L. SCHWARZMANN.

EMBROIDERING MACHINE.

APPLICATION FILED MAY 14, 1917.

1,354,919.

Patented Oct. 5, 1920.

3 SHEETS—SHEET 1.

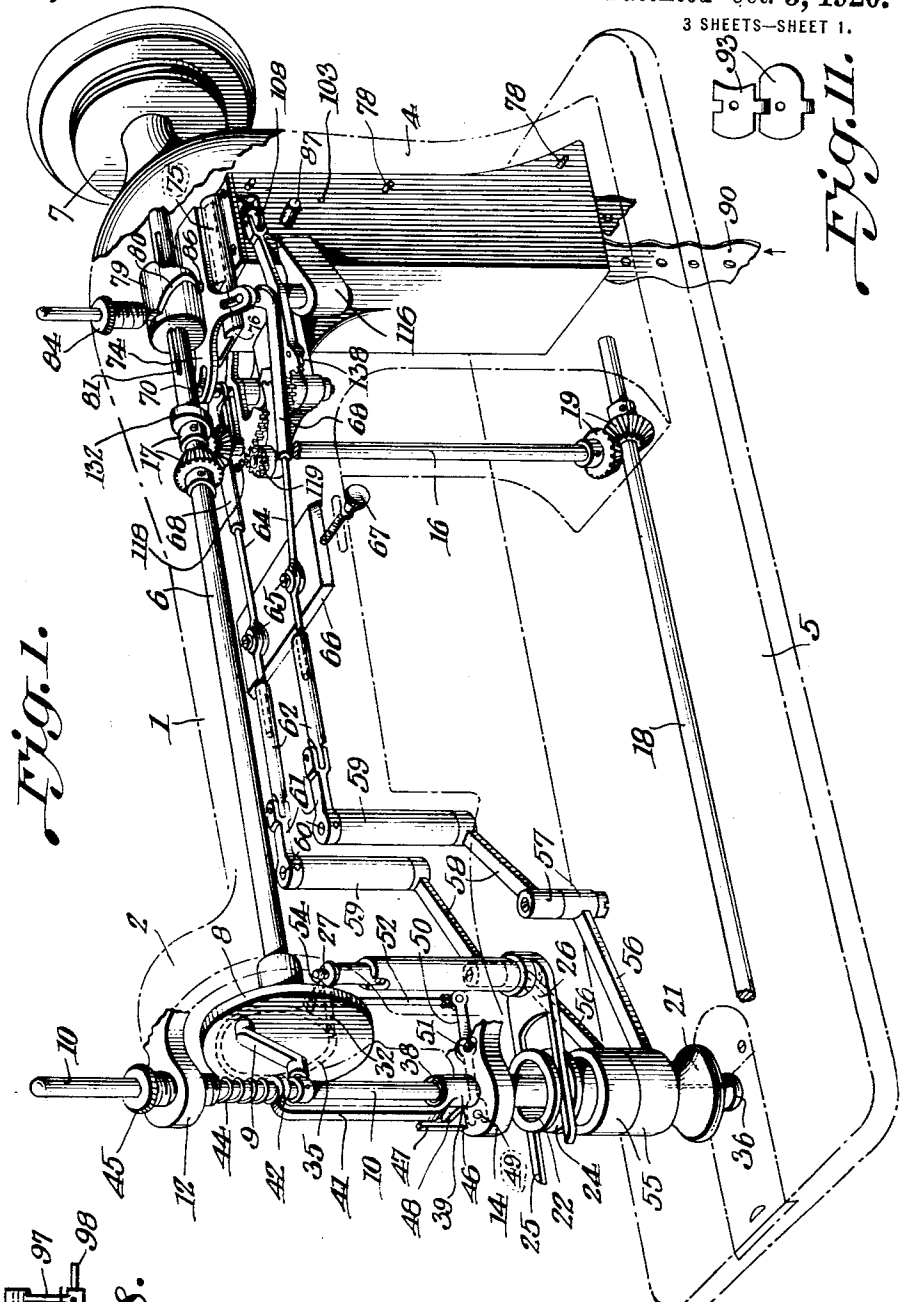


Fig. I.

