Aug. 11, 1936. A. A. BOHMANN ET AL 2,050,780

AUTOMATIC MECHANISM FOR FRAME EMBROIDERY MACHINES

Filed Feb. 8, 1934 14 Sheets-Sheet 1

Fig.1

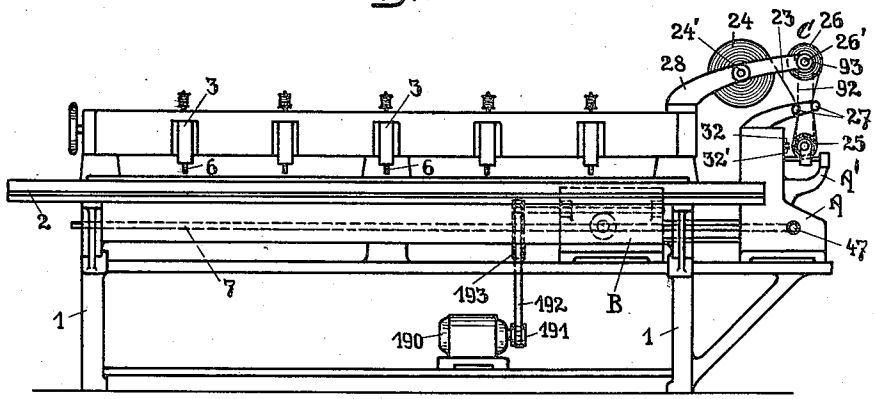


Fig.2

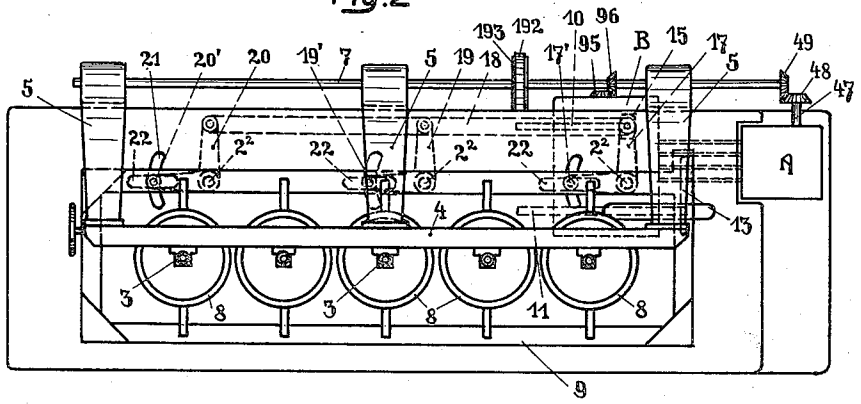
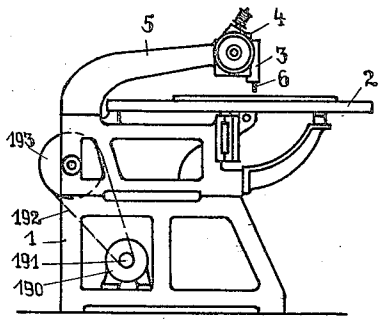


Fig.3



Inventors:-
A.A. Bohmann
and K.G. Scheibel
by E.F. Neuendorffer
Atty.

Aug. 11, 1936. A. A. BOHMANN ET AL 2,050,780

AUTOMATIC MECHANISM FOR FRAME EMBROIDERY MACHINES

Filed Feb. 8, 1934 14 Sheets-Sheet 2

Fig. 5

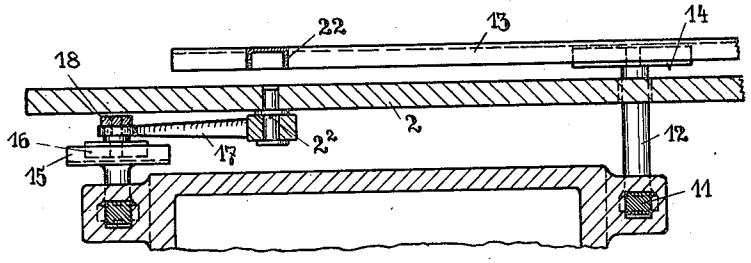
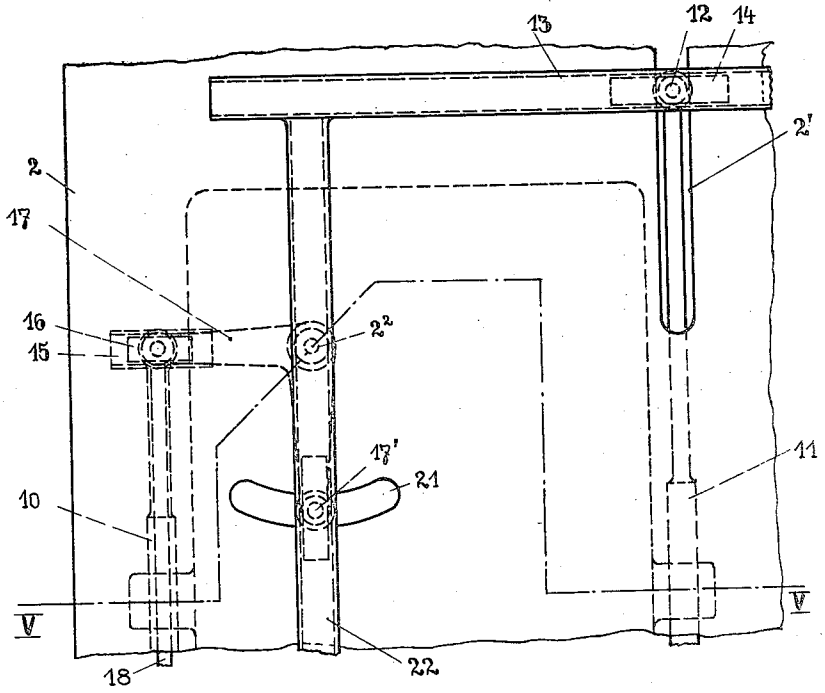


Fig. 4



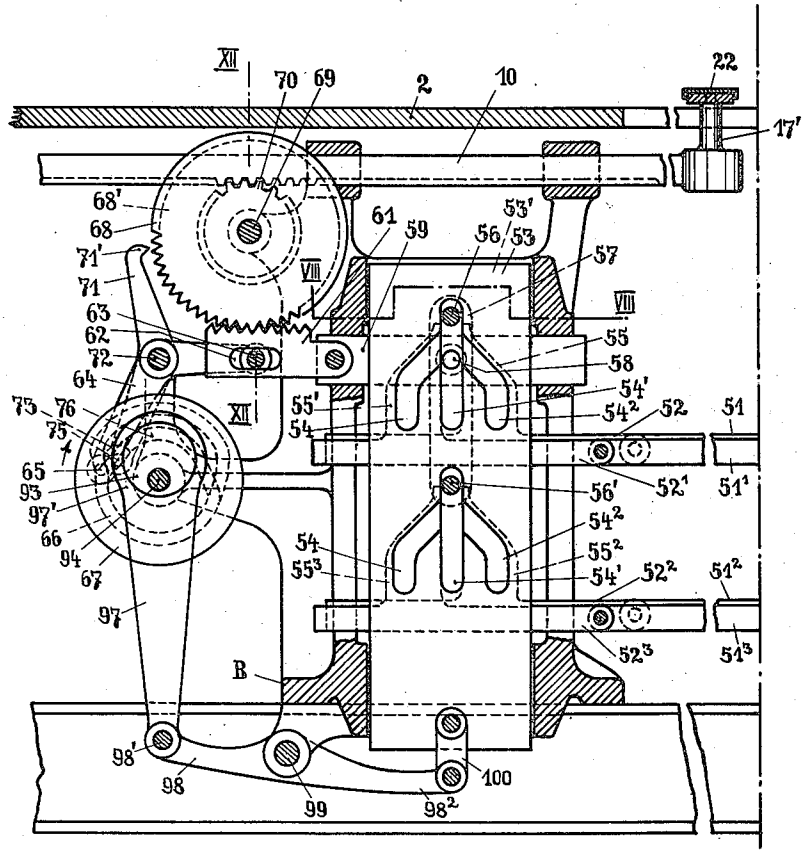
Inventors:-
A. A. Bohmann
and K. G. Scheibel
by E. F. Wendroth
Atty.

Aug. 11, 1936. A. A. BOHMANN ET AL 2,050,780

AUTOMATIC MECHANISM FOR FRAME EMBROIDERY MACHINES

Filed Feb. 8, 1934 14 Sheets-Sheet 3

Fig.6



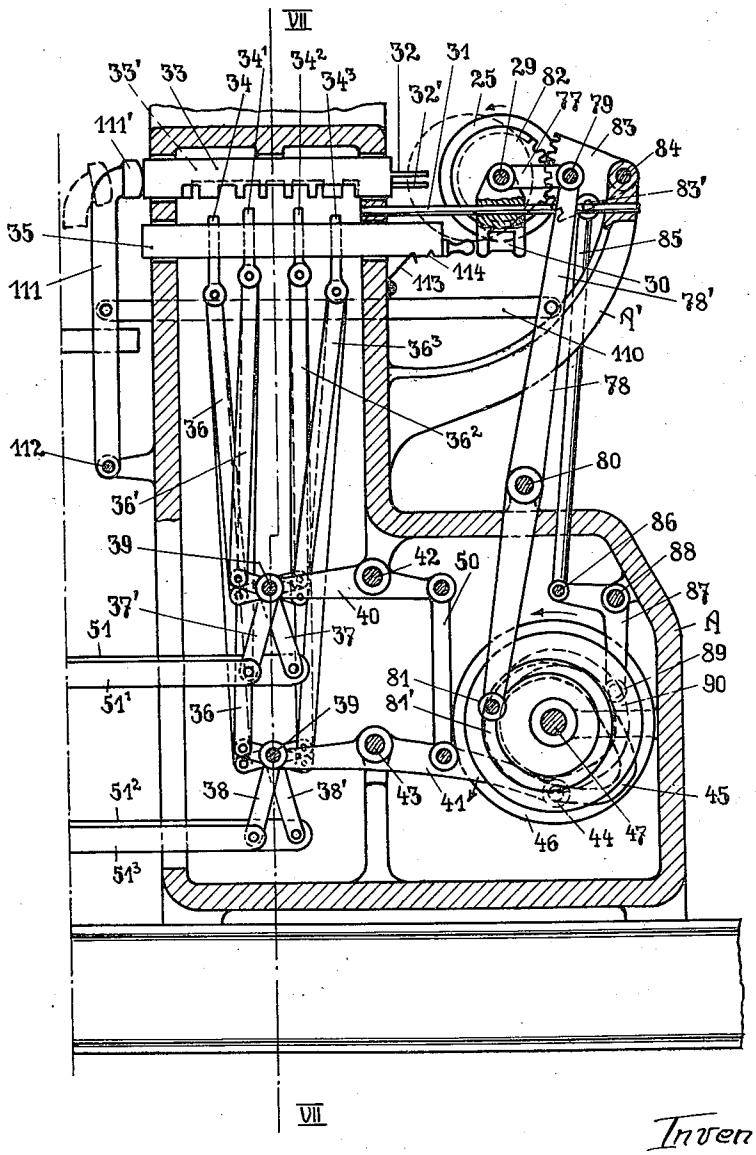
Inventors:-
A. A. Bohmann
and K. G. Scheibel
by E. F. Brandwood
Atty.

Aug. 11, 1936. A. A. BOHMANN ET AL 2,050,780

AUTOMATIC MECHANISM FOR FRAME EMBROIDERY MACHINES

Filed Feb. 8, 1934 14 Sheets-Sheet 4

Fig.6 A



Inventors:-
A. A. Bohmann
and K. G. Scheibel
by E. H. Ueberroth
Atty.

