, combined with a schematic representation of the electric circuit controlling the goods-presser shifting mechanism;

FIG. 8 is a schematic, perspective view showing the arrangement of the electro-magnetic switches in the goods-presser shifting circuit with reference to the frame-moving straps of the machine;

FIG. 9 is an enlarged view of one of the electro-magnetic switches of the goods-presser shifting circuit;

FIG. 10 is a fragmentary, enlarged section illustrating the cam and follower of the goods-presser shifting mechanism;

FIG. 11 is a development of the surface of the cam of FIG. 10;

FIG. 12 is a section taken on line 12-12 of FIG. 11;

FIG. 13 is a section taken on line 13-13 of FIG. 12;

FIG. 14 is an enlarged, fragmentary, elevational view of the shuttle-moving mechanism of the apparatus of the invention as viewed from the needle side of the machine;

FIG. 15 is a fragmentary section taken on line 15-15 of FIG. 14;

FIG. 16 is an elevational view of the adjustable barrel cam follower of FIGS. 14 and 15, shown in one position;

FIG. 17 is a view similar to that of FIG. 16, showing the cam follower in another position;

FIG. 18 is a sectional view, on an enlarged scale, taken on line 18-18 of FIG. 17;

FIG. 19 is an enlarged, fragmentary, sectional and

partly elevational view of the turn buckle mechanism illustrated in FIG. 14;

FIG. 20 is a section taken on line 20—20 of FIG. 19;

FIG. 21 is a fragmentary, foreshortened representation of one form of clutch mechanism for engaging the needle and shuttle drives; shown in uncoupled position;

FIG. 22 is a similar view of the clutch mechanism of FIG. 21, shown in coupled position;

FIG. 23 is a fragmentary, perspective view of another form of clutch mechanism for the machine of the present invention;

FIG. 24 is a perspective view of still another form of clutch mechanism for the machine of the present invention that may be electrically controlled; and

FIG. 25 is a plan view of the movable clutch member for use with any of the forms of clutch of the present invention, illustrating its spline mounting.

Referring now in greater detail to the embodiment of the invention which is more or less schematically illustrated in the accompanying drawings, the embroidering machine shown comprises a more or less conventional, skeletal frame consisting of a pair of spaced parallel end standards 30 (only one shown), that are connected by preferably tubular, horizontal tie beams 31, preferably four in number, and arranged in vertically-spaced front and rear pairs. The skeletal frame may include a number of intermediate upright supports for the tie beams 31, in the conventional manner, not thought necessary to be specifically illustrated.

A motor 32, is mounted preferably at the rear upper corner of the exterior face of the standard 30, on the side of the automatic control of the apparatus (not illustrated). The motor 32 is operatively connected, as by a drivebelt 33, to the pulley wheel 34, secured on a horizontally-disposed main drive shaft 35, that is suitably journaled along the lower portion of said standard 30, as on the laterally-extending brackets 36. The main drive shaft 35 has fixed thereon a plurality of bevel gears, preferably of the worm type, to allow a minimum of play, which engage and actuate corresponding gear mounted on vertically-disposed, rotary shafts that are, in turn, operatively connected to the various moving parts of the machine.

Thus, an upright shaft 37, journaled in bracket 38, is operatively geared at its lower end, as at 39, to the main drive shaft 35, and carries at its upper end the fixed member of a clutch, generally designated as 40, the details of which will hereafter be described in full. The other member of the clutch 40 is slidably splined on the lower end of the aligned shaft 41, which is journaled in the brackets 42, and is operatively geared at its upper and lower ends, as at 43, to the ends of the upper and lower needle bar actuating shafts, each designated as 45.

The front tie beams 31a of the frame carry a plurality of spaced brackets, 46 (only one shown, FIGS. 1, 2, 3, and 4), each of which is formed with a longitudinally-extending bearing 47, at its end in which the needle bar shaft 45 is journaled. Each bearing 47 is provided with an arm extension 48, at the end of which is provided a second bearing 49, in which is journaled a pin 50, carrying on a projecting end a forked member or yoke 51, whose arms 52, extend preferably upwardly and straddle the shaft 45. A reversely directed yoke 53, is connected, as by the pins 54, by the end of its arms to the ends of the arms of the yoke 51 and in laterally spaced relation thereto. Each of the pins 54 carries a roller 55, preferably with one of the rollers 55 in staggered or offset relation relative to the other roller 55 on the opposed pin 54. The shaft 45 carries thereon in the space between the yokes 51 and 53 a pair of cams 56, or a single cam with a pair of cam surfaces, said cam or cam surfaces being oppositely enlarged in such manner that each is at all times engaged by one of the rollers 55. The yoke 53 carries at its apex a pin 57, on which is pivotally secured one end of a link 58, whose other end carries a bearing 59, which

is journaled on a pin 60, carried on a bracket 61, that supports the needle bar, 62. The bracket 61 is provided with a bore 63, extending parallel to the link 58 by which it is slidably guided on a rod 64, fixedly supported on a bracket 65, mounted on the tie beam, 31a. It will be apparent that, as shaft 45 is rotated and yokes 51 and 53 are tilted, alternately, in opposite directions, the needle bar 62 will be reciprocated by link 58 in a horizontal direction into and out of stitch-forming direction. It will also be apparent that the same effect may be attained by other or modified arrangements of cam and follower mechanisms and linkages between the shaft 45 and needle bar 63, and by supporting and guiding means for the needle bar 63, other than described.

The tie beams 31a, also carry a plurality of spaced brackets 68 (FIGS. 1, 5 and 6), each having a bearing 69, that rotatably and preferably also slidably supports a shaft 70, on which is mounted, as by spaced, connected sleeves 71, the goods-presser bar 72, having the spaced presser fingers 73. The tie beams 31a also support spaced brackets 75, each carrying a bearing 76, in which is rotatably supported a shaft 77, that passes through the standard 30 and is operatively geared, as at 78, to the upright shaft 80, that is operatively geared to main drive shaft 35. The shaft 77 carries, preferably, a pair of oppositely-directed cams 81 and 82, which are each engaged by a bearing wheel 83, carried on the end of each arm of a yoke 84, at the end of an arm 85, which is connected to a sleeve 74, that is fixed on the goods-presser rod supporting shaft 70.

It will be apparent from the foregoing that as the shaft 77 is rotated by the main shaft 35, the cams 81 and 82 will tilt the yoke 84 toward and away from a fabric supported on the machine, thereby causing the shaft 70 to rock in its bearings 69, and move the goods-presser fingers 73 away from and toward such fabric. It will also be apparent that, whereas the needle drive is intermittently operable in accordance with a pattern by means of the clutch 40, the goods-presser bar 72 is operable continuously irrespective of the operation of the needles, as such continuous operation of the goods-presser bar does not affect the embroidering or stitch-forming movements of the needles.