Fig. II.

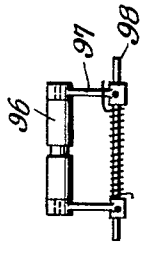


Fig. 8.

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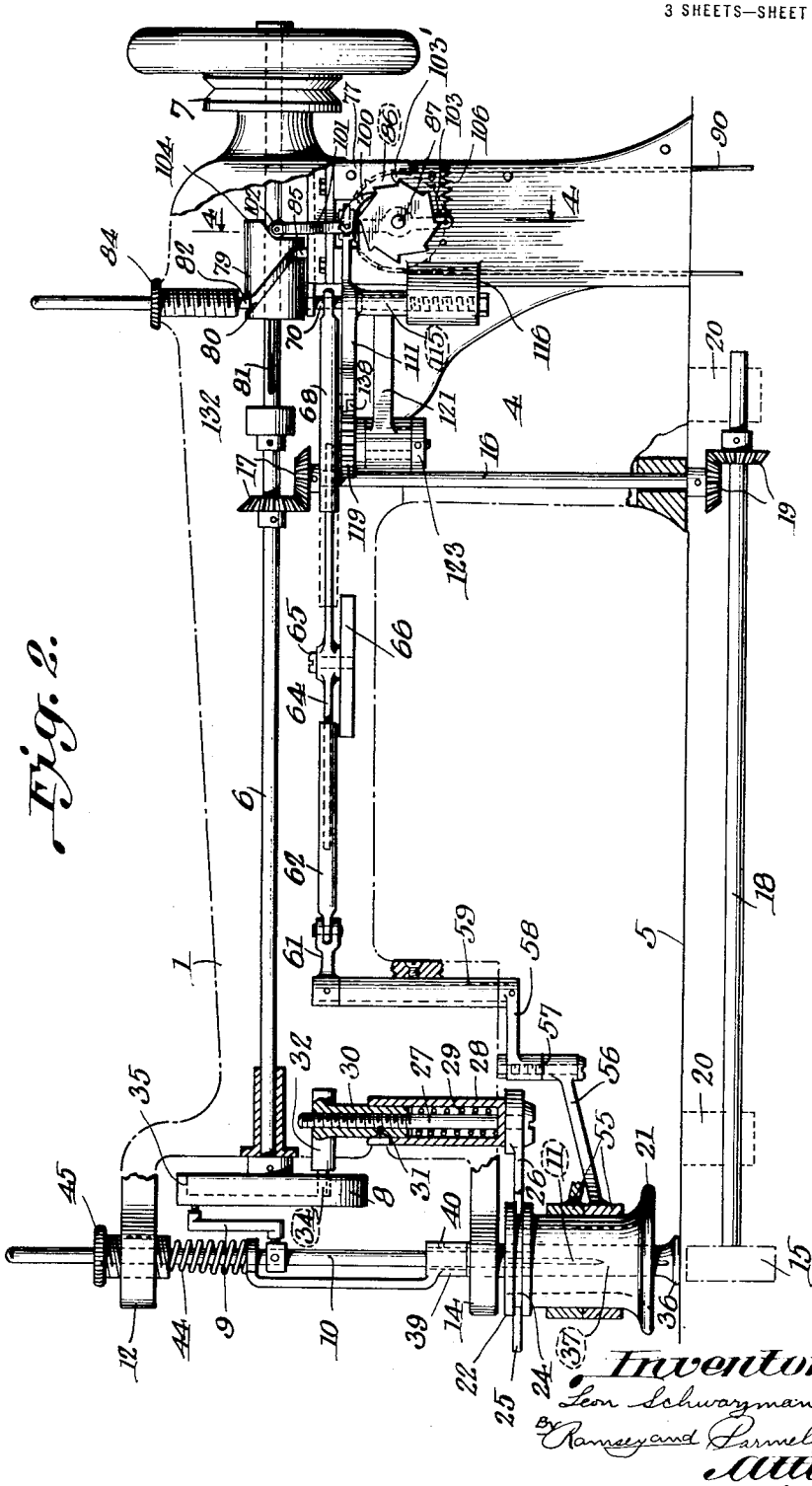


Fig. 2.