Aug. 11, 1936. A. A. BOHMANN ET AL 2,050,780

AUTOMATIC MECHANISM FOR FRAME EMBROIDERY MACHINES

Filed Feb. 8, 1934 14 Sheets-Sheet 5

Fig.7

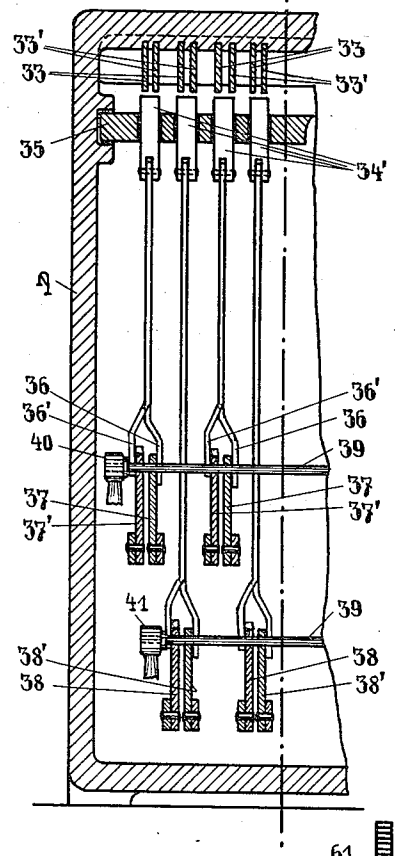


Fig.25

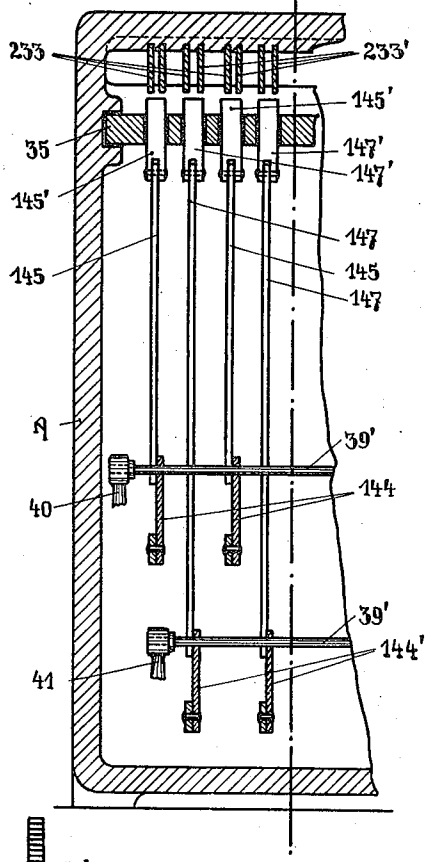
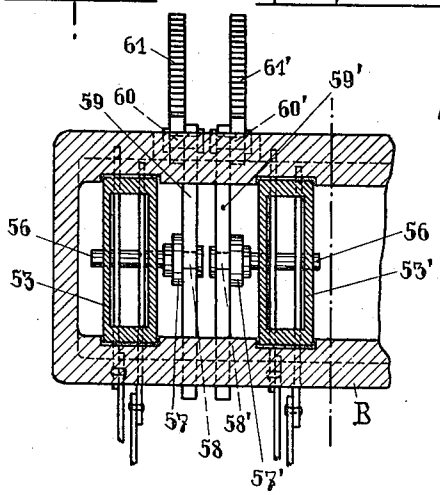


Fig.8



Inventors:-
A.A. Bohmann
and K.G. Scheibel
by E.F. Wunderlich
Attv.

Aug. 11, 1936. A. A. BOHMANN ET AL 2,050,780

AUTOMATIC MECHANISM FOR FRAME EMBROIDERY MACHINES

Filed Feb. 8, 1934 14 Sheets-Sheet 6

Fig.9

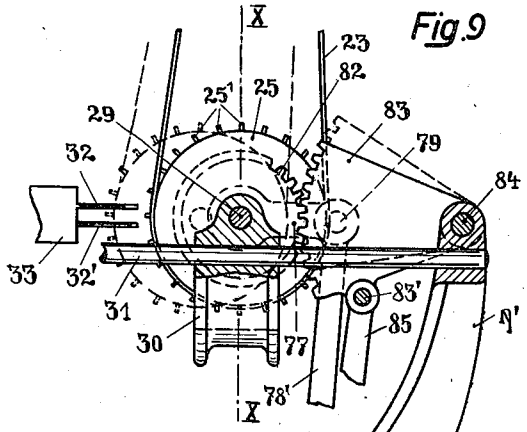


Fig.10

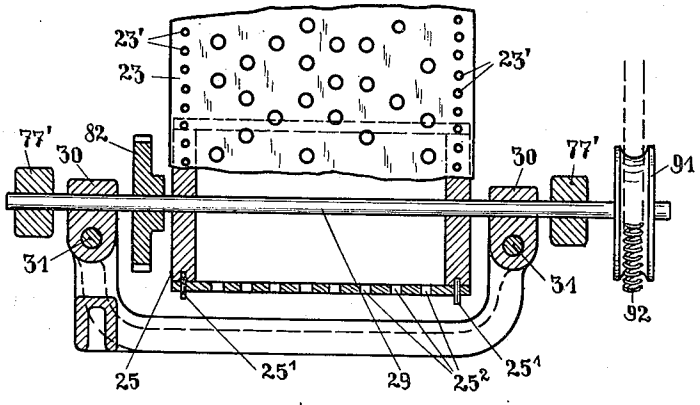
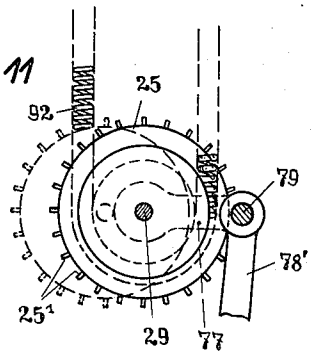


Fig.11



Inventors:-
A. A. Bohmann
and K. G. Scheibel
by S. F. Wunderlich
Atty.

Aug. 11, 1936. A. A. BOHMANN ET AL 2,050,780

AUTOMATIC MECHANISM FOR FRAME EMBROIDERY MACHINES

Filed Feb. 8, 1934 14 Sheets-Sheet 7

Fig.19

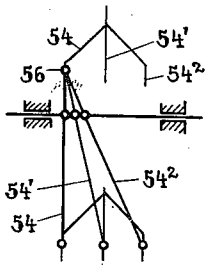


Fig.20

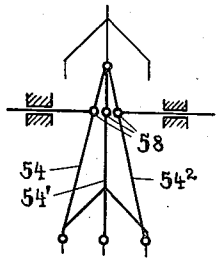


Fig.21

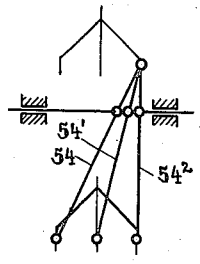


Fig. 22

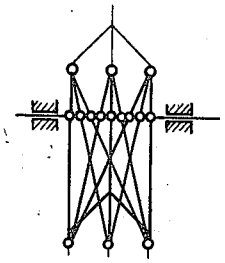


Fig.29

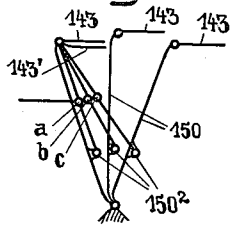


Fig.30

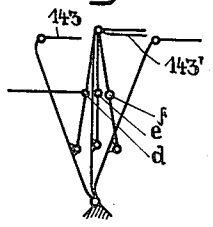


Fig.31

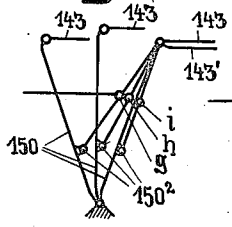


Fig.32

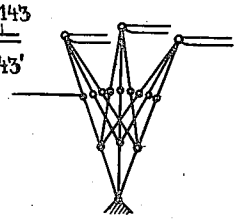


Fig.23

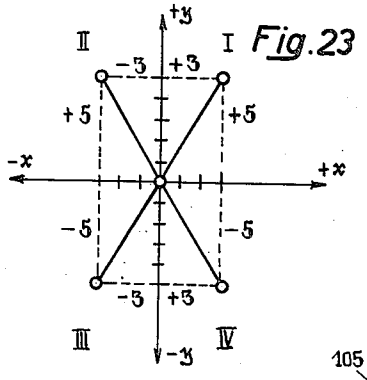
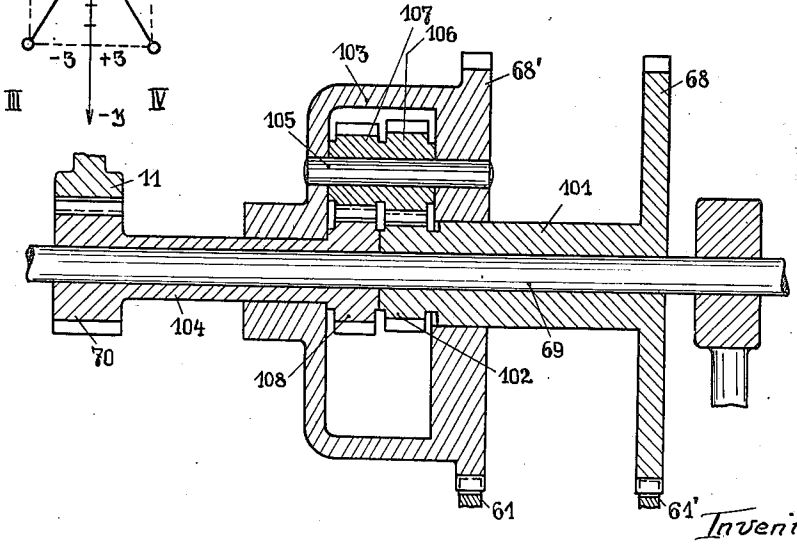


Fig.12



Inventors:-
A.A. Bohmann
and K.G. Scheibel
by S.F. Beaudette
Atty.

Aug. 11, 1936. A. A. BOHMANN ET AL 2,050,780

AUTOMATIC MECHANISM FOR FRAME EMBROIDERY MACHINES

Filed Feb. 8, 1934 14 Sheets-Sheet 8

Fig. 13

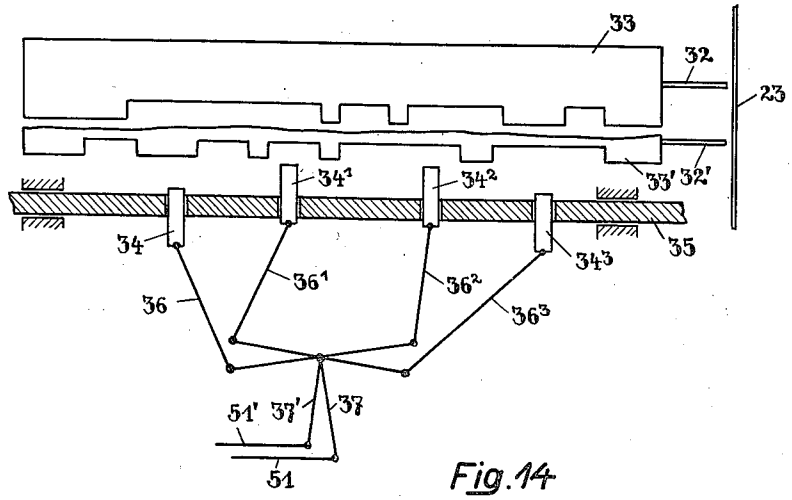


Fig. 14

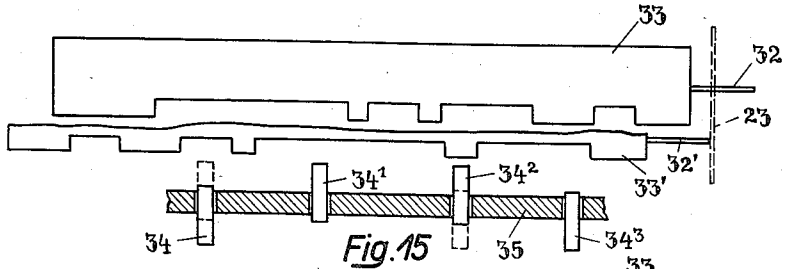
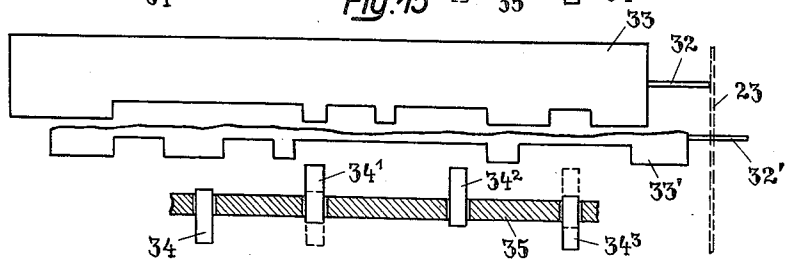


Fig. 15



Inventors:-
A. A. Bohmann
and K. G. Scheibel
by E. F. Wunderlich
Atty.