The synchronized movement of the shuttles of the embroidering machine of the invention with the movement of the needle bar is likewise effected by rotary means. For that purpose, the rear, lower tie 31b, carries a plurality of spaced brackets 86 FIGS. 1 and 14 through 18, in which is rotatably journaled a shaft 87, whose end is journaled in a bearing 88, carried on the standard 30 and is operatively geared, as at 89, with an upright shaft 90, journaled in a bracket 91, supported on the standard 30 and carrying on its free end the movable part of another clutch 49a, whose fixed member is carried on a lower upright shaft 92, supported on bracket 93, and operatively geared as at 94, to the main drive shaft 35.

The shaft 87 carries a barrel cam 95, formed with a suitably curved cam slot, 96. The tie 31b also carries a bracket 97, having spaced bearings disposed transversely of the tie beam, in which is journaled a pivot pin 98, having mounted on its end overhanging the rotary shaft 87 a rocker arm 99. One end of the rocker arm 99 carries a cam follower, generally designated as 100, whose projecting pin 101, fits into the cam slot of the barrel cam 95, and the other end of the rocker arm is pivotally connected to one end of a rod 102, whose other end is operatively connectable to a vertically-reciprocable, horizontally-disposed bar that carries the shuttle-moving pins. As such bar and the shuttle-moving pins, as well as the shuttle support and guiding means may be of conventional construction, it has not been thought necessary to illustrate the same in detail in the drawings.

Means that are easily and conveniently manipulable may be provided for adjusting the position of the rocker

5

arm 99, to thereby adjust the position of the shuttle pin bar and, therefore, of the shuttles relative to their needles. For that purpose, the cam follower 100 may be formed to be adjustable in a manner to vary the length of the side of the rocker arm 99 on which it is supported. Such cam follower may comprise a cylindrical stem 104, on one end face of which the cam follower pin projects in eccentric position. The stem 104 fits rotatably in a circular opening 105, formed in the appropriate end of the rocker arm 99 and is provided at its other end with a lateral flange 106, that overlies the edge of the opening 105. The flange 106 is formed with a plurality of spaced openings 107 therethrough, along half its area, each of which may be selectively brought into register with the tapped recess 108, formed in the rocker arm 99 adjacent the opening 105, for receiving the end of a screw 109, inserted through the selected opening 107 to secure the cam follower in place.

It will be apparent that the stem 104 may be rotated in the opening 105 until its projecting cam follower pin 101 is in upper position, as shown in FIG. 16, and secured in such position by the set screw 109, so as to make the effective distance between the cam follower pin 101 and the rocker arm pivot 98 shorter, thereby raising the other end of the rocker arm 99, and the starting and finishing position of the shuttle-moving pin bar from and to a lower position. On the other hand, if the cam follower stem 104 is rotated in the opening 105 until the follower pin 101, is in lowermost position, as shown in FIGS. 17 and 18, and secured in that position, the cam supporting arm of the rocker arm 99 is lengthened so that it is shifted to the left, in FIG. 14, to thereby raise the shuttle-moving bar in both starting and finishing position.

Means are provided to compensate for the variation in length in the cam follower supporting part of the rocker arm, so as to avoid displacement of the follower pin 101, in the cam slot 96. Such means may be in the form of mechanism for shifting the position of the barrel cam 95. The means illustrated in the drawings for that purpose comprises turnbuckle means formed by the provision of a gap in the shaft 87, preferably intermediate its operatively connected end and the barrel cam 95, and reducing the thickness of the facing ends of the two shaft sections, as at 110, and oppositely threading them. An oppositely threaded turnbuckle nut 112, preferably of polygonal shape, is threaded on the shaft ends 110. The shaft section 87a, which is in operative connection with the driving mechanism of the apparatus, is fixed in position against lateral displacement, while the shaft section to the other side is not. It will be apparent, therefore, that as the turnbuckle nut 112 is turned to either shorten or lengthen the gap between the shaft sections, the main shaft section will be moved toward or away from the section 87a to move the barrel cam 95 relative to the rocker arm pivot 98, to accommodate the rocker arm with the lengthened or shortened cam follower.

Means are provided for operatively interengaging the two sections of shaft 87 and, at the same time, prevent any inadvertent rotary displacement that might disturb their relative adjusted position set by the turnbuckle. The means illustrated for these purposes in the drawings comprises a sleeve 113, of a length to be simultaneously engageable over both facing, unreduced end portions of the sections of shaft 87, even at maximum spacing. The sleeve is formed with an internal rib or key 114, which is engageable in keyways 115, formed in the unreduced adjacent end portions of the sections of shaft 87, and is further provided, at each end, with a tapped opening 116, which holds a screw 117. To adjust the position of the barrel cam 95, the sleeve 113 is slid over unto the end of one of the sections of shaft 87, to expose the turnbuckle nut 112 which is then turned in the desired direction. Thereafter, the sleeve is moved over the gap and partly over the end of the adjacent shaft section; its key fitted into the keyway of such adjacent end section and the

6

screws 117, tightened in place. If desired, more than one keyway 115 may be formed in the end portion of each section of shaft 87, for finer adjustment. Also, the end portion of each section of shaft 87 may be provided with a flattened area 118, engageable by a screw 117 for greater security against slipping and loosening of the screw.

The clutches 40 and 40a of the machine are controlled by the automatic Jacquard-controlled mechanism of the apparatus, and may take a number of different forms, one of which is illustrated in FIGS. 1, 21 and 22, and the others of which are illustrated, respectively, in FIGS. 23 and 24.

In the embodiment of FIGS. 21 and 22, the clutch mechanism comprises a gear 120, secured on shaft 37, which meshes with a second, preferably larger gear 121, of predetermined ratio, that is secured on a shaft 122, journaled in brackets 123, secured on the standard 30. The shaft 122 has secured thereover, preferably between the brackets 123, above the gear 121, a vertically-disposed barrel cam 124, having the continuous cam slot 125, which extends diagonally thereacross; such barrel cam rotating with the shaft 122. The shaft 37 has mounted on its upper end a clutch member 126, preferably formed with a radially-toothed clutch surface. A complementary upper clutch member 127, is splined on the lower end of shaft 41. The upper clutch member 127 is of preferably cylindrical shape and has a bottom surface provided with radially-extending teeth that are complementary to the teeth on the upper surface of the lower clutch member 126. The upper clutch member 127 is formed with a peripheral groove 128, of preferably rectangular cross-section, intermediate its ends, within which are engaged a pair of pins 129, set into the ends of the arms of a yoke 130, that straddles the clutch member 127. The yoke 130 is formed at the end of a lever 131, which is pivotally supported intermediate its ends, as at 132, on a horizontally-disposed support 133, which may be secured on the standard 30.