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3 SHEETS—SHEET 3.

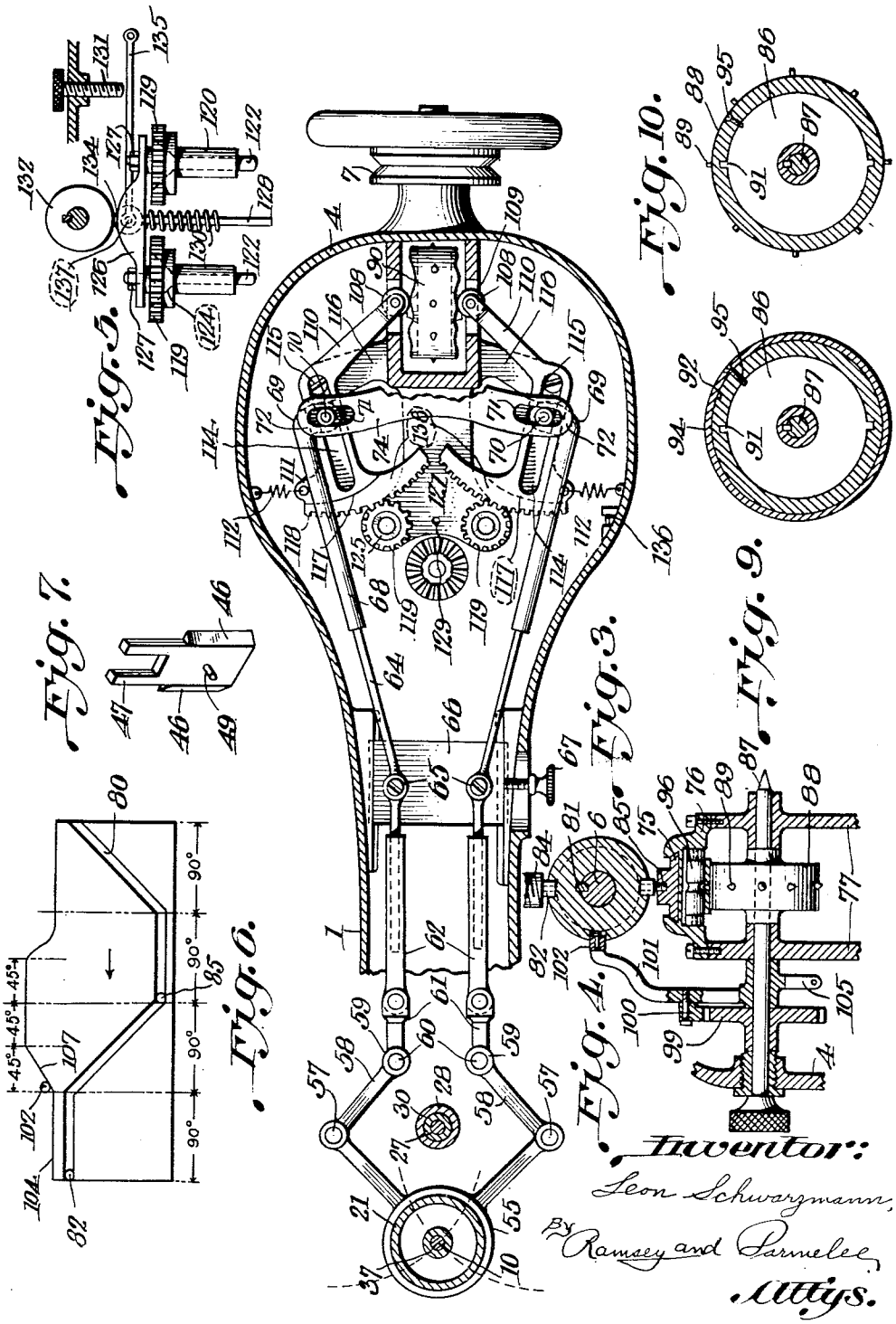


Fig. 5.

Fig. 10.

Fig. 7.

Fig. 9.

Fig. 3.

Fig. 6.

Fig. 4.

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UNITED STATES PATENT OFFICE.