Aug. 11, 1936. A. A. BOHMANN ET AL 2,050,780

AUTOMATIC MECHANISM FOR FRAME EMBROIDERY MACHINES

Filed Feb. 8, 1934 14 Sheets-Sheet 9

Fig. 16

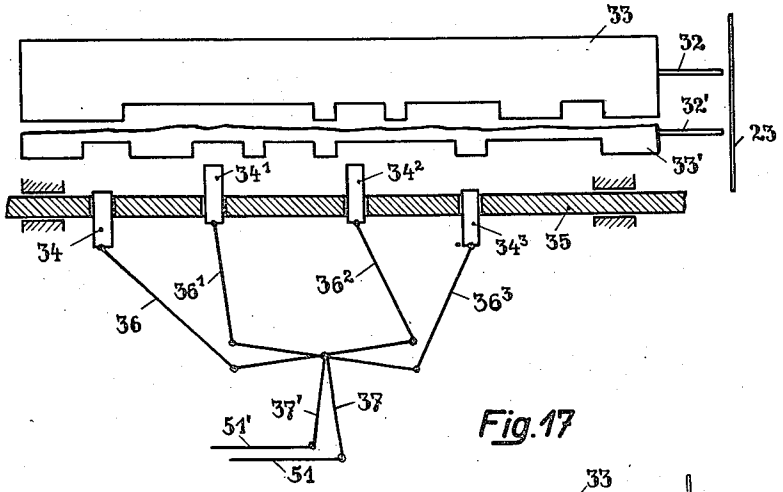


Fig. 17

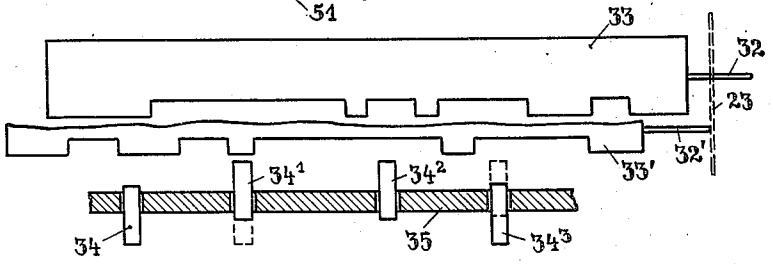
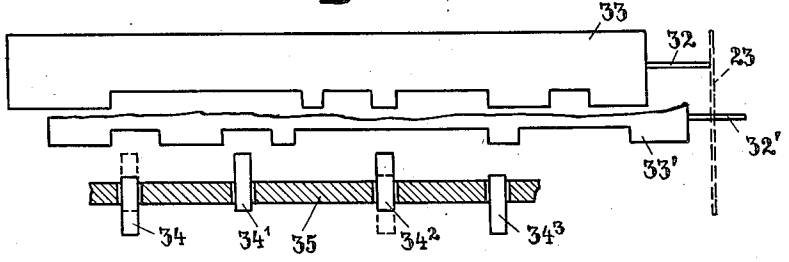


Fig. 18



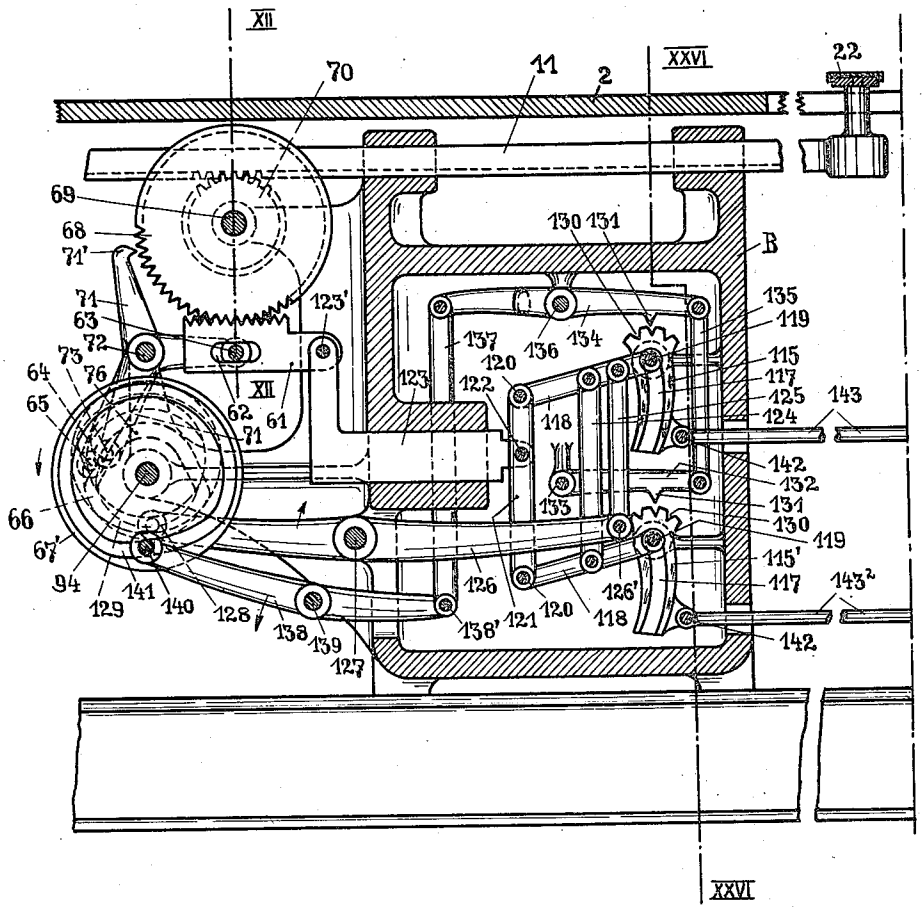
Inventors:-
A. A. Bohmann
and K. G. Scheibel
by E. F. Wenderoth
Atty.

Aug. 11, 1936. A. A. BOHMANN ET AL 2,050,780

AUTOMATIC MECHANISM FOR FRAME EMBROIDERY MACHINES

Filed Feb. 8, 1934 14 Sheets-Sheet 10

Fig. 24



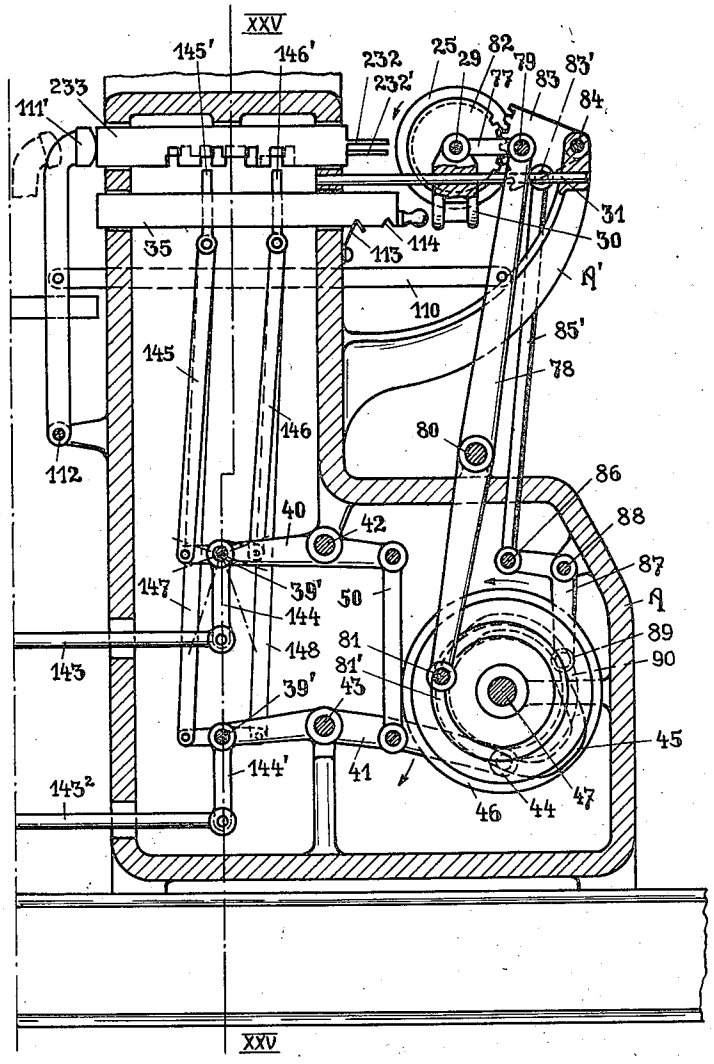
Inventors:-
A. A. Bohmann
and K. G. Scheibel
by E. F. Greenawalt
Atty.

Aug. 11, 1936. A. A. BOHMANN ET AL 2,050,780

AUTOMATIC MECHANISM FOR FRAME EMBROIDERY MACHINES

Filed Feb. 8, 1934 14 Sheets-Sheet 11

Fig. 24 A



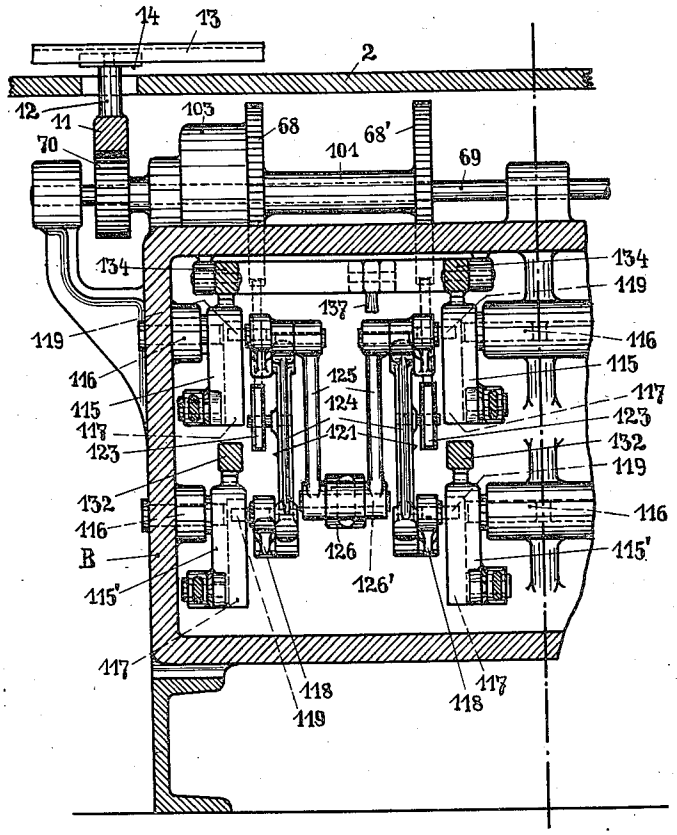
Inventors:-
A. A. Bohmann
and K. G. Scheibel
by E. F. Wendroth
Atty.