A link 135, is pivotally secured by one of its ends to the other end of lever 131. The link 135 is provided intermediate its ends with laterally-extending arms 136 and 137, whose purpose will hereafter be explained, and has its other end in pivoted, slidable engagement with the end portion of one arm of a rocker arm 138, which is pivotally supported at its apex on a fixed pivot 139, in any desired manner. Such sliding engagement may be formed by means of a pin 140, in the end of the link 135 which slides in a closed slot 141, provided in the adjacent end of the rocker arm 138. The other end of the rocker arm 138 is in pivoted, sliding engagement with the end of one leg of an L-shaped rod 142, which is journaled by its other leg in fixed bearings suitably supported on the machine. The sliding engagement between the end of the rocker arm 138 and the leg of the L-shaped rod 142 will likewise be formed by a pivot pin provided in the said end of the rocker arm and by a slot in the adjacent end of the L-shaped rod 142. The other leg of the rod 142 has fixed thereto one end of an arm 143, whose other end is pivoted on a bar 145, which is connectable to the automatic mechanism of the machine, for reciprocation thereby, in a manner readily apparent to those skilled in the art and not thought necessary to be here specifically illustrated.

It will be apparent that, as the bar 145 in the embodiment of FIGS. 21 and 22, is reciprocated in a vertical direction, the rod 142 will be rocked in its bearings to, alternately tilt the rocker arm 138 to depress the link connected end of the lever 131, to raise the upper clutch member 127 out of engagement with the lower one, and to raise such lever end to depress the upper clutch member into operative engagement with the lower clutch member 126.

Means are provided for retaining the upper clutch member 127 against inadvertent displacement, when either

in or out of contact with the lower clutch member 126; except according to the pattern controlled automatic mechanism. For that purpose, the arms 136 and 137 of the link 135 are arranged substantially in alignment with a line connecting the center of the gears 120 and 121, with the arm 137 in close proximity to the slot 125 of the cam 124, with its end movable in and out thereof upon the tilting of the rocker arm 138, to which their supporting link is connected. An upright plate 146, is fixedly supported, in any suitable manner, with one edge thereof in close proximity to the end of the link arm 136.

The plate 146 is formed with a pair of vertically spaced detent notches 147 and 148, in its edge adjacent the end of the link arm 136. These notches are arranged in such position that when the clutch member 127 is in disengaged position, the end of the arm 136 of link 135 will be disposed opposite the lowermost of the notches 147; and when the clutch member 127 is lowered and in engaged position, the end of the link arm 136 will be disposed opposite the upper notch 148.

The operation of the clutch retaining means is as follows: When the Jacquard pattern controlling the machine requires the needles and shuttles to be inactivated, the pattern will cause the automatic mechanism which it controls to raise the clutch member 127. This will be effected by the depressing of the member 145, which will rock the bar 142 to tilt the rocker arm 138 towards the right, as shown in FIG. 21. The tilting of the rocker arm to the right will simultaneously lower the link 135 and depress the connected end of the lever 131, to raise the forked end 130 thereof and lift the clutch member 127. This movement will also shift the lower end of the link 135 to the right, so that the end of its arm 136 will engage within the lower detent notch 147 to thereby maintain the clutch member 127 in raised, inactive position.

When the pattern calls for the activation of the needles and shuttles, which requires the throwing of the upper clutch member into contact with the fixed lower clutch member 126, the automatic mechanism will raise the member 145. This will rock the rod 142 in a direction to tilt the upper end of the rocker arm 138 to the left, as shown in FIG. 22. This will accomplish the following: It will tilt the lower part of link 135 to the left, as also shown in FIG. 22, to withdraw the end of link arm 136 from the notch 147 and insert the end of the link arm 137 into the cam slot 125, which is so arranged to have its lowermost part disposed to receive such end of arm 137. The cam slot 125, upon rotation of the cam 124 a half revolution on its axis, will raise the link 135 to tilt the lever 131 into clutch lowering position; and, when the arm 137 of link 135 is in uppermost position, opposite the notch 148, a pattern controlled movement of the member 145 will depress the same, to tilt the rocker arm 138 to the right, thereby disengaging the end of link arm 137 from the cam slot 125 and engaging the end of the link arm 136 in the detent notch 148, to maintain the clutch member 127 in engaged position.

Means are provided for preventing over-ride of the shaft 41 upon release of the clutch 40, so as to prevent inadvertent operation of the machine not according to pattern. This means may comprise one or more detent recesses or notches 149, formed in the upper portion of the clutch member 127, above its groove 128, and detent tooth 150, engageable within such notch 149, fixedly mounted in position, as on the standard 30, for engagement within said notch, promptly upon the release of the clutch member 127 from the clutch member 126. The tooth 150 may, preferably taper forwardly and also downwardly, to facilitate its reception within the notch 149.

In the embodiment of FIG. 23, the clutch moving lever 131 is pivotally supported intermediate its ends on the pivot 132 which is fixed on a plate 151, that may be fixedly mounted, as on the standard 30, and is provided with a curved slot 152, opposite the free end of the lever 131. The lever 131 is provided at that end with a pin

153, passing therethrough, one end of which is received and guided in the slot 152 and the other end of which pivotally supports the end of a link 155, whose other end is pivoted on a pin 156. Also pivoted on the pin 156 is the end of a member or rod 157, that is operatively connected to the Jacquard-controlled automatic mechanism of the machine one end of a second link 158, whose other end is pivotally fixed, as at 159; the two links 155 and 158, forming a toggle that is operable by the member 157. The pin 156 also supports one end of a thrust bar 160, whose other end may curve around the clutch 40 and engage one end of a rocker arm 161, whose other end pivotally engages a vertically disposed link 163, that is in pivoted slidable engagement with a bar 164, whose upper portion is of T cross-section and is engaged by its cross bar 165 in the vertical guideway 166, that is fixedly secured in place, as on the standard 30, and whose leg portion constitutes a detent tooth 167, that is engageable in the detent notch 168, formed in a flange 169, provided on the upper clutch portion 127, as the latter is moved into disengaged position.

The operation of the detent means of this embodiment is as follows: When the clutch is to be thrown out of operation, the member 157 is moved by the automatic mechanism of the machine to the left (FIG. 23). This pulls the toggle to the left, to bend and foreshorten it and to thereby lower the pin 153 in the guide slot 152 and also the end of the lever 131 in which the pin 153 is set, raising the other end of the lever and the clutch member 127, which is pivotally supported on said lever end. The movement of the member 157 to the left also pulls the thrust bar 160 to the left, tilting the rocker arm 161 to move the tooth 167 into the notch 168, which is simultaneously being moved upwardly; in which movement the tooth 167 is assisted by the suitably anchored tension spring 170. To throw the clutch 40 into operative engagement, the position illustrated in FIG. 23, the member 157 is moved to the right, to straighten out the toggle formed by links 155 and 158, raising the connected end of the lever 131 and lowering its other end and the clutch member which it engages. This movement of the member 157 to the right also moves the thrust arm 160 to the right, to tilt the rocker arm 161 in a direction to raise the detent tooth 167 from the notch 168, simultaneously with the movement of the clutch member downwardly. A slight overbalance of the toggle in its straight position will maintain the clutch in engaged position until moved therefrom by the automatic mechanism, according to the Jacquard pattern.