LEON SCHWARZMANN, OF WASHINGTON, DISTRICT OF COLUMBIA.

EMBROIDERING-MACHINE.

1,354,919. Specification of Letters Patent. Patented Oct. 5, 1920.

Application filed May 14, 1917. Serial No. 168,371.

To all whom it may concern:

Be it known that I, LEON SCHWARZMANN, a citizen of Russia, and a resident of the city of Washington, District of Columbia, have invented certain new and useful Improvements in Embroidering-Machines, of which the following is a specification.

This invention relates broadly to sewing machines, and more particularly to sewing embroidering machines.

The principal object of the present invention is to provide a machine which shall be entirely automatic in operation to produce a perfect design with great efficiency, not depending on the experience of the operator, thereby making it adaptable for household use.

A further object of the present invention is to provide an embroidering machine having a mechanically driven pattern to automatically control the feed of the material upon which the design is being embroidered.

A still further object of the invention is to provide automatically operated feeding mechanism capable of causing movement of the cloth or other material in any desired direction and extension so that a stitch of any desired length may be produced.

Still another object of the invention is to provide alternately operating presser and feeding feet which shall be disposed concentrically one within the other, to secure accurate holding and feeding of the cloth.

Still another object of the present invention is to provide a pattern control which may be in either tape or pattern ring form.

A still further object of the invention is to provide means for braking the devices controlling the feed of the cloth in their adjusted positions; so that any desired material may be used in constructing the pattern and also to provide means for locking at will said devices so that continuous straight stitches may be produced.

The foregoing and other objects, together with attendant advantages will in part be obvious and will in part be pointed out in the specification hereinafter following, and the drawings forming a part thereof, throughout the several views of which like characters of reference have been used to indicate like parts.

Referring to the drawings, Figure 1 is a perspective view of my improved machine with some of the parts removed for sake of clearness.

Fig. 2 is a side view partly in section.

Fig. 3 is a top plan view partly in section of a portion of my improved machine.

Fig. 4 is an enlarged sectional view on line 4—4 of Fig. 2.

Fig. 5 is an enlarged detail view of the braking and locking mechanism.

Fig. 6 is a development of the driving cam.

Fig. 7 is an enlarged detail view of a portion of the presser foot lifting mechanism.

Fig. 8 is a detail view of the holding roller for the tape.

Fig. 9 is a detail view of the pattern ring.

Fig. 10 is a detail view of the tape feeding wheel.

Fig. 11 is an enlarged detail view of a modified pattern chain.

In the embroidering machines heretofore constructed, the cloth or other material being worked upon, was fed as found necessary either by a handle under the bed plate of the machine, or by means of a pantograph mechanism, or pattern operated mechanism wherein the pattern is a mechanical element in transmitting operating forces. Such machines have not proven altogether successful for the reason that where the human agency enters into the control of the cloth feeding mechanism, variations and mistakes are likely to occur.

The so called Jacquard machines, while to a large extent solving the difficulties pointed out, are so complicated as to render their use limited. On the other hand, the embroidering machines having cam wheel controls are not commercially adapted for producing a large variety of designs because of the large expense necessary to having a great number of different cams and the difficulty of obtaining help with sufficient mechanical skill to make the changes necessary when designs are changed. It is therefore necessary that a number of different machines be employed in order to produce a variety of patterns.

The present invention contemplates a simple mechanism embodying the advantages of the foregoing machines and doing away with the objections thereto, by providing a pattern tape or ring which is automatically fed during the operation of the machine and which may be changed at will to vary the design produced.

Referring more particularly to the draw-

ings, the improved machine comprises the usual horizontal or main casing 1 having a head 2 and a vertical or supporting portion 4 carried on the bed plate 5. Suitably journaled in the horizontal casing 1 of the machine is a main shaft 6 receiving motion through the ordinary pulley wheel 7 secured to one end thereof. At its opposite end, the shaft 6 is provided with a disk 8 having on its outer face a crank arm 9 suitably connected to the bar 10 carrying the needle 11, for reciprocating the same. The needle bar is slidable through projections or bearings 12 and 14 formed on the head of the machine.