Aug. 11, 1936. A. A. BOHMANN ET AL 2,050,780

AUTOMATIC MECHANISM FOR FRAME EMBROIDERY MACHINES

Filed Feb. 8, 1934 14 Sheets-Sheet 12

Fig. 26



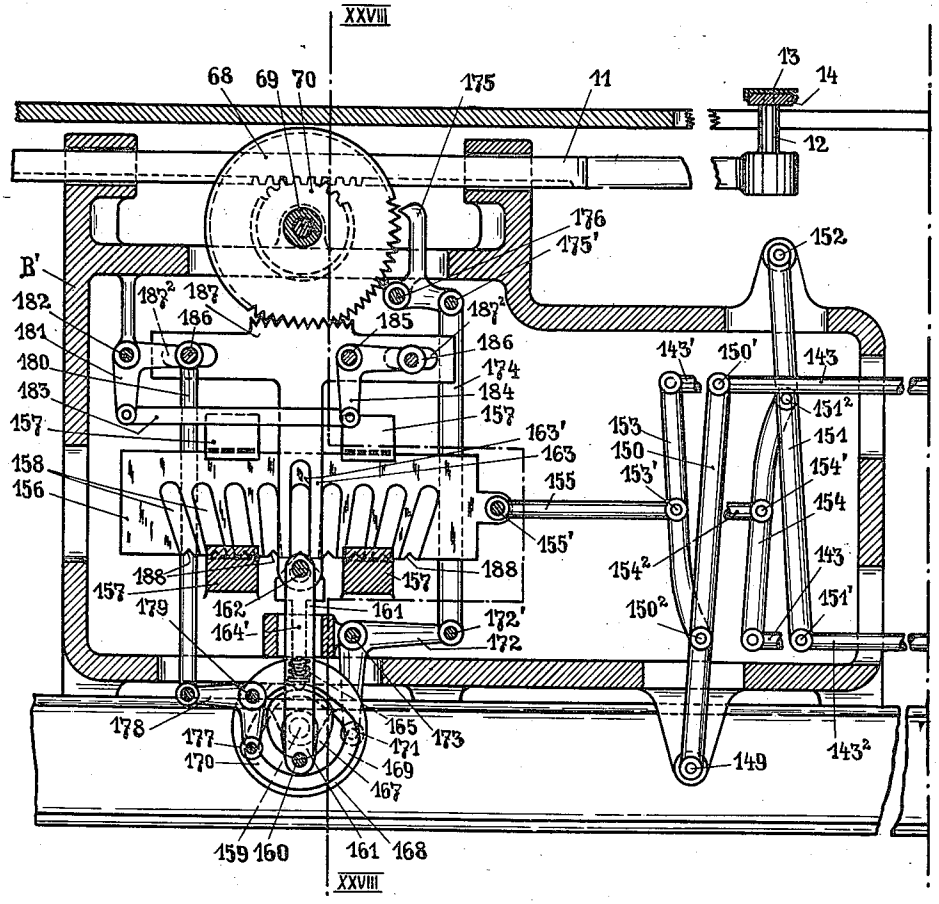
Inventors:-
A. A. Bohmann
and K. G. Scheibel
by Sinclair Kuenchalk
Atty.

Aug. 11, 1936. A. A. BOHMANN ET AL 2,050,780

AUTOMATIC MECHANISM FOR FRAME EMBROIDERY MACHINES

Filed Feb. 8, 1934 14 Sheets-Sheet 13

Fig. 27



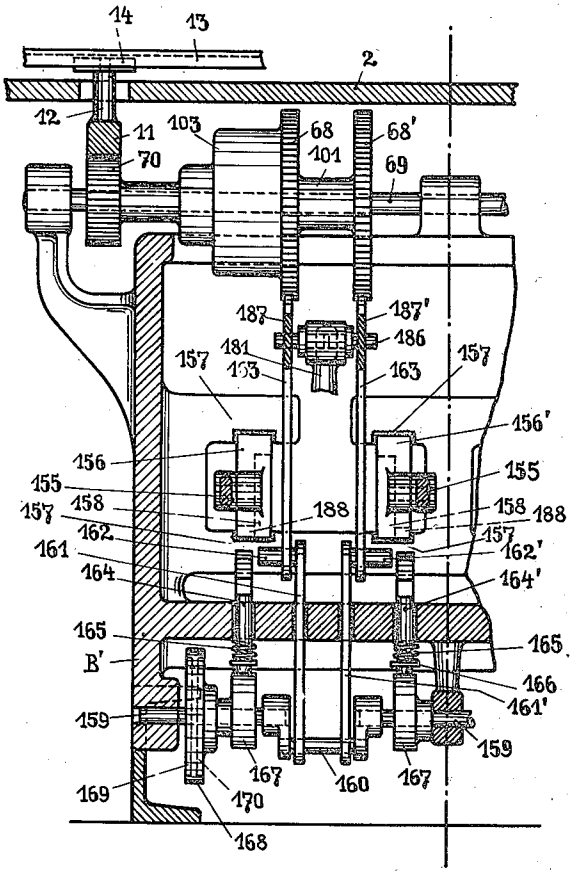
Inventors:-
A. A. Bohmann
and K. G. Scheibel
by S. F. Wendroth
Atty.

Aug. 11, 1936. A. A. BOHMANN ET AL 2,050,780

AUTOMATIC MECHANISM FOR FRAME EMBROIDERY MACHINES

Filed Feb. 8, 1934 14 Sheets-Sheet 14

Fig. 28



Inventors:-
A. A. Bohmann
and K. G. Scheibel
by E. F. Blumenstetter
Atty.

Patented Aug. 11, 1936 2,050,780

UNITED STATES PATENT OFFICE

2,050,780

AUTOMATIC MECHANISM FOR FRAME EMBROIDERY MACHINES

Arthur Albrecht Bohmann, Dresden-Leubnitz, and Kurt Gustav Scheibel, Dresden-Strehlen, Germany, assignors to Würker G. m. b. H., Dresden, Germany

Application February 8, 1934, Serial No. 710,360
In Germany February 11, 1933

67 Claims. (Cl. 112—86)

The invention relates to automatic apparatus for frame embroidery machines and aims not only at effecting the entire adjustment of the intermediate members by means moved from the automatic driving means but also at utilizing this means in known manner for the frame's movement itself. The invention consists in this that a slide carriage moved by the automatic drive in a closed path in its movement in the one direction moves an entraining means released from the means for shifting the frame and in its reverse movement after previously effected connection of the entraining means with the means for displacing the frame returns to initial position, and thereby effects the frame movement.

The invention resides moreover in the particular construction of the carriage and of the means adjusted by the carriage and effecting the embroidery frame displacement as also in the connection of the adjusting member carried by the carriage with the intermediate members adjusted by the needle plates.

Thus the carriage may consist of a slide moved to and fro with adjusting means switches mounted thereon for an adjusting member which is mounted on a slide or the like movable transversely of the movement of the carriage and carrying the entraining means for the frame displacing means. Many different advantages result from such an arrangement which advantages will be explained in the description of the embodiment now to be described.

In place of the carriage, a pin may be provided operated by a crank drive or the like, the pin co-operating with the grooves or slots in the adjusting member to which the plate movement is transmitted and a connecting rod engaging the pin or the like and being connected to the rack bar or the like of the frame differential drive.

Thus it is possible with a suitable construction of the adjusting member to facilitate the displacement of the rack bar not only with respect to its direction of motion but also with respect to the amount of its displacement.

In the adjusting member may be provided a number of guide tracks on both sides of a neutral guide track and corresponding to the values to be adjusted in which the pin slides according to the position of the adjusting member.

In order after adjustment to relieve the intermediate members controlling the adjusting members of pressures or the like it is preferable to block the adjusting member from the plates by a bolt or the like.

Preferably the construction of the automatic device is such that the jacquard card support and the driving means with the needle plates controlled by the jacquard card is arranged over the bed plate of the embroidery machine, the remaining automatic driving means on the other hand being disposed beneath the bed plate.

Such an arrangement is possible since the jacquard card mechanism with the associated needle plates is structurally separate from the remaining automatic drive and both parts are connected with one another only by one or more rods.

As a result all the parts (jacquard card arrangement) which require to be accessible to the operative can be arranged in any suitable position above the machine plate, while all the parts which operate purely automatically and require no special treatment can be arranged beneath the bed plate, where they do not interfere with attendance on the embroidery machine.

It is of importance that the transmission of the plate movement initiated by the jacquard card from the automatic embroidery device can be effected by means of a quite simple bell crank lever mechanism.

For the purpose of considerably simplifying the structure it is preferably arranged so that the plates displaced by the jacquard cards themselves are formed after the manner of design cards so that the ends of the rods moved towards them can be formed as points and thus can effect an operation which transfers the automatic drive to the position initiated by the jacquard card or leaves the drive of the automatic device unaffected.

The accompanying drawings will serve for a better explanation of the invention.

Fig. 1 is a front view of the whole frame embroidery machine with the automatic mechanism forming the subject of the present invention. Fig. 2 is a plan view thereof, Fig. 3 a side elevation. Fig. 4 shows a part of the plan shown in Fig. 2 to enlarged scale. Fig. 5 is a vertical transverse section on the line V—V of Fig. 4. Fig. 6 and 6A constitute together a vertical longitudinal section of the automatic device. Fig. 7 a vertical cross section on the line VII—VII of Fig. 6A. Fig. 8 a horizontal longitudinal section on the line VIII—VIII of Fig. 6. Fig. 9 shows a part of that shown in Fig. 6A to enlarged scale. Fig. 10 is a vertical cross section on the line X—X of Fig. 9. Fig. 11 is a separate detail of Fig. 9. Fig. 12 is a vertical cross section on the line XII—XII of Fig. 6 to enlarged scale, Fig 13 a part of what is shown in Fig. 6A to en-

larged scale. Figs. 14 to 18 are details. Figs. 19 to 22 are details in which the possibilities of adjustment are explained diagrammatically. Fig. 23 is a graphical illustration explanatory of the embroidery frame movements. Fig. 24 and Fig. 24A constitute together a vertical longitudinal section through an automatic device of another embodiment. Fig. 25 a vertical cross section on the line XXV—XXV of Fig. 24A. Fig. 26 is a vertical cross section on the line XXVI—XXVI of Fig. 24. Fig. 27 shows a further modification of the arrangement forming the subject of the invention. Fig. 28 is a vertical cross section on the line XXVIII—XXVIII of Fig. 27. Figs. 29 to 32 are details in which are shown diagrammatically the possibilities of adjustment of the arrangement illustrated in Figs. 27 and 28.

The invention will now be described with reference to Figs. 1 to 5.

In the figures, 1 denotes the pedestal of the embroidery machine on which the bed plate 2 is supported. Above the bed plate 2 are mounted separate needle heads 3 which are connected to one another by a transverse support 4. The support 4 is secured to three arms 5 connected with the pedestal and extending over the bed plate. The separate needle bars indicated by 6 are reciprocated vertically as in a sewing machine. Beneath the bed plate 2 are arranged adjacent the separate needle heads 4 the hook shuttles for the lower threads which like the needle bars are driven by means not shown from the main shaft 7.

The separate parts of material to be embroidered are stretched in embroidery frames 8 which are secured to a common embroidery frame work 9. After each needle insertion and after the needles have been retracted from the material, the frame 9 must be displaced in order that those parts of the material in which the new stitch is to be formed come beneath the needle points. The movement of this embroidery frame is effected by the automatic mechanism forming the subject of the invention of which the two casings are indicated in Fig. 1 by A and B. Adjustment of this automatic mechanism is controlled by a jacquard card device indicated at C in Fig. 1.

It is to be observed that in order that each part of the work can be brought beneath the corresponding needle point the embroidery frame must be shiftable in two directions at right angles to one another parallel to the plane of the table, viz. in a direction which is parallel to the longitudinal line of the support 4 and in a direction at right angles thereto. For this purpose the two rack bars 10, 11 are provided each adapted to be moved by a separate gearing provided in the machine, said rack bars being shiftable in their longitudinal direction in the casing B of the machine.

The rack bar 11 which effects the displacement of the framework 9 in its longitudinal direction engages by means of a pin 12 upwardly extending and fastened at its end in a rail 13 of U-shaped profile which is secured to the under side of the embroidery frame 9. In order that the frame will be satisfactorily guided there is provided on the upper end of the pin 12, a guide block 14 which fits in the U-shaped profile of the rail 13. If thus the rack bar 11 is displaced, then the framework 9 is moved therewith. As is clear particularly from Figs. 4 and 5 the pin 12 engages in a slot 2' in the bed plate 2.

The rack bar 10 is provided at its right hand end with a guide rail of channelled form open at its upper side in which engages the guide block 16. The guide block 16 is rotatably mounted on the one arm of a bell crank lever 17. The bell crank lever 17 is arranged to swing about the pivot 2^2 secured to the bed plate 2.

To the bell crank lever 17 is connected a rod 18 which is connected to the ends of the bell crank levers 19, 20. The bell crank levers 19, 20 are adapted to turn on pivots 2^2 secured to the machine bed plate 2. On the free arms of the bell crank levers 17, 19, 20 are provided pins 17', 19', 20' which project through suitable arcuate slots 21 in the bed plate into the path of the framework 9. In the path of the pins 17', 19', 20' there are secured on the lower side of the framework 9 channelled rails 22 into which the pins 17', 19', 20' project. If thus the rack bar 10 is moved either to the left or to the right, the levers 17, 19, 20 are turned about their pivots and produce a displacement of the frame work 9 at right angles to its longitudinal axis.