In FIG. 24, there is more or less diagrammatically shown electrically controlled means for moving the clutch member in and out of engaging position. This embodiment is shown to comprise an armature 172, set into the free end of the lever 131, and projecting from it to each side thereof, both, above and below it. A pair of solenoids 173 and 174, are mounted above and below such armature 172, which may be alternately activated through suitable switches in their electric circuits controlled by the automatic mechanism of the machine, to alternately open and close the circuits through them, for moving the armature selectively into one or the other of them, to raise or lower the clutch member 127. To maintain the clutch in either open or closed position, the end of the one arm of the yoke 130 of the lever 131 is, as shown, provided with an extension 175 to which is connected one end of a link 176, whose other end is connected to a member 177, slidably held in a holding switch 178, which is connected in a circuit that may likewise be opened and closed by the automatic mechanism of the machine to release and hold the member 177 in either its upper or lower position, as the clutch member is electrically moved from one position to the other. As numerous circuits may be arranged to effect the activation of the solenoids 173 and 174 and of the holding switch 178, in proper sequence from the automatic mech-

anism of the machine, and as details of such circuits may be readily worked out by any one skilled in the art, such circuits and their details are not thought necessary to be either shown or described herein.

The means for shifting the goods-presser 72 to prevent the impingement of its fingers 73 on the threads of elongated, diagonal stitches are illustrated, more or less schematically, in FIGS. 6-13, of the drawings. Such means is best fitted for use with the fabric supporting frame and frame reciprocating mechanism particularly adapted for the rotary motion machine of the present invention, which is described and claimed in my said co-pending application; fragmentary portions of which, believed adequate to illustrate the present invention, are shown in FIGS. 1 and 8.

In my said co-pending application I have described a frame moving mechanism in which the frame is connected to a vertically reciprocable strap or band, illustrated at 180 in the drawings herein, and to a horizontally reciprocable strap, 181, each of which is connected at one end to a wheel, such as 182, which is geared for operation, as at 183, to the main drive shaft 35, and is controlled as to direction of rotation from the automatic Jacquard controlled mechanism.

The goods-presser shifting mechanism of the present invention comprises a cylinder 185, mounted on the end of the goods-presser supporting shaft 70 and provided with a peripheral groove 186, intermediate its ends. A lever 187, is pivoted at a center point thereof, as by pivot pin 188, which may be set into the end of an arm or post 189, mounted on the tie beam 31a (FIG. 7). One end of the lever 187 operatively engages the cylinder 185, as by the yoke 190, at one end of the lever, which straddles the cylinder 185 and whose ends carry pins 191, with or without rollers mounted thereon, that engage in the cylinder groove 186. The opposite end of the bore 192, preferably in radial alinement with the driven shaft 77, in which is slidably disposed an elongated pin 193, provided with a flat head 194, at its end facing the shaft 77. The shaft 77 carries, opposite the pin 193, a cylinder 195, which is formed with a peripheral cam groove 196, that is provided with a lateral offset 197, in a direction facing away from the end of shaft 70. The groove 196 is provided with overhanging flanges, 198, along most of its length and with an escape ramp 199, rising in a direction opposite to the direction of rotation of the shaft 77, opposite the unflanged portion thereof. The ramp extends to the surface of the cylinder 195 and is preferably formed with a sharp drop 200, that may be radial with the shaft 77. The head 194 of pin 193 is engageable in the cam groove 196 and under its flanges 198.

It will be apparent that when the pin head 194 is disposed within the cam groove 196, it will be shifted, as shaft 77 rotates, by the offset portion 197 of the groove in one direction (to the right, in FIG. 6), thereby shifting the associated end of the lever 187 in the same direction and its other, yoke-end, in the opposed direction, to thereby slide shaft 70 and the goods-presser and its fingers 73, in the said opposed direction, as illustrated in FIG. 6, wherein the broken lines show the fingers 73 in normal position.

It will also be obvious that the pin head 194 will normally be pushed by the ramp 199 out of engagement with the cam slot 196, after it is restored to a straight part of the cam groove 196, and the goods-presser shaft 70 is thus restored to normal position. Means are, therefore, provided, preferably electrically actuated, for restoring the pin 193 into the cam slot 196, at the time of formation of long, diagonal embroidery stitches.

Such means is shown to comprise a solenoid coil, 201, mounted on the lever 187 over the pin 193, to the side opposite from the shaft 77, which is connected in an electric circuit having a pair of switches provided therein, one closed at the end of the long, vertical stroke of the

strap 180, such as occurs in a long diagonal stitch formation, and the other closed at the end of a horizontal stroke of the strap 181, such as occurs under the same circumstance. Thus, the simultaneous closing of the two stitches in long, diagonal stroke formation, activate the solenoid 201 to push the pin 193 into the groove 196, where it will be shifted, upon rotation of shaft 77, by the offset groove portion 197 to shift the goods-presser 72, as explained above; the pin 193 being ejected from operative position, after being restored to normal position, by the ramp 199. At the same time, completion of the double-direction frame stroke and its return to normal position opens the two switches and breaks the circuit through solenoid 201.

Such switch means in the goods-presser shifting circuit is each shown to comprise, a plate 202, mounted parallel to the path of each of the frame-moving straps 180 and 181, which supports an arm 203, extending transversely of the strap path and projecting beyond it and supports on its end a normally open microswitch 204, whose operating button or pin 205, faces the operatively connected end of the strap, either 180 or 181, as the case may be. A slider plate 206, formed with a substantially centrally disposed slot, is mounted, by said slot over the strap, to the side of the arm 204 facing the operatively connected end of the strap and in frictional engagement with such strap. The slider plate 206 carries an element, such as a pin or button 208, positioned to contact the switch pin 205, at the end of the long strap stroke required to form a composite diagonal stitch of a length that may be interfered with by the goods-presser fingers 73. The slider 206, however, will not contact the switch pin 205, on the normal stitch-forming strokes of the straps.

It will be seen, that when only one switch 204 is closed, as at the end of the frame movement in a single direction at one time, as shown in FIG. 7, only one switch 204, at most, will be closed, leaving a gap in the circuit of the solenoid 201, at the other frame-moving strap switch 204. Thus, the circuit remains broken and the solenoid 201 remains inoperative. It is only when both switches 204 are closed, upon the simultaneous long-stroke movement of the frame in both vertical and horizontal planes, to provide the composite diagonal movement for the diagonal stitch, that the circuit through the solenoid 201 will be closed, to insert the pin head 194 into the cam slot 196, where it will be shifted, before being ejected, to shift the goods-presser 72, as explained above.