For operating the shuttle mechanism 15, which may be of any well known type suitable for machines of this nature, there may be provided a vertical shaft 16 adapted to receive motion from the shaft 6 through bevel gears 17, and transmit the same to the horizontally extending shaft 18, by means of bevel gears 19. The shaft is mounted below the bed plate of the machine in suitable journals 20.

For feeding the cloth so that the desired design may be produced thereon, I have shown the feeding foot 21 concentric to and surrounding the needle bar 10 and having at its upper end a collar 22 provided with a peripheral groove 24. Working in the groove 24 on diametrically opposite sides of the feeding foot are the arms 25 of lifting plate 26. The plate at its solid end loosely surrounds the rod or bolt 27 slidable therethrough. The rod is mounted within a sleeve or casing 28 containing a compression spring 29 abutting against the adjustable threaded hub 30 maintained in position by set screw 31. The hub 30 has projecting forwardly therefrom an arm 32, carrying at its forward end a roller 34 operative in the cam groove 35 in the rear of disk 8. It will now be understood, that when the disk 8 rotates, the cam 35 acting upon the roller 34 will reciprocate the rod 27 which transmits movement to the sleeve 28 through the hub 30 and spring 29. The plate 26 will in turn be yieldingly forced downwardly to bring the feeding foot into engagement with the fabric. Continued rotation of disk 8 will lift plate 26 by engagement of the rod head with the under surface of the plate.

In order to hold the cloth against the bed plate of the machine when the feeding foot 21 is in its elevated position, so that the upward movement of the needle will not lift the cloth away from the bed plate, there is provided a tubular presser foot 36 concentrically mounted within the feeding foot and having a tubular portion 37 projecting upwardly therefrom and surrounding the needle bar. In order that the presser foot 36 may be readily inserted or removed from its operative position, it is provided at its upper end with a portion 38 around and to which is secured the sleeve 39 by means of set screws or the like 40. The sleeve 39 has an upwardly and outwardly extending arm 41 bent inwardly at its upper end and forming a ring 42 surrounding the needle bar. Pressing against the upper side of the ring 42 to maintain the presser foot 36 normally in its lowermost position, there is provided a coil spring 44 the tension of which is variable at will by means of the adjustable thumb nut 45 threaded in the projection 12, and constituting the upper guide for the needle bar.

For lifting the presser foot simultaneously with the lowering of the feeding foot and vice versa, there may be employed a plate 46 dovetailed in cross section and slidably mounted in one side of the projection 14. The plate is provided with bifurcations or arms 47 adapted to receive a lateral projection 48 extending from one side of the sleeve 39. The reciprocation of the plate 46 is performed by the pin 49 fixed thereon and engaging the forked end of lever 50 pivotally mounted to the main casing of the machine at 51 and connected at its opposite end to the pitman 52 having connection with the arm 54 formed on the hub 30 and working through a suitable slot in the main casing of the machine at substantially right angles to the arm 32 and extending through the main casing, thereby serving as a guide to prevent turning of the hub 30. The feeding foot 21 is provided on its lower surface with rubber inserts or may be roughened to insure a firm gripping of the cloth. It will be obvious that due to the pivotal mounting of the lever 50 and the operation thereof from the same arm which operates the feeding foot, that the two feet will have simultaneous movements in opposite directions.

The cam groove 35, as well as the other operating cams which shall hereinafter be described, has four equal units or periods of operation which occur successively to form one complete cycle of operation of the feeding and presser feet. In other words, rotation of the disk 8 through an arc of 90° is essential to either the complete lowering or raising of either of the feet, and after either of these operations the feet remain in their respective positions throughout the next 90° of rotation of the disk.