The separate movements of the framework 9 which in conjunction with the insertions of the embroidery machine needles produce the embroidery design are produced by the jacquard card 23 which is unwound from the reel 24 led over the card cylinder 25 and finally wound on a reel 26. The two rollers 27 serve as guide reels and ensure that the jacquard card 23 is properly guided around the card cylinder 25. The spindles 24', 26' on the jacquard card reels are secured to a bracket 28 in the machine frame. The step by step movement of the jacquard card is effected by the card cylinder 25. The particular feeding mechanism will be hereinafter described.

The spindle 29 of the card cylinder 25 is provided on a slide 30 which is mounted so that it may be moved to and fro on the guide rods 31. In the position shown in Fig. 6A the slide 30 carrying the card cylinder 25 is in its extreme right hand position. By mechanism which will be later described the slide is moved to the left and back again. In the movement of the card cylinder 25 to the left, the card meets the plate needles 32, 32'. The plate needles 32, 32' are mounted on the plates 33, 33' which are arranged in pairs in the manner illustrated in Figs. 7. These plates are formed on their lower side with recesses or projections. If the plates are in the unused position, i. e. the starting position, then the projections or recesses in these plates are in register with the pushers 34 to 34^3 arranged adjacent them in the manner illustrated in Fig. 13, the plate 33 being pushed out for the sake of clearness in order that its shape can be seen. The pushers 34 to 34^3 are mounted so as to be movable vertically in the carrier 35. To the pushers 34 to 34^3 are connected rods 36 to 36^3 which at their other ends are connected with two T-shaped levers 37, 37', 38 and 38'. It must here be noted that, as shown in particular in Fig. 7, the pushers 34 to 34^3 are of such width that they engage always in the plane of two plates associated with a pair of plates 33, 33'. Each pair of plates is thus arranged adjacent a set of rods 36 to 36^3. For each pair of plates, also, is provided at the other end a pair of levers 37, 37' or 38, 38'.

As in the embodiment illustrated the values of the geometrical row 1, 3, 9, 27 have been used, then as shown in particular in Figs. 7, four pairs of plates 33, 33' are necessary for one direction of movement of the framework. For the direction of movement at right angles thereto four such pairs of plates are also necessary but as these plates are exactly the same as those acting

in the other direction, they are not shown in the drawing.

Each pair of levers 37, 37' and 38, 38' are mounted on spindles 39 which are carried by the rock levers 40, 41. While the lever 40 is rotatably mounted in the machine frame at 42, the pivot 43 secured to the machine frame is provided for the lever 41. The lever 41 engages with its roller 44 in a cam groove 45 in a cam drum 46. The cam drum is secured to the shaft 47 mounted in the machine frame. The shaft 47 is fitted with a bevel pinion 48 which meshes with a bevel pinion 49 mounted on the main shaft 7. The lever 41 is connected by the link 50 with the rock lever 40 so that the lever 40 is moved at the same time as the lever 41.

If the lever 41 is moved by the cam groove 45 in clockwise direction, then the lever 40 is given the same movement and the pivots 39 are moved upwards. Then the rods 36—36^3 are also correspondingly moved upwards and the pushers 34 to 34^3 moved towards the plates 33, 33' for engagement therewith.

To the downwardly projecting arms of the T-shaped levers 37, 37', 38, 38' are connected links 51 to 51^3, the ends of which are connected to the connecting rods 52 to 52^3. The rods 52 to 52^3 are movable horizontally in the carriage 53. A pair of plates 33, 33' are associated with each T-shaped set of levers 37, 37', 38, 38', but when four pairs of plates are provided two carriages must be provided, so that in addition to the carriage 53 the carriage 53' is provided. These carriages 53, 53' are vertically movable in the casing B.

Each carriage 53, 53' is provided with two sets of switches which consist each of three meeting slots 54, 54', and 54^2. These slots are arranged adjacent the switch tongues 55, 55', 55^2, and 55^3 which are secured to the connecting rods 52, 52', 52^2, and 53^3. With the switch slots of each carriage co-operate the pins 56, 56'. These are mounted on the lever 57, while the pins 56, 56' which co-operate with the second carriage 53^1 are provided on the lever 57'. The levers 57, and 57' are rotatably mounted by means of the pivots 58, 58' in the slides 59, 59'. On the slides 59, 59' are rotatably mounted by means of the pivots 60, 60' the rack bars 61, 61'. The rack bars 61, 61' are provided with longitudinal slots 62 in which engage pins 63. The pins 63 are mounted on one end of the bell crank lever 64 which by means of a roller 65 tracks the cam drum 66 of a cam disc 67. From the cam drum 66 the lever 64 intermittently receives a pivoting movement in clockwise direction, the two rack bars 61, 61' moving out of engagement with their corresponding pinions 68, 68'. The pinions 68, 68' are mounted on the shaft 69. Their rotation is transmitted by means of a differential gear to the pinion 70 which is also mounted on the shaft. This differential gear is shown in Fig. 12.

As shown in Fig. 12 the pinion 68 is mounted on a bush 101 which is freely rotatable on the shaft 69, and which is provided at its end with a pinion 102. The pinion 68' is mounted on a drum 103 which is freely rotatable on the bush 101 at one side and freely rotatable on a bush 104 at the other side. In the drum 103 are freely rotatable on the spindle 105 two connected pinions 106, 107. While the pinion 106 meshes with the pinion 102, the pinion 107 meshes with a pinion 108 provided on the bush 104. The bush 104 is freely rotatable on the shaft 69 and is provided at its free end with a pinion 70 which co-operates with the rack bar 11. Obviously a drive such as shown in Fig. 6 must also be provided for the rack bar 10 which, however, since it is exactly the same and acts like that shown in Fig. 6 is not shown separately in the drawings.

It should also be mentioned that with the pinions 68, 68' is associated an arresting and disengaging pawl 71 which is formed as a double armed lever and is arranged to turn freely on the pivot 72 of the bell crank lever 64. The free end of the pawl lever 71 extends with the roller 73 into the cam groove 76 which is also provided on the cam drum 67. The arresting pawl is provided at its upper end with a pointed tooth 71' which comes into engagement with the pinions 68, 68' after each movement thereof, to check the same. For this purpose the teeth of the two pinions as shown in Fig. 6; are somewhat pointed differing thus from the usual teeth. The feeding mechanism of the card cylinder 25 will be explained with reference to Figs. 9 to 11.

The spindle 29 on which the card cylinder 25 is secured is at both sides of the card cylinder mounted in the slide 30 which is arranged to be displaced longitudinally on the guide rods 31. The spindle 29 is embraced by the two lugs 77', 77' of the links 77 which are connected at the other end to the two forked ends 78' of the link 78 by means of the pins 79. The link 78 is preferably mounted at 80 on the casing A.

The roller 81 provided at the lower end of lever 78 co-operates with the cam 81' provided on the cam drum 46. The lever 78 receives a pivoting movement from this cam.

In the position shown in Figs. 6A and 9 the upper ends 78' of the lever 78 are in the extreme right hand position. The slide 30 is also in its extreme right hand position. On the spindle 29 is also mounted a pinion 82 with which meshes a toothed sector 83 adapted to turn about the pivot 84 on the frame arm A'. To the toothed sector is connected at 83' the link 85 which at its other end is connected at 86 with the bell crank lever 87. The bell crank lever 87 is pivoted at 88 in the casing A and engages by means of the roller 89 provided at its free end in a cam groove 90 on the cam drum 46. On the spindle 29 is also mounted the belt pulley 91 over which passes a spiral spring 92 formed as a driving belt, and passing over a pulley on the spindle 26' of the jacquard reel 26 (Figs. 1 and 11).

It should be mentioned that in order to avoid slip of the jacquard card 23 on the card cylinder 25 it is provided at its ends with pins 25' which co-operate with corresponding rows of holes 23' provided on the edges of the jacquard cards. The card cylinder 25 which is suitably hollow is provided on its periphery with openings 25^2 which the plate pins 32, 32' can enter, when these pass through a corresponding hole in the jacquard card. The movement of the carriage 53, 53' is controlled from the eccentric 93 which is mounted on the shaft 94. The shaft 94 is mounted in the casing B and carries in addition to the cam disc 67 the bevel pinion 95 which meshes with the bevel pinion 96 mounted on the main shaft 7. The eccentric 93 is embraced by an eye 97' of the connecting rod 97 which is connected at 98' to a double armed lever 98. The double armed lever 98 is pivotally mounted at 99 in the casing B. To its free end 98^2 are connected as many links 100 as there are carriages. The links 100 are pivotally connected to the carriages 53, 53'.

The modus operandi of the arrangement is as follows:

As soon as the card cylinder **25** is moved by the lever **78** into the position shown in Fig. 6A, the lever **87** is given by the cam **90** a partial rotation in a clockwise direction and the rod **85** connected with the lever **87** is pushed upwards and the toothed sector **83** given a corresponding movement about its pivot. As a result, however, the card cylinder **25** is also given a corresponding rotary movement in the direction of the arrow shown in Fig. 6A. Obviously the cam **90** is so arranged that the rotary movement imparted to the cylinder **25** will be of such amount that the next row of holes in the jacquard card **23** are brought in front of the plate pins **32**, **32'**. Then the lever **78** is swung by its cam groove **81'** so that the card cylinder **25** is moved into the position indicated in dotted lines in Figs. 9 and 11. The pinion accordingly moves out of engagement with the toothed sector **83** so that the return of the parts **83**, **85**, **87** to their initial position (see Fig. 6A) has no effect on the card cylinder **25**. Since the spindle **29** of the card cylinder is connected by the driving belt **92** with the spindle **25'** of the jacquard card winding reel a corresponding portion of the jacquard car is wound on the reel **26**.

In the displacement of the card cylinder **25** towards the left the plate pins **32**, **32'** strike the jacquard card. Now according as the plate pins enter a hole or meet solid portion of the card **23**, these pins remain in their initial position or are displaced to the left of Fig. 6A. If it is assumed that the plate pins **32'** have met a solid portion of the card the plates **33'** would be moved to the left in the manner shown in Fig. 14. After the card cylinder **25** has reached its left hand position for the purpose of contacting the jacquard card by the pins, the lever **41**, the roller **44** of which tracks the cam groove **45**, is caused to move in the direction of the arrow indicated in Fig. 6A. The pivots **39** of the T-shaped levers **37**, **37'**, **38**, **38'** are moved upwards. By means of the rods **36** to **36³**, the slides **34** to **34³** are moved upwards for the purpose of contacting the plates. While the slides **34'**, **34³** again meet the recesses, whereby they remain in their initial position the slide **34²** meets a projection as shown in Fig. 14 as a result of which it is moved into the position shown in dotted lines. While however the slide **34²** is moved downwardly the slide **34** as it is connected with the slide **34²** by the common T-shaped lever **37** is pushed upwards into the dotted position. This means however that the lever **37** has been turned in relation to the position shown in Fig. 6A that it comes into line with the lever **37**. At the same time, however, by the movement of the lever **37** the link **51** and the connecting rod **52** are moved towards the left. As a result the switch tongue **55** moves into the position indicated by dot and dash lines in Fig. 6. The switch slot **54²** would thereby be free to the pin **56**. On the succeeding upward movement of the carriage **53**, **53'** effected by means of the rods **93–100** the pin **56** is guided in the slot **54²** while the pin **56'**, if no displacement of the switch tongues **55²** and/or **55³** has taken place in relation to the lower guide, passes into the slot **54'** on the lower switch. The tilting of the lever **57** caused thereby would, however, indicate a corresponding displacement of the same to the right in relation to its slide **59**.

While the carriages **53**, **53'** move upwards, the lever **64** is so turned that the rack bars **61**, **61'** are out of engagement with their pinions **68**, **68'**. Thus first of all only a displacement of the slides would take place. After the rack bars, **61**, **61'** are moved into the position shown in Fig. 6 by means of the lever **64** where they are in engagement with their pinions, the carriages **53**, **53'** are again moved downwards into their initial position. Then the slides **59**, **59'** are moved backwards if they were previously displaced in the upward movement of the carriages. Then the racks **61**, **61'** which are connected with their pinions cause a rotation of the pinions and a corresponding displacement of the embroidery frame. By the use of the carriage **53** it is thus possible to effect adjustment of the intermediate members, while completely freed from load and the loading of the intermediate members takes place only when the work required for displacement of the embroidery frame is effected by the carriage or the rods **93**, **94** and **97–100** connected therewith. It should be noticed that the described operation of the carriages is of particular advantage because in the upward movement of the carriages i. e. when the weight of the carriages must be raised, only adjustment of the rods **59**, **61** takes place and in the downward movement of the carriages the embroidery framework is moved, the weight of the carriages, acting as a driving medium. By the arrangement in accordance with the invention a balancing of the forces is obtained which is very valuable for the silent running of the machine.