Means may be provided to insure the return of the sliders 206 to their initial positions, so as to insure against their cumulative or creeping movement, upon successive frame-moving strokes of the straps, that might bring about inadvertent closing of the switches 204. Such means comprise an electromagnet 210, schematically indicated by its housing, which is mounted on the plate 202 and straddles the strap 180 or 181, as the case may be, to the side of the slider 206 facing the operatively connected end of the strap. The electromagnets 210, of both straps, are connected in one electric circuit which is normally open but which is closed at the end of each frame-moving stroke of either of the straps until the commencement of the next stroke, as by the rotary switch consisting of a non-conductor disk 211, mounted on the shaft 77, alongside of cylinder 195, in whose outer face is set the short, electroconductive inlay 212, that is intermittently wiped by a pair of spaced leaf-spring terminals 213, connected in the circuit of electromagnets 210, which may be supported from the post 189 (FIGS. 6 and 7).

It will be apparent that, upon rotation of shaft 77, which is continuous during the operation of the machine, the circuit through the electromagnets 210 will be closed for an instant by the simultaneous contact of both leaf springs 213 with the inlay 212, to energize the electromagnets and pull the slider plates 206 against them and away from switch 204, insuring against cumulative move-

ment of the slider plate into position of closing the switch 204 upon successive strap reciprocations.

This completes the description of the illustrated embodiment of the embroidery machine of the invention. It may here be stated that, for brevity and simplicity of illustration and description, certain of the operating parts of the machine, which are standard in machines of the type to which the present invention relates and whose structure and mode of operation is not altered or directly affected by the present invention, such as the shuttle box supporting means and the shuttle moving pin supporting bar and their arrangement on the machine and the specific linkage of the latter to the rocker arm 99, for instance, have been omitted, both from the drawings and description. Their structure, operational connections and function are generally shown and described in the manuals for the various machines to which the present invention relates in a manner which will enable any one skilled in the art to correlate these parts to the parts of the machine herein illustrated and described.

It will be apparent from the drawings and from the foregoing description that the embroidering machine of the present invention has substantially all of its functioning parts and mechanism actuated by rotary driving means and thus such driving means makes possible operation of the machine at higher speeds than heretofore practical. It will also be apparent that the embroidering machine of the present invention will run with a minimum of noise, vibration and distortion of its parts, to thereby insure greater accuracy and uniformity of stitch formation, even at the higher speeds of operation made possible thereby. It will be additionally apparent that by the machine of the present invention, relatively long, diagonal stitches may be formed with equal thread tension as the shorter stitches.

It will be further apparent that numerous variations and modification in the embroidering machine of the present invention may be made by any one skilled in the art, in accordance with the principles of the invention hereinabove set forth and without the exercise of any inventive ingenuity. I desire, therefore, to be protected for any and all such variations and modifications that may be made within the spirit of the invention and the scope of the claims hereto appended.

What I claim is:

1. For an embroidering machine adapted to be automatically controlled by Jacquard-pattern mechanism, of the character described, a main drive shaft, means journaling said main drive shaft for rotation; a needle bar, means mounting said needle bar for reciprocal movement, means reciprocating said needle bar; including a needle bar actuating shaft, means rotatably supporting said needle bar actuating shaft, means operatively connecting said needle bar actuating shaft to said main drive shaft for rotation thereby, a cam mounted on said needle bar actuating shaft, and means including a cam follower engageable by said cam, connected to said needle bar, a goods-presser bar, means reciprocating said goods-presser bar, at least one lever connected by an end thereof to said goods-presser bar, a goods-presser bar supporting rod, means supporting said rod for reciprocal rotary movement, said lever secured to said rod intermediate its ends, a goods-presser bar actuating shaft, means rotatably supporting said goods-presser bar actuating shaft, means operatively connecting said goods-presser bar actuating shaft to said main drive shaft for rotation thereby, a cam on said goods-presser bar actuating shaft and a cam follower on the other end of said goods-presser bar supporting lever engageable by said last-named cam; a shuttle-actuating shaft means supporting said shaft for rotation, means operatively engaging said shuttle-actuating shaft to said main drive shaft for rotation thereby, a bell-crank, means pivotally supporting said bell-crank, a barrel cam secured over said shuttle-actuating shaft, a cam follower on the end of one arm

of said bell crank engageable in said barrel cam, the end of the other arm of said bell-crank engageable on a shuttle-moving mechanism.

2. For an embroidering machine adapted to be automatically controlled by Jacquard-pattern mechanism, of the character described, a main drive shaft, means journaling said main drive shaft for rotation; a needle bar, means mounting said needle bar for reciprocal movement, a needle bar actuating shaft, means rotatably supporting said needle bar actuating shaft, means operatively connecting said needle bar actuating shaft to said main drive shaft for rotation thereby, cam means mounted on said needle bar actuating shaft and means, including a cam follower on the other end engageable by said cam means connected to said needle bar; a goods-presser bar, means reciprocating said goods-presser bar comprising at least one lever connected by an end thereof to said goods-presser bar, a goods-presser bar supporting rod, means supporting said rod for reciprocal rotary movement, said lever secured to said rod intermediate its ends, a goods-presser bar actuating shaft, means rotatably supporting said goods-presser bar actuating shaft; means operatively connecting said goods-presser bar actuating shaft to said main drive shaft for rotation thereby, a cam on said goods-presser bar actuating shaft and a cam follower on the other end of said goods-presser bar supporting lever engageable by said last-named cam; a shuttle-actuating shaft, means supporting said shaft for rotation, means operatively connecting said shuttle-actuating shaft to said main drive shaft for rotation thereby, a bell crank, means pivotally supporting said bell crank, a barrel cam secured over said shuttle-actuating shaft, a cam follower on the end of one arm of said bell crank engaged in said barrel cam, the end of the other arm of said bell crank connectable to a shuttle-moving mechanism, said means operatively connecting said needle bar actuating shaft and said shuttle actuating shaft to said main driving shaft each including a clutch and means actuated by said automatic control mechanism for moving said clutch in and out of operating position.

3. For an embroidering machine adapted to be automatically controlled by Jacquard-pattern mechanism, of the character described, a main drive shaft, means journaling said main drive shaft for rotation; a needle bar, means mounting said needle bar for reciprocal movement, means reciprocating said needle bar comprising a needle bar actuating shaft, means rotatably supporting said needle bar actuating shaft, means operatively connecting said needle bar actuating shaft to said main drive shaft for rotation thereby, cam means mounted on said needle bar actuating shaft and cam follower means engageable by said cam means and connected to said needle bar; a goods-presser bar, means reciprocating said goods-presser bar comprising at least one lever connected by an end thereof to said goods-presser bar, a goods-presser bar supporting rod, means supporting said rod for reciprocal rotary movement, said lever secured to said rod intermediate its ends, a goods-presser bar actuating shaft, means rotatably supporting said goods-presser bar actuating shaft, means operatively connecting said goods-presser bar actuating shaft to said main drive shaft for rotation thereby, a cam on said goods-presser bar actuating shaft and a cam follower on the other end of said goods-presser bar supporting lever engageable by said last-named cam; a shuttle actuating shaft, means supporting said shaft for rotation, means operatively engaging said shuttle-actuating shaft to said main drive shaft for rotation thereby, a bell crank, means pivotally supporting said bell crank, a barrel cam secured over said shuttle-actuating shaft, a cam follower on the end of one arm of said bell crank engageable in said barrel cam, the end of the other arm of said bell crank connectable to a shuttle-moving mechanism, said means operatively connecting said needle bar actuating shaft and said shuttle-actuating shaft to said main driving shaft

each comprising a first shaft section and means mounting the same for rotation, said first shaft section operatively connected to said main drive shaft by one end, a second shaft section, means mounting said second shaft for rotation in spaced end to end relation to said first shaft section, said second shaft section operatively connected by its end remote from said first shaft section to said actuating shaft, one of said shaft sections carrying on its free end a first clutch member fixedly secured thereon, the other of said shaft sections carrying on its end facing said clutch member a second clutch member slidably engageable thereon for movement axially thereof in and out of contact with said fixed clutch member, and means actuated by said automatic control mechanism for moving said second clutch member in and out of contact with said first clutch member.

4. For an embroidering machine adapted to be automatically controlled by Jacquard-pattern mechanism and stitch-forming mechanism including a needle-supporting bar and shuttle-supporting and moving means, a shaft for actuating a stitch-forming mechanism of the machine, means rotatably supporting said shaft, a main driving shaft, means rotatably supporting said main driving shaft and means operatively connecting said actuating shaft with said main driving shaft, including a first shaft section, means mounting said shaft section for rotation and means operatively connecting one end of said first shaft section with said main driving shaft, a second shaft section, means mounting said second shaft section for rotation in spaced, end-to-end relation to said first shaft section, one of said shaft sections carrying on its end juxtaposed to the other of said shaft sections a first clutch member fixedly secured thereto, the adjacent end of the other of said shaft sections carrying a co-operating clutch member axially slidably mounted thereon for movement in and out of contact with said fixed clutch member, means operatively engaging the other end of said second shaft section with said stitch-forming mechanism actuating shaft, and means connectable to said automatic control mechanism engaging said movable clutch member to move it in and out of engagement with said fixed clutch member.

5. The apparatus of claim 4, including means actuated by said automatic control mechanism for locking and releasing said movable clutch member when in engaged and in disengaged position.

6. The embroidering machine of claim 4, wherein said movable clutch member is cylindrical and said means moving the same in and out of engagement with said fixed clutch member comprises a lever supported intermediate its ends, one end of said lever slidably engaging said movable clutch member and means connected to the other end of said lever engageable by said automatic control mechanism for reciprocating the said lever in the plane of said second shaft section.

7. The embroidering machine of claim 4, wherein means are provided for engaging said second shaft section against rotation upon disengagement of said movable clutch member from said fixed clutch member.

8. The embroidering machine of claim 4, wherein means are provided for inhibiting the rotation of said second shaft section upon disengagement of said movable clutch member from said fixed clutch member, said means comprising a detent notch formed in the upper corner of said movable clutch member, a detent tooth adapted to fit within said detent notch and means mounting said detent tooth in position for engagement within said notch upon movement of said movable clutch member out of engagement with said fixed clutch member.

9. The embroidering machine of claim 4, wherein said second clutch member is cylindrical and the means provided for moving the same in and out of engagement with said first clutch member comprises a peripheral groove formed in said second clutch member, a lever pivotally supported intermediate its ends, said lever hav-

ing one end freely engageable in said groove and its other end connectable to said automatic control mechanism for reciprocation thereby in the plane of said second shaft section.

10. For an embroidering machine adapted to be automatically controlled by Jacquard-pattern mechanism and stitch-forming mechanism including a needle-supporting bar and shuttle-supporting and moving means, a shaft for actuating a stitch-forming mechanism of the machine, means rotatably supporting said shaft, a main driving shaft, means rotatably supporting said main driving shaft and means operatively connecting said actuating shaft with said main driving shaft, including a first shaft section, means mounting said shaft section for rotation and means operatively connecting one end of said first shaft section with said main driving shaft, a second shaft section, means mounting said second shaft section for rotation in spaced, end-to-end relation to said first shaft section, said first shaft section having fixed on its free end a first clutch member, the juxtaposed end of said second shaft section having axially slidably mounted thereon a second clutch member for movement in and out of engagement with said fixed clutch member, a lever, means pivotally supporting said lever intermediate its ends, means on one end of said lever slidably and pivotally engaging said second clutch member; means, including a link connected by one end to the other end of said lever, a bell crank lever connected by one end to the other end of said link and means connected to the other end of said bell crank, engageable by said automatic control mechanism for movement to reciprocate said other lever end in a plane parallel to said second shaft section to move said movable clutch member in and out of engagement with said fixed clutch member.

11. The embroidering machine of claim 10, including means for releasably locking said movable clutch member in engaged and disengaged position, comprising a second shaft, means rotatably mounting said second shaft for rotation, means inter-engaging said second shaft and said first shaft section for simultaneous rotation, a barrel cam mounted on said second shaft opposite said link, said barrel cam having a diagonally disposed cam groove formed thereon, a cross-arm on said link having one end thereof disposed adjacent said barrel cam, a plate supported parallel to said link with the free edge thereof adjacent the other end of said cross arm said plate having a notch formed in said edge thereof in substantial register with one extreme point of said cam slot and a second notch in register with the opposed extreme point of said cam slot, said bell crank arranged to tilt said link for moving said cross arm ends, respectively, in and out of said cam slot, and out and into one of said notches.

12. The embroidering machine of claim 10, wherein means are provided for adjusting the angle of said bell crank relative to said actuating shaft.

13. The embroidering machine of claim 11, wherein said second clutch member is cylindrical and is provided with a peripheral groove intermediate its ends and the means for moving said second clutch member comprises a lever pivotally supported intermediate its ends, said lever having a yoke at one end straddling said second clutch member, said yoke having oppositely facing pins at its end; engaging in said groove, and means on the other end of said lever connectable to said automatic control mechanism for reciprocation thereby in the plane of said second shaft section.