As each of the double armed levers **57**, **57'** have lever arms of unequal length (compare the distance from the pivot **58** to the pivots **56** and **56'** in Fig. 6) and as each of the pivots co-operates with three switch slots **54** to **54²** there is obtained as is shown diagrammatically in Fig. 22 for the pivot **58** a zero position and four positions to the left and to the right of this initial position. As a consequence the slides **59**, **59'** in addition to the initial or zero position can assume eight different positions. Figs. 19–21 will help to elucidate Fig. 22. From Fig. 19 it is clear that while the upper pivot **56** is in the switch slot **54** three different positions are possible, while the lower pivot may be in the left hand switch slot **54**, then in the middle switch slot **54'** and finally in the right hand switch slot **54²**. Fig. 20 shows three other positions when the upper pivot **56** is in the middle slot **54'** of the upper switch. The remaining three positions are then clear from Fig. 21 in which the upper pivot is located in the right hand switch slot **54²** of the upper switch.

In Fig. 15 is finally shown a position such as would be assumed when for example in the movement to the left of the card cylinder **25** the plates **33** meet a solid portion of the card. In this case when the pivot **39** is moved upwards the slide **34'** would strike a projection on the plate and thereby effect a corresponding downward displacement of the slide **34'** and upwards displacement of the slide **34³**. By this displacement of the slides **34'**, **34³** the T-shaped lever **37'**, would be swung to the right from the position shown in Fig. 6A so that the rod **51'** connected therewith is displaced to the right. The guide member **55'** secured to the connecting rod **52'** is moved to the right so that the guide **54** slot is free to the pivot **56**. In the upward movement of the carriage **53**, the pivot **56** is guided into the switch slot **54** whereby the lever **57** and the rod connected therewith is given a corresponding movement.

On the return movement of the card cylinder **25** to the right, the plates **33**, **33'** if they have been displaced are returned to their initial position. This movement is effected by the lever **111**

which is pivoted at 112 to the casing A and connected with the lever 78 by the link 110. At the upper end of the lever 111 is mounted a cross bar 111' which is so wide that it can grip and move back into initial position all the plates.

The plates 33, 33' are so formed that by slight adjustment the embroidery design can be reversed.

A stitch which for example is so marked on the design card that it (see Fig. 23) can move from the zero point three parts in the direction of the $-x$. axis and five parts in the direction of the $+y$ axis must when a design is to be reversed lie three parts in the $+x$ axis and five parts in the direction of the $+y$ axis. Conversely, the stitch which lies from the zero point three parts in the direction of the $+x$ axis and five parts in the direction of the $-y$ axis must be so displaced that it lies three parts in the direction of the $-x$ axis and five parts in the direction of the $-y$ axis.

This reversal of the embroidery design is effected by displacing the carrier 35 in which the slides 34—34^3 are movably mounted to the left in the direction of Fig. 6 so that the slides 34—34^3 move from the position shown in Fig. 13 to the position shown in Fig. 16. The carrier 35 is thus so displaced that the spring 113 enters the groove 114 in the carrier 35.

If in this position of the carrier 35 when the pins 32' of the plate 33' strike a solid portion of the card in the corresponding movement of the card cylinder 25 then the plate 33' is moved from its initial position to the position shown in Fig. 17.

If now the spindles 39 are moved upwardly by the machine drive then the slides 34, 34^2 are no longer displaced as they were in the adjustment according to Fig. 14, but the slides 34', 34^3 are moved from their initial position as is shown clearly in Fig. 17. The slides 34', 34^3 thus pass from the position shown in full lines into the position shown in dotted lines. The plates are so formed that in the displacement of the carrier 35 the adjusting values are displaced with reverse signs.

Here it may be also observed that obviously the displacement of the carrier on a reversal of the embroidery design causes no displacement for those plates which control the feeding movement of the embroidery frame in the direction at right angles.

Finally there is indicated in Fig. 18 how the displacement of the carrier 35 to the left acts when the plate needle 32 meets a solid portion of the card. In this case the slides 34, 34^2 are moved (and not the slides 34', 34^3 as in Fig. 15) from the full line position to the position shown in dotted lines.

In the embodiment illustrated in Figs. 24–26 in lieu of the carriage 53 carrying the switching devices 54, 54^2 setting members 115, 115' are employed which are mounted to pivot about pivots 116 on the casing B. These setting members are each provided with a groove 117 struck on a radius which is formed on the length of the levers 118. The levers 118 engage with their pivots 119 in the grooves 117 of the setting devices and are connected by the pivots 120 to the lever 121 having arms of unequal length, the pivot 122 of which is mounted on the slide 123.

The slide 123 is mounted to move longitudinally in the casing B and its function corresponds with the slide 59 of the construction shown in Figs. 1 to 23. On the slide 123 engage at 123' rack bars 61 or 61' which as in the embodiment already described mesh with the pinions 68 or 68'.

Each of the upper levers 118 is connected by a link 124 with the lever 118 therebelow. Also, the upper levers 118 are engaged by the links 125, which are connected by a common pivot pin 126' with the end of lever 126. The actuating lever is mounted to pivot about a pivot 127 on the machine casing B and engages by means of a guide roller 128 in the cam groove 129 which is provided on the cam drum 67' mounted on the spindle 94. Cams 66 and 76 are also provided for the rollers 65 and 73 of the levers 64 and 71 in the cam drum 67'.

On the setting members are provided in the three positions which each setting member can assume three notches 130, opposite which the locking lug 131 is disposed. The locking lugs 131 adjacent the lower setting members 115' are secured to the levers 132 so as to turn about the pivots 133, while the locking lugs 131 arranged adjacent the upper setting members 115 are arranged on the double armed levers 134. The levers 132 are connected by the links 135 with the levers 134. To the two levers 134 the pivots 136 of which are secured to the casing B are connected the link 137. The link 137 is connected by the pivot 138' with the double armed lever 138 which is mounted to pivot about a pivot 139 on the machine casing. The lever 138 engages by means of its roller 140 in the cam groove 141 provided on the cam drum 67'.

To each setting member is connected at 142 a link 143 or 143^2 which are each connected with a T-shaped lever 144, 144'.

The pivots 39' of the T-shaped levers 144, 144^2 are as in the first embodiment (see Fig. 6) connected to levers 40, 41. While the links 145, 146 are connected to the T-shaped lever 144, the links 147, 148 are connected to the T-shaped lever 144'. Each of the links 145–148 is connected to a slide 145'–148'. The slides 145'–148' are thus so arranged that at any moment the slides 145', 146' or 147', 148' are in one plane so that both the slides 145', 146' as also the slides 147', 148' co-operate with a pair of plates 233, 233'. The plates 233, 233' act exactly like the plates 33, 33' in the first embodiment. They differ only as regards their recesses or projections with which the slides co-operate from those of the first embodiment. Also the plates 233, 233' are provided with plate needles 232, 232' with which the jacquard card arrangement, which in the present embodiment in other respects is exactly the same and operates in the same way as in the first embodiment, co-operates.

By the particular construction of the plates three positions are possible for the levers 144 or 144', viz: the middle position and two tilted positions which are indicated by dotted lines on the T-shaped levers 144 in Fig. 24. According as the plate needles 232, 232' enter the holes in the jacquard card or meet a solid portion, the plates 233, 233' connected with the plate needles remain in their initial position or are displaced to the left of Fig. 24. If thereupon the pivot 39' of the T-shaped lever is moved upwards by the cam disc 46, then as the plates are adjusted either displacement of the T-shaped levers towards the left or right takes place, or they remain in the middle position.

By the connecting rods 143, 143^2 the corresponding setting members 115, 115' are adjusted with the T-shaped levers 144, 144'. Thereupon the lever 138 is turned by the cam 141 in the di-

rection of the arrow indicated in Fig. 24. The levers 134, 132 are moved to such an extent that the locking lugs 131 provided thereon enter corresponding notches 130, as the result of which the setting members 115, 115' are held in the positions thus obtained by the levers 144, 144'. After the setting members are held in this manner the lever 126 is moved by the cam 120 in the direction indicated by the arrow in Fig. 24, as a result of which the levers 118 move downwards and the pins 119 move correspondingly in the cams 117. According to the adjustment of the setting members the slide 123 is thus moved or remains in its initial position. The three possibilities of adjustment of each setting member and the three switching slots 54—54² act as in the construction shown in Fig. 6, whereby the levers are given the positions shown diagrammatically in Figs. 19–22.

Obviously before the lever 126 moves, the rack bars 61, 61' are first moved out of engagement with their pinions so that in the downward movement of the levers 118 only the movement of the slide 123 takes place. While shortly before the lever 126 is swung back into its initial position, the rack bars 61, 61' are again brought into mesh with their pinions so that the slide 123, while the levers 118 move back into their initial position, is again brought into its initial position and the movement of the embroidery frame effected by the differential gear described.

The embodiments illustrated in Figs. 27 and 28 constitute a modification of the embodiment shown in Figs. 24–26. The parts in this embodiment contained in the casing A are constructed exactly like those in the embodiment illustrated in Fig. 24 for which reason only the casing B' of the last embodiment is illustrated. Also in the construction shown in Fig. 27 two sets of setting devices of the same kind are disposed in series as indicated in Fig. 28, only one set being illustrated in Fig. 27.

In the embodiment shown in Figs. 27 and 28 the link 143 shown in Fig. 24 is connected at 150' to the upper end of the lever 150 mounted on the casing B' at 149. The link 143² shown in Fig. 24 however is connected at 151' to the lever 151 mounted at 152. The links 143', 143³ lying behind the links 143, 143² which have been omitted in order not to confuse Fig. 24, are connected to the ends of the levers 153, 154 as is clear from Fig. 27. While the lever 153 is connected at 150² to the lever 150 the lever 154 is connected at 151² to the lever 151. To the lever 153 is connected at 153' the link 155 which is connected by the pivot 155' with the setting member 156 formed as a slide. To the lever 154 is connected at 154' the link 154² which is connected with a setting member 156' corresponding to the setting member 156 which, however, in order not to confuse the drawings, has been omitted in Fig. 27. These setting members are mounted to move longitudinally in the guides 157 and are provided with nine grooves 158. Adjacent these setting members is mounted the driving shaft 159 which is provided with a crank pin 160. The shaft 159 like the spindle 194 is connected with the main shaft 7 of the embroidery machine. On the crank pin 160 are mounted the two connecting rods 161 and 161' which are provided at their ends with guide pins 162 or 162'. The guide pins enter slots 163' which are provided on downwardly extending brackets of the rack bars 187, 187'. On rotation of the shaft 159 the pins 162, 162' are reciprocated vertically in the guide slots 163'. The pins 162, 162' are made of sufficient length as shown in Fig. 28 that they enter the grooves 158.

By the rods 150 to 154 shown, in particular, in Fig. 27 there are provided for each setting member nine possibilities of adjustment which are illustrated diagrammatically in Figs. 29–32. From Fig. 29 it is clear how by the adjustment of the rod 143' into the extreme left hand position in relation to the rod 143 three possibilities of adjustment are provided. The first position is indicated by *a*, the second by *b* and the third by *c*.

In Fig. 30 is shown how on the adjustment of the rod 143' into the middle position in relation to the rod 143 three positions are again possible which are indicated by *d*, *e* and *f*.

Finally Fig. 31 shows how on adjustment of the rod 143' into the right hand position three further positions are possible which are indicated by *g*, *h* and *i*.

Fig. 32 shows all nine positions diagrammatically.

Each setting member 156, 156' is arranged adjacent a locking slide 164, 164' which are mounted to move vertically in the casing B'. On the lower ends of the locking slides are provided springs 165 which bear on the one hand against the guide and on the other against a disc 166 secured to the foot of the locking slide 164, 164'. Under the action of the springs the locking slides are pressed against cam 167 provided on the shaft 159. On the shaft 159 is mounted the cam disc 168 which is provided with cam grooves 169 and 170. In the cam groove 169 engages the roller 171 which is provided on the one arm of the bell crank lever 172 mounted at 173. To the free arm of the bell crank lever 172 is connected at 172' the link 174 which is connected by the pivots 175' with the pawl lever 175. The pawl lever 175 is mounted to pivot at 176 and has the same function as the pawl lever 71 in the first described embodiment.

In the cam groove 170 engages the roller 177 which is rotatable on the one arm of the bell crank lever 178. The bell crank lever 178 is mounted to pivot at 179 on the casing B' and is connected by the link 180 with the bell crank lever 181. The bell crank lever 181 which is pivoted at 182 on the machine frame is connected by the link 183 with a corresponding bell crank lever 184 which is pivoted at 185 on the machine frame. Pins 186 are provided both on the bell crank lever 181 and on the bell crank lever 184 which pins enter slots 187². The slots 187² are provided on the rack bar 187. The rack bars are movable to and fro on the pins 186 and is mounted to move up and down by tilting the levers 181, 184.

The modus operandi of the invention is as follows:

Before contact of the plates by the upward movement of the pivots 39' in the casing *a*, the locking slides 164 are released by the rotation of the shaft 159 and the cam 167 mounted thereon so that they leave the corresponding notches 188 provided on the setting members 156, 156'. In the succeeding contacting of the plates the rods 150, 154 effect the adjustment of the setting members 156, 156'. If for example the adjustment is so effected that the pivot 153' assumes the position indicated in Fig. 29 by *c* then at the same time the setting member 156 would be so displaced that the third cam groove 158 (counting from the left of Fig. 27) is moved in front of the locking slide 164. While now the locking slides 164 are moved upwards by their cam grooves

into the locking position, i. e. the locking slides with their pointed ends enter the corresponding recesses 188, the rack bar 187 is moved downwards parallel therewith by the rods 177–186 and come out of engagement with the pinion 68. Now the pins 162, 162' are guided upward by the crank pin 160. The pin 162 thus moves into the third groove of the setting member 166 and the pin 162 receives from the inclined portion of the corresponding groove 158 a corresponding lateral displacement which as the pins 162, 162' also engages in the slots 163' is transmitted to the rack bars 187 resulting in a corresponding movement to the left of the rack bar. Thereupon the rack bar 187 is moved by the cam groove 170 upwards parallel therewith so that the rack bar 187 meshes with the pinion 68. Before the pin 162 commences its downward movement the locking tooth 175 is retracted from the pinion 68 by the cam grooves 169. In the succeeding return movement of the setting members (to the right of Fig. 27) into its initial position this movement is transmitted to the pinion 68 and from there by way of the differential gear already described, to the rack bar 11. As soon as the crank pin 160 has again reached its lowermost position, the pins 162, 162' are thus withdrawn from the grooves 158 and the locking slides 164 are again moved downwards so that a new adjustment can take place.

It should be mentioned that the drive is taken from the eletcro motor 190, the belt pulley 191 of which is connected by the belt 192 with the belt pulley 193 mounted on the main shaft 7.

We claim:

1. An automatic mechanism for the frame of embroidery machines comprising means for displacing the frame of an embroidery machine, means for disconnecting said displacing means and means for adjusting the amount of displacement of said frame during the time said displacing means is disconnected.

2. An automatic mechanism for the frame of embroidery machines comprising means for displacing the frame of an embroidery machine, means for adjusting the amount of displacement of said displacing means, a jacquard mechanism for operating said last named means and means for locking said determining means temporarily after being adjusted by said jacquard mechanism.

3. An automatic mechanism for the frame of embroidery machines comprising means for displacing the frame of an embroidery machine, means for disconnecting said displacing means, means for adjusting the amount of displacement of said displacing means during the time said frame is disconnected and means for operating said displacing means after said means for displacing the frame has been again connected.

4. An automatic mechanism for the frame of embroidery machines comprising means for displacing the frame of an embroidery machine, a reciprocating carriage for operating said displacing means and means for moving said carriage so as to adjust the amount of displacement of said frame.

5. An automatic mechanism for the frame of embroidery machines comprising means for displacing the frame of an embroidery machine, a slide for operating said displacing means, a carriage carrying said slide for adjusting the amount of displacement and a jacquard mechanism controlling said carriage.

6. An automatic mechanism for the frame of embroidery machines comprising means for displacing the frame of an embroidery machine, a slide for operating said displacing means, a reciprocating carriage carrying said slide for adjusting the amount of displacement and a jacquard mechanism controlling said reciprocating carriage.

7. An automatic mechanism for the frame of embroidery machines comprising means for displacing the frame of an embroidery machine, a reciprocating slide cooperating with said displacing means, setting means mounted upon said reciprocating slide, a second slide, a setting member mounted upon said second slide cooperating with said setting means and said second slide operating said means for displacing the frame.

8. An automatic mechanism for the frame of embroidery machines comprising means for displacing the frame of an embroidery machine, a vertical reciprocating carriage cooperating with said displacing means, means for adjusting said carriage and said carriage being so connected with said displacing means that upon an upward movement thereof the carriage is adjusted by said adjusting means and upon a return movement of said carriage said displacing means are operated.

9. An automatic mechanism for the frame of embroidery machines comprising means for displacing the frame of an embroidery machine, a vertical reciprocating carriage having slots therein, an adjusting member cooperating with said slots, means for operating said adjusting member and means controlled by said adjusting member for operating said displacing means.

10. An automatic mechanism for the frame of embroidery machines comprising means for displacing the frame of an embroidery machine, a carriage having slots therein, means for reciprocating said carriage, a slide movable transversely of the movement of said carriage, an adjusting member carried by said slide cooperating with said slots, said slide controlling said displacing means and means controlling said adjusting member.

11. An automatic mechanism for the frame of embroidery machines comprising means for displacing the frame of an embroidery machine, a vertical reciprocating slide having slots therein, a second slide operating said displacing means carried by said first mentioned slide, a double-armed lever mounted upon said second slide cooperating with said slots and means controlling the positioning of said double-armed lever.

12. An automatic mechanism for the frame of embroidery machines comprising means for displacing the frame of an embroidery machine, a slide for operating said displacing means, means for disconnecting said slide from said displacing means, a second reciprocating slide having slots therein, a double-armed lever mounted upon said first-mentioned slide cooperating with said slots and means for controlling said double-armed lever so as to control the movement of displacement of said displacing means.

13. An automatic mechanism for the frame of embroidery machines comprising means for displacing the frame of an embroidery machine, a slide cooperating with said displacing means, means for disconnecting said slide from said displacing means, a second slide and means controlled by said second slide controlling the movements of said first slide.

14. An automatic mechanism for the frame of embroidery machines comprising means for displacing the frame of an embroidery machine, a slide cooperating with said displacing means,

means for disconnecting said slide from said displacing means, a second slide and means controlled by said second slide controlling the movements of said first slide, said second slide adjusting the movement of said first slide when moved in one direction and controlling the displacement of said displacing means when moved in the other direction.

15. An automatic mechanism for the frame of embroidery machines comprising, means coacting with said frame for displacing the same, a slide connected to said displacing means, a reciprocating carriage having slots therein, an adjusting member carried by said slide and cooperating with said slots, setting means for said adjustment member associated with said carriage and means for operating said setting means.

16. An automatic mechanism for the frame of embroidery machines comprising, means coacting with said frame for displacing the same, a slide connected to said displacing means, a reciprocating carriage having slots therein, an adjusting member carried by said slide and cooperating with said slots, switching devices adapted to shut off certain of said slots and direct said adjusting member into a predetermined slot associated with said carriage and means for operating said adjusting member.

17. An automatic mechanism for the frame of embroidery machines comprising, means coacting with said frame for displacing the same, a slide connected to said displacing means, a reciprocating carriage having slots therein, an adjusting member carried by said slide and cooperating with said slots, setting means for said adjustment member associated with said carriage and a jacquard mechanism for actuating said switching devices.

18. An automatic mechanism for the frame of embroidery machines comprising, a differential gear for displacing said frame, a reciprocating mechanism controlling the movement of said differential gear, means operative upon the movement of said reciprocating mechanism in one direction for adjusting the amount of movement to be given to said differential gear upon the movement of said reciprocating mechanism in the opposite direction and means operative upon movement of said reciprocating mechanism in the opposite direction for imparting said amount of movement to said differential gear.

19. An automatic mechanism for the frame of embroidery machines comprising, a differential gear for displacing said frame, a reciprocating carriage, a slide associated with said carriage having a releasable connection with said gear, means for adjusting the position of said slide with relation to said carriage and means for maintaining said adjustment during the operative stroke of said carriage.

20. An automatic mechanism for the frame of embroidery machines comprising, means for displacing said frame, a reciprocating carriage having diverging slots therein, a slide movable transversely of said carriage, an adjusting member carried by said slide cooperating with the slots in said carriage, a releasable connection between said slide and means for displacing said frame, a jacquard mechanism, switching devices upon said carriage controlled by said jacquard mechanism for adjusting said adjusting member with relation to said slots and means for holding said switching devices in position until said adjusting member has entered the predetermined slot.

21. An automatic mechanism for the frame of embroidery machines comprising, means for displacing said frame, an adjustable slide releasably connected to said displacing means, a reciprocating box-like casing having slotted tracks therein, an adjusting member connected to said slide, pins upon said member cooperating with said slotted tracks to adjust said slide and means for directing said pins into a predetermined slotted track for securing a predetermined adjustment of said slide.

22. An automatic mechanism for the frame of embroidery machines comprising, means for displacing said frame, an adjustable slide releasably connected to said displacing means, a reciprocating box-like casing having slotted tracks therein, an adjusting member connected to said slide, pins upon said member cooperating with said slotted tracks to adjust said slide, means associated with said casing for blocking certain tracks and leaving a predetermined track open for said pins and means for operating said blocking means.

23. An automatic mechanism for the frame of embroidery machines comprising, means for displacing said frame, an adjustable slide releasably connected to said displacing means, a reciprocating box-like casing having slotted tracks therein, an adjusting member connected to said slide, pins upon said member cooperating with said slotted tracks to adjust said slide, selecting means associated with said casing for selecting a predetermined track for said pins and means for operating said selecting means.

24. An automatic mechanism for the frame of embroidery machines comprising, means for displacing said frame, an adjustable slide releasably connected to said displacing means, a reciprocating box-like casing having slotted tracks therein, an adjusting member connected to said slide, pins upon said member cooperating with said slotted tracks to adjust said slide, selecting means associated with said casing for selecting a predetermined track for said pins whereby a desired adjustment of said slide may be obtained, means for automatically operating said selecting means and means for holding said last named means in operation until said pins have entered said predetermined track.

25. An automatic mechanism for the frame of embroidery machines comprising, means for displacing said frame, an adjustable slide releasably connected to said displacing means, a reciprocating box-like casing having slotted tracks therein, an adjusting member connected to said slide, pins upon said member cooperating with said slotted tracks to adjust said slide, and movable plates associated with said casing for directing said pins into a predetermined track to secure a desired adjustment of said slide to secure a predetermined displacement of said frame.

26. An automatic mechanism for the frame of embroidery machines comprising, means for displacing said frame, means controlling the amount of said displacement, means for setting said controlling means to secure a predetermined displacement of said frame and a delayed action mechanism for operating said displacing means for said frame.

27. An automatic mechanism for the frame of embroidery machines comprising, means for displacing said frame, means controlling the amount of said displacement, means for setting said controlling means to secure a predetermined displacement of said frame and means operating

said displacing means after said controlling means have been set.

28. An automatic mechanism for the frame of embroidery machines comprising, means for displacing said frame, means controlling the amount of said displacement, means for setting said controlling means to secure a predetermined displacement of said frame and a jacquard mechanism operating said setting means.

29. An automatic mechanism for the frame of embroidery machines comprising a jacquard roller, means for reciprocating said roller, means for intermittently rotating said roller, plates having needles cooperating with said roller, a plurality of rods cooperating with said plates, a frame and means operated by said rods for displacing said frame.

30. An automatic mechanism for the frame of embroidery machines comprising a jacquard roller, means for reciprocating said roller, means for intermittently rotating said roller, plates having needles cooperating with said roller, controlling means upon said plates, rods cooperating with said controlling means, means for moving said rods towards and away from said controlling means, a frame and means operated by said rods for displacing said frame.