14. For an embroidering machine adapted to be automatically controlled by Jacquard-pattern mechanism and stitch-forming mechanism including a needle-supporting member and shuttle-supporting and moving means, a shaft for actuating a stitch-forming mechanism of the machine, means rotatably supporting said shaft, a main driving shaft and means rotatably supporting said main driving shaft, means operatively connecting said actuating shaft to said main driving shaft, including a first

15

shaft section, means mounting said shaft section for rotation and means operatively connecting one end of said first shaft section with said main driving shaft, a second shaft section, means mounting said second shaft section for rotation in spaced, end-to-end relation to said first shaft section, means operatively connecting said second shaft section to said actuating shaft, said first shaft section having fixed on its free end a first clutch member, the juxtaposed end of said second shaft section having a second clutch member axially, slidably mounted thereon for movement in and out of engagement with said fixed clutch member, said clutch member having a peripheral groove formed therein, a lever, means pivotally supporting said lever intermediate its ends, one end of said lever freely engaged within said groove, means reciprocating said lever in the plane of said shaft sections comprising a pin set into the other end of said lever, a guideway for said pin for limited reciprocal movement thereof in the plane of said shaft sections, a toggle connected by one end to said pin and means securing the other end of said toggle in fixed position, an arm connectable to the automatic control mechanism of the apparatus secured to said toggle at the mid-joint thereof; and means actuated by said toggle, engaging said second clutch member upon its movement out of engagement with said first clutch member.

15. The apparatus of claim 14, wherein said means engaging said second clutch member upon movement out of engagement with said first clutch member comprises a notch formed in said clutch member, a tooth adapted to fit within said notch, means slidably mounting said tooth for movement toward and away from said notch, a bell crank pivotally supported adjacent said tooth, a link connecting one end of said bell crank with said tooth, and a second link connecting the other end of said bell crank with the mid-joint of said toggle.

16. For an embroidering machine adapted to be automatically controlled by Jacquard-pattern mechanism and stitch-forming mechanism including a needle-supporting member and shuttle-supporting and moving means, a shaft for actuating the stitch-forming mechanism of the machine, means rotatably supporting said shaft, a main driving shaft and means rotatably supporting said main driving shaft, means operatively connecting said actuating shaft to said main driving shaft, including a first shaft section, means mounting said shaft section for rotation and means operatively connecting one end of said first shaft section with said main driving shaft, a second shaft section, means mounting said second shaft section for rotation in spaced end-to-end relation to said first shaft section, said second shaft section operatively connected to said actuating shaft, said first shaft section having fixed on its free end a first clutch member, the juxtaposed end of said second shaft section having a second clutch member axially, slidably mounted thereon for movement in and out of engagement with said fixed clutch member, a lever, means pivotally supporting said lever intermediate its ends, one end of said lever pivotally and slidably engaging said second clutch member, an armature set into the other end of said lever and projecting to each side thereof, and a solenoid coil alongside each projecting end of said armature, each said coil connected in an electric circuit and means selectively controllable by said automatic control mechanism for selectively closing the circuit through each of said solenoid coils.

17. For an embroidering machine adapted to be automatically controlled by Jacquard-pattern mechanism and stitch-forming mechanism including shuttle-supporting and moving means, means actuating said shuttle-supporting and moving means, including a shaft, means rotatably supporting said shaft, a main driving shaft, means rotatably supporting said main driving shaft, means connecting said shuttle-moving mechanism actuating shaft with said main driving shaft, including a clutch structure and means controlled by said automatic control mechanism for

16

moving said clutch structure in and out of clutching position, a barrel cam mounted on said actuating shaft, said barrel cam having a diagonally extending, continuous cam groove formed therein, a bell crank having a cam follower at the end of one arm thereof, means pivotally supporting said bell crank with said cam follower in said cam slot, and means pivotally supported at the end of the other arm of said bell crank adapted to operatively engage said shuttle-moving mechanism.

18. The embroidering machine of claim 17, wherein said goods-presser supporting bar has a cylinder mounted thereover, said cylinder having a groove formed therein, said first-named end of said lever freely engaged within said groove.

19. For an embroidering machine adapted to be automatically controlled by Jacquard-pattern mechanism and stitch-forming mechanism including shuttle-supporting and moving means, means actuating said shuttle-supporting and moving means, including a shaft, means rotatably supporting said shaft, a main driving shaft, means rotatably supporting said main driving shaft, means connecting said shuttle-moving mechanism actuating shaft with said main driving shaft, including a clutch structure and means controlled by said automatic control mechanism for moving said clutch structure in and out of clutching position, a barrel cam mounted on said actuating shaft, said barrel cam having a diagonally extending, continuous cam groove formed therein, a bell crank having a cam follower at the end of one arm thereof, means pivotally supporting said bell crank with said cam follower in said cam slot, and means pivotally supported at the end of the other arm of said bell crank adapted to operatively engage said shuttle-moving mechanism, and means for adjusting the angle of said bell crank relative to said actuating shaft, said means comprising a cam follower, means adjustably securing said follower longitudinally of said bell crank arm and a gap formed in said shaft between the section thereof supporting said barrel cam and the operatively connected end thereof, the facing ends of the shaft sections to each side of said gap being reduced in cross-section and oppositely threaded, an elongated nut having oppositely directed internal threads at its opposed ends engaged over said reduced ends of said shaft sections and adapted to be turned for varying the distance between their ends, and releasable means engaging said shaft sections against relative rotation.

20. The embroidering machine of claim 19, wherein said means engaging said shaft sections against relative rotation comprise a longitudinally-extending keyway formed in each shaft section extending inwardly from its edge defining the reduced portion thereof, a sleeve of a length greater than the combined length of said reduced end portions of said shaft sections slidably fitted over said shaft sections, said sleeve having a key in the bore thereof adapted to fit within said keyways, and a radially-extending tapped opening formed in said sleeve at each end thereof, each said tapped opening retaining a screw adapted to be adjusted to engage against the end portion of an underlying shaft section.

21. The embroidering machine of claim 19 wherein the means for adjusting the angle of said bell crank relative to said actuating shaft, comprises a cam follower including a cylindrical stem portion, a follower pin extending from one flat surface of said cylinder, in offset relation to the longitudinal axis thereof, a circular opening formed in an edge portion of said bell crank arm, said cylindrical cam follower portion rotatably fitted in the said opening and means securing said cylinder in adjustably rotated position within said opening.

22. The embroidering machine of claim 19 wherein the means for adjusting the angle of said bell crank relative to said actuating shaft, comprises a cam follower including a cylindrical stem portion, a follower pin extending from one flat surface of said cylinder, in offset relation to the longitudinal axis thereof, a circular opening formed

17

in an edge portion of said bell crank arm, said cylindrical cam follower portion rotatably fitted in the said opening and means securing said cylinder in adjustably rotated position within said opening comprising a peripheral flange on the other end of said cylinder engageable against the marginal edge portion of said opening, circularly arranged spaced openings formed in said flange and a tapped opening formed in said bell crank arm and adjacent said opening in position to register with said flange openings as said stem is rotated within its opening, and a screw passing through a selected one of said flange openings engaged within said tapped opening.