31. An automatic mechanism for the frame of embroidery machines comprising a jacquard roller, means for reciprocating said roller, means for intermittently rotating said roller, plates having needles cooperating with said roller, controlling means upon said plates controlling the design being embroidered, a carrier, rods upon said carrier cooperating with said controlling means, links connected to said rods, means for moving said links and the rods carried thereby towards and away from said controlling means, a frame and means operated by said links for displacing said frame.

32. An automatic mechanism for the frame of embroidery machines comprising a jacquard roller, means for reciprocating said roller, means for intermittently rotating said roller, plates having needles cooperating with said roller, controlling means upon said plates controlling the design being embroidered, a carrier, rods upon said carrier cooperating with said controlling means, links connected to said rods, T-shaped links to which said links are connected, spindles upon which said T-shaped links are rotatably mounted, means for moving said spindles together with said links and rods toward and away from said controlling means whereby the positioning of said T-shaped links on said spindles is controlled, a frame and means connected to said T-shaped links for displacing said frame.

33. An automatic mechanism for the frame of embroidery machines comprising a jacquard roller, means for reciprocating said roller, means for intermittently rotating said roller, plates having needles cooperating with said roller, controlling means upon said plates controlling the design being embroidered, a carrier, rods upon said carrier cooperating with said controlling means, links connected to said rods, T-shaped links to which said links are connected, spindles upon which said T-shaped links are rotatably mounted, means for moving said spindles together with said links and rods toward and away from said controlling means whereby the positioning of said T-shaped links on said spindles is controlled, levers connected to said T-shaped links, guide plates controlled by said levers, a carriage having slots upon which said guide plates are carried and controlling said slots, a slide movable transversely of said carriage, an adjusting member having pins cooperating with said slots carried by said slide, a frame and means connected to said slide for displacing said frame.

34. An automatic mechanism for the frame of embroidery machines comprising, means for displacing said frame a predetermined amount and means for adjusting said displacing means so that a reverse design may be embroidered while utilizing the same displacing means.

35. An automatic mechanism for the frame of embroidery machines comprising, means for displacing said frame to permit the formation of an embroidered design, means for disconnecting said displacing means from said frame, means for adjusting the amount of a subsequent displacement of said frame during the time said displacing means is disconnected from said frame and means for adjusting said displacing means to permit a reverse design to be embroidered.

36. An automatic mechanism for the frame of embroidery machines comprising, means for displacing said frame a predetermined amount in any direction, a jacquard control, a plurality of rods operated by said control to control said displacing means, a carrier for said rods and means for reversing the design being embroidered by moving said carrier and the rods carried thereby.

37. An automatic mechanism for the frame of embroidery machines comprising, means for displacing said frame a predetermined amount in any direction, a jacquard control, plates operated by said control, controlling means upon said plates, rods operated by said controlling means to operate said displacing means and means for shifting the relative position between said plates and rods whereby a reverse displacement of said displacing means may be obtained.

38. An automatic mechanism for the frame of embroidery machines comprising means for displacing the frame of an embroidery machine, a movable member for actuating said means and means controlling the amount of movement of said movable member and thereby the extent said displacing means are actuated.

39. An automatic mechanism for the frame of embroidery machines comprising means for displacing the frame of an embroidery machine, a movable member for actuating said means and a pivoted member controlling the amount of movement of said movable member.

40. An automatic mechanism for the frame of embroidery machines comprising means for displacing the frame of an embroidery machine, a movable member for actuating said means, a pivoted setting member having a groove therein controlling the amount of movement of said movable member and means cooperating with said groove for actuating said movable member.

41. An automatic mechanism for the frame of embroidery machines comprising means for displacing the frame of an embroidery machine, a slide actuating said displacing means, a pivoted member, means for pivoting said pivoted member in accordance with a predetermined design and means for actuating said slide in proportion to the pivoting of said pivoted member.

42. An automatic mechanism for the frame of embroidery machines comprising means for displacing the frame of an embroidery machine, a slide releasably connected to said displacing means, a pivoted arc shaped member and means

for actuating said slide in proportion to the position of said pivoted arc shaped member.

43. An automatic mechanism for the frame of embroidery machines comprising means for displacing the frame of an embroidery machine, a slide releasably connected to said displacing means, a pivoted member having an arc shaped groove therein, means for pivoting said pivoted member to various predetermined positions in accordance with a predetermined design and means cooperating with said groove and connected to said slide for actuating said slide in accordance with the position of said pivoted member.

44. An automatic mechanism for the frame of embroidery machines comprising means for displacing the frame of an embroidery machine, a pin, means for positioning said pin at various predetermined positions in accordance with a predetermined design and means connecting said pin and displacing means whereby said frame may be displaced in accordance with the positioning of said pin.

45. An automatic mechanism for the frame of embroidery machines comprising means for displacing the frame of an embroidery machine, a setting member having a groove therein, a pin cooperating with said groove, means for positioning said setting member at various predetermined positions in accordance with a predetermined design and means connecting said pin and said displacing means whereby said frame may be positioned in accordance with the positioning of said pin in said groove.

46. An automatic mechanism for the frame of embroidery machines comprising means for displacing the frame of an embroidery machine, a releasable rack bar coacting with said means, a slide pivotally connected to said rack bar and means for moving said slide in accordance with a predetermined design.

47. An automatic mechanism for the frame of embroidery machines comprising means for displacing the frame of an embroidery machine, a releasable rack bar coacting with said means, a slide connected to said rack bar, a member determining the amount of movement of said slide, means for moving said member in accordance with a predetermined design and a connection between said member and said slide.

48. An automatic mechanism for the frame of embroidery machines comprising means for displacing the frame of an embroidery machine, a releasable rack bar coacting with said means, a slide connected to said rack bar, a member determining the amount of movement of said slide, means for moving said member in accordance with a predetermined design, means for locking said member after being moved and means for moving said slide in accordance with the position to which said member had been moved.

49. An automatic mechanism for the frame of an embroidery machine comprising means for displacing the frame of an embroidery machine, a jacquard control, design plates controlled by said control, a setting member actuated by said design plates and means controlled by said setting member actuating said displacing means whereby both direction and amount of displacement of said frame is controlled.

50. An automatic mechanism for the frame of an embroidery machine comprising means for displacing the frame of an embroidery machine, a jacquard control, design plates controlled by said control, rods movable towards and away from said design plates and controlled thereby, a setting member, means interconnecting said rods and said setting member for transmitting the movements of said rods to said setting member and means controlled by said setting member actuating said displacing means whereby both direction and amount of displacement of said frame is controlled.

51. An automatic mechanism for the frame of an embroidery machine comprising means for displacing the frame of an embroidery machine, a jacquard control, design plates controlled by said control, rods movable towards and away from said design plates and controlled thereby, a setting member, means interconnecting said rods and said setting member for transmitting the movement of said rods to said setting member, means for temporarily locking said setting member and means controlled by said setting member actuating said displacing means whereby both direction and amount of displacement of said frame is controlled.

52. An automatic mechanism for the frame of an embroidery machine comprising means for displacing the frame of an embroidery machine, a jacquard control, design plates controlled by said control, a plurality of rods actuated by said design plates, a series of setting members controlled by said rods, said setting members being arranged in superposed relation, slides controlled by said setting members and means interconnecting said slides and said means for displacing said frame.

53. An automatic mechanism for the frame of an embroidery machine comprising means for displacing the frame of an embroidery machine, a jacquard control, design plates controlled by said control, a plurality of rods actuated by said design plates, a series of pivoted setting members having grooves therein controlled by said rods, a slide for each pair of setting members and means cooperating with said grooves for imparting movements to said slides in accordance with the positioning of said setting members.

54. An automatic mechanism for the frame of an embroidery machine comprising, means for displacing said frame, a setting member, means for moving said setting member in accordance with a predetermined design and means interconnecting said setting member and said displacing means for actuating said displacing means in accordance with the positioning of said setting member.

55. An automatic mechanism for the frame of an embroidery machine comprising, means for displacing said frame, a slide, means for actuating said slide in accordance with a predetermined design and means interconnecting said slide and displacing means for actuating said displacing means in accordance with the positioning of said slide.

56. An automatic mechanism for the frame of an embroidery machine comprising, means for displacing said frame, a slide having a series of grooves therein, a rack bar actuating said displacing means and having a groove located adjacent said series of grooves, means for moving said slide in accordance with a predetermined design and means cooperating with said rack bar groove and said grooves in said slide for actuating said rack bar in proportion to the amount of movement given said slide.

57. In an automatic mechanism for the frame of embroidery machines, the combination of means for displacing said frame, a setting bar

for said displacing means and a series of control paths provided upon said setting bar.

58. In an automatic mechanism for the frame of embroidery machines, the combination of means for displacing said frame, a setting bar for said displacing means, a neutral control path upon said setting bar and a series of control paths located upon each side of said neutral path.

59. In an automatic mechanism for the frame of embroidery machines, the combination of means for displacing said frame, a setting bar for said displacing means, a neutral control path upon said setting bar and a series of control paths located upon each side of said neutral path and being shaped according to the values to which said setting member is to be adjusted.

60. An automatic mechanism for the frame of embroidery machines comprising means for displacing the frame of an embroidery machine, a slide having various control paths thereon, means for moving said slide in accordance with a predetermined design, a rack bar actuating said displacing means and means cooperating with said rack bar and a predetermined control path in said slide for actuating said rack bar a predetermined amount.

61. An automatic mechanism for the frame of embroidery machines comprising means for displacing the frame of an embroidery machine, a slide having various control paths thereon, one of said control paths being neutral while the others are uniformly distributed upon each side of said neutral path, means for moving said slide in accordance with a predetermined design, a rack bar actuating said displacing means and means cooperating with said rack bar and a predetermined control path in said slide for actuating said rack bar a predetermined amount.

62. An automatic mechanism for the frame of embroidery machines comprising means for displacing the frame of an embroidery machine, a slide having control paths thereon, means for moving said slide to a predetermined position to place a predetermined path in operative position, means for locking said slide in such position, a rack operating said displacing means having an extension and means cooperating with said extension and said path in operative position for moving said rack to thereby actuate said displacing means.

63. An automatic mechanism for the frame of embroidery machines comprising means for displacing the frame of an embroidery machine, a slide having control paths thereon of different values, means for moving a selected control path to operative position, means for temporarily locking said slide with a selected path in operative position, a rack operating said displacing means having an extension and means cooperating with said extension and said path in operative position for moving said rack to thereby actuate said displacing means.

64. An automatic mechanism for the frames of embroidery machines comprising means for displacing the frame of an embroidery machine, a jacquard control, a series of plates operated by said control, a series of rods controlled by said plates, each rod being subjected to the control of two adjacent plates, a setting means, means interconnecting said setting means and said rods and means controlled by said setting means determining the amount of displacement of said displacing means.

65. An automatic mechanism for the frames of embroidery machines comprising means for displacing a frame of an embroidery machine, a rack actuating said displacing means, means for disconnecting said rack from said displacing means, means for locking said displacing means while said rack is disconnected therefrom, a slide having control paths thereon, means for actuating said slide in accordance with a predetermined design so as to select a predetermined control path, an extension upon said rack extending adjacent said slide having a groove therein and cam operated means coacting with said groove and the selected control path for actuating said rack and thereby said displacement mechanism.

66. An automatic mechanism for the frames of embroidery machines comprising means for displacing the frame of an embroidery machine, means for actuating said displacing means, a slide, means controlling the movements of said slide in accordance with a predetermined design, means for locking said slide after said slide has been moved, means coacting with said means for actuating said displacing means and said slide operative after said slide has been locked in position for determining the amount of displacement and means for disconnecting said actuating means for said displacing means during the time said slide is being moved.

67. An automatic mechanism for the frames of embroidery machines comprising means for displacing the frame of an embroidery machine, means for actuating said displacing means, means for disconnecting said actuating means from said displacing means, means for moving said actuating means a predetermined amount in accordance with a predetermined design while said actuating means are disconnected from said displacing means and means for actuating said displacing means upon the return movement of said actuating means when said displacing means and said actuating means are again connected.

ARTHUR ALBRECHT BOHMANN.
KURT GUSTAV SCHEIBEL.