23. For an embroidering machine adapted to be automatically controlled by Jacquard-pattern mechanism of the character described, including a fabric-supporting frame and means reciprocating said frame in two directions, each at right angles to the other, each said reciprocating means including a strap connected by one end thereof to the periphery of a rotatably-supported wheel, said frame connected to each of said shafts, a main drive shaft connectable to a source of power, means rotatably supporting said main drive shaft; means operatively supporting said wheel to said main driving shaft; needle-reciprocating means, including an actuating shaft, means rotatably supporting said actuating shaft, and means operatively connecting said actuating shaft to said drive shaft; shuttle-moving means including a second actuating shaft, means rotatably supporting said second actuating shaft and means operatively connecting said second shaft to said main driving shaft; a goods-presser bar having goods-presser fingers, means reciprocating said bar toward and away from said fabric-supporting frame, said means including at least one lever connected by one end to said goods-presser bar, a lever-supporting shaft means rotatably and slidably supporting said shaft, said lever secured on said shaft intermediate its ends, a goods-presser bar actuating shaft, means rotatably supporting said goods-presser bar actuating shaft, said goods-presser bar actuating shaft operatively connected to said main driving shaft, a cam mounted on said goods-presser bar actuating shaft and a cam follower on the other end of said lever engaged by said cam; means shifting said goods-presser bar supporting shaft upon simultaneous movement of said frame in both directions, said means comprising a normally-open switch connected in a common electric circuit associated with each of said straps, means mounted on each of said straps arranged to close said associated switch at the end of a movement of said strap in one direction of its reciprocal motion, means, including a solenoid connected in said electric circuit engaging said goods-presser bar supporting shaft for sliding the same in one direction upon the closing of both said switches in said circuit and means automatically returning said goods-presser bar supporting shaft to initial position upon the breaking of said electric circuit.

24. In an embroidering machine having a fabric-supporting frame and means reciprocating said frame in each of two directions at right angles to one another, each of the means for reciprocating the frame in one direction comprising a rotatably supported wheel a strap connected by one end to the periphery of said rotatably supported wheel, said frame connected to each of said straps, a main drive shaft and means rotatably supporting said main drive shaft, each of said wheels operatively connected to said main drive shaft; goods-presser means including a bar having presser fingers formed thereon, means supporting said bar, including a shaft and means rotatably and slidably supporting said shaft and means for moving said shaft and returning it to initial position, comprising a common electric circuit associated with said straps, a normally-open switch connected in said electric circuit associated with each of said straps, means carried on each of said straps for closing the associated switch at the end of a stroke in one direction of its reciprocating motion, and means controlled by said electric circuit for shifting

18

said supporting shaft upon the closing of said circuit and means automatically returning said shaft to initial position upon the breaking of said circuit.

25. The embroidering machine of claim 24, wherein the means for shifting the said goods-presser bar supporting shaft comprises a cam, means rotatably supporting said cam, means operatively connecting said main driving shaft rotating with said cam supporting means, a solenoid connected in said electric circuit, the armature of said solenoid forming a follower for said cam, a lever, means pivotally supporting said lever intermediate its ends, one end of said lever supporting said solenoid and the other end of said lever engaging said goods-presser supporting shaft.

26. The embroidering machine of claim 24, including goods-presser reciprocating means comprising an arm fixed intermediate its ends on said supporting shaft, one end of said arm connected to said goods-presser bar, a goods-presser bar actuating shaft, means rotatably supporting said goods-presser bar actuating shaft, means operatively connecting said goods-presser bar actuating shaft to said main driving shaft, a cylinder mounted on said goods-presser bar actuating shaft, said cylinder having a cam slot formed peripherally thereof, said slot having a laterally-offset portion, a lever, means pivotally supporting said lever intermediate its ends, one end of said lever pivotally and slidably engaging said goods-presser bar supporting shaft, the other end of said lever supporting a solenoid connected in said electric circuit opposite said cam slot, said solenoid having an elongated armature forming a cam follower engageable within said cam slot upon closing of said circuit through said solenoid.

27. The embroidering machine of claim 24, including goods-presser bar reciprocating means comprising an arm fixed intermediate its ends on said supporting bar, one end of said arm connected to said goods-presser bar, a goods-presser bar actuating shaft, means rotatably supporting said goods-presser bar actuating shaft, means operatively connecting said goods-presser bar actuating shaft to said main driving shaft, a cylinder mounted on said goods-presser bar actuating shaft, said cylinder having a cam slot formed peripherally thereof, said slot having a laterally-offset portion, a lever, means pivotally supporting said lever intermediate its ends, one end of said lever pivotally and slidably engaging said goods-presser bar supporting shaft, the other end of said lever supporting a solenoid connected in said electric circuit opposite said cam slot, said solenoid having an elongated armature forming a cam follower engageable within said cam slot upon closing of said electric circuit through said solenoid, said cam slot having overhanging flanges extending part of the circumference thereof and encompassing said offset portion, the floor of said cam groove having a ramp opposite said flangeless portion thereof, said ramp rising to the surface of said cylinder, said armature having a head engageable under the said flanges.

28. The embroidering machine of claim 24, wherein said means for closing the switch associated with each of said straps includes a magnetically attractable member frictionally mounted on said strap and movable thereby into switch-closing position and means are provided for returning said frictionally-mounted member to initial position at the end of each stroke of said strap into switch-closing position, said means comprising an electro-magnet adjacent said member, said electro-magnet connected in a second electric circuit, a non-electric disc having an electro-conductive inlay in a surface thereof, means rotatably supporting said disc and means operated by said main driving shaft for rotating said disc, and a pair of terminals engaged against said inlay surface of said disc and adapted to simultaneously contact said inlay upon rotation of said disc.

29. The embroidering machine of claim 24, wherein said means for closing the switch associated with each of said straps includes a magnetically-attractable member

19

frictionally slidably mounted on said strap and movable thereby into switch-closing position, and wherein means are provided for returning said magnetically attractable member to initial position at the end of each of said strokes of said strap into switch-closing position, said member-returning means comprising an electro-magnet supported adjacent said member, said electro-magnet connected in a second electric circuit, a non-electric cylinder mounted on said goods-presser bar supporting shaft, said cylinder having an electro-conductive inlay in a portion of a flat surface thereof, a pair of spaced terminals connected in said electric circuit and means supporting said

20

terminals in contacting position with said flat surface of said cylinder for simultaneous contact of said inlay upon rotation of said cylinder.

References Cited in the file of this patent

UNITED STATES PATENTS

1,107,674	Kobler -----	Aug. 18, 1914
1,139,375	Saurer -----	May 11, 1915
1,139,586	Schoenfeld -----	May 18, 1915
1,162,009	Zahn -----	Nov. 30, 1915
2,950,694	Siegel -----	Aug. 30, 1960