After the feeding foot 21 has been lowered into engagement with the cloth or other material being embroidered, it is essential that means be provided for feeding the foot a predetermined distance in the desired direction in order that the design may be properly formed. For accomplishing this movement of the foot there are provided rings 55 surrounding the same loosely one above the other so as not to in-

terfere with reciprocation of the foot. Secured to each of the rings 55 and projecting rearwardly and upwardly therefrom so as to leave room for the work, are diverging arms 56 extending normally at right angles from the needle, as shown in Fig. 3, and having pivotal connections 57 with the converging links 58. At their opposite ends the links 58 underlie bearings 59 secured in the main casing of the machine, and receiving rods 60 extending therethrough and to which the links 58 are fixedly connected. At their opposite ends the rods 60 are similarly connected to levers 61 bifurcated to receive one end of each of the tubular members 62. Slidingly mounted within the members 62 are rods 64 having pivotal mountings 65 on the plate 66 adjustably held in position in the frame of the machine by means of a thumb nut 67. From the pivots 65, the rods 64 extend in diverging relationship and are slidingly mounted in the ends of tubular members 68 corresponding broadly to the members 62, and having inwardly extending ends 69. Each of the inturned ends has secured thereto a transversely extending roller pin 70. The upper ends of the pins 70 carry rollers extending into the arc shaped slots 71 formed in the ends 72 of T-shaped plate 74. The plate 74 has a dove-tailed portion 75 formed thereon and slidingly supported by the correspondingly shaped plate 76 secured on the upper end of the U-shaped casing 77 inclosed within the upstanding portion 4 of the main casing and held in position by the fastening screws 78.

For operating the plate 74 to reciprocate the tubular members 68 telescopically on rods 64, there is provided a cam wheel 79, having a cam groove 80 formed peripherally therein, and slidably keyed to the shaft 6 by means of any usual key and key way 81. Reciprocation of the cam wheel on the shaft is brought about by the roller pin 82 extending from the bushing 84 screwed in the machine casing. This reciprocation is in turn transmitted to the plate 74 through the roller 85 formed on its upper surface and extending into the groove 80. The groove 80 corresponds broadly to the cam groove 35 in the disk in that it is divided into four independent sections each extending for a space of 90° as shown in the development in Fig. 6, so that the plate 74 has two periods of rest and two periods of movement, which periods alternate one with the other. The purpose of providing the pin 82 is to increase the amount of movement transmitted to plate 74, which movement is just twice the effective length of the inclined portions of the cam groove 80, as will be readily understood.

From the foregoing it will be obvious that reciprocation of the plate 74 causes the members 68 to telescopically slide on the rods 64. Since the guide slots 114 later to be described, are parallel to the tubular member 68, no swinging movement of the rods 64 about their pivotal mountings 65 is produced. Since a swinging movement of the rods 64 is essential to a feeding movement of the foot 21, it will be understood that while the parts are in the position described there will be no feeding of the cloth. The swinging movement of the members 68 in opposite directions an equal amount will produce a feeding movement of the foot in a straight line toward or away from the supporting casing 4, while movement of one of the arms a greater amount or in the same direction as the other will produce a feeding movement of the foot radially in one direction or the other. In each instance the amount of feeding movement is dependent upon the amount of swinging movement imparted to the rods 64, so that by regulating the same a stitch of any desired length and in any direction horizontally from the needle may be produced. This movement is accomplished and controlled by means of a pattern carrying wheel 86, keyed to the shaft 87 and having a rim 88 circumferentially mounted thereon. This rim carries points 89 adapted to engage with and feed a pattern tape 90 having configurations on its edges in accordance with the design to be produced. The rim 88 is properly positioned on the wheel 86 by means of a guiding projection 91 formed thereon. It is sometimes desirable to produce a given design of comparatively few stitches over and over again. For accomplishing this, the pattern rim 88 may be removed and the pattern rim 92 substituted, which rim is adapted to receive a pattern ring 94. The rims are held in applied position on the wheels 86 by means of set screws 95. In some instances it may be found convenient to construct the pattern of a plurality of links 93 as shown in Fig. 11 having suitable means formed thereon for pivotally connecting the same. The links will preferably each be of such length that they will control the making of but one stitch, so that each link will be a complete unit. Any identification or marking may be applied to the links so that they may be selected and assembled to produce the desired design. The tape or pattern is held against the pattern carrying wheel by means of a roller 96 having a central groove overlying the feeding points 89. The roller is rotatably carried in spring pressed arms 97 secured to the shaft 98 journaled in the plate 76 above the tape wheel.

The tape wheel is fed step by step through the medium of a ratchet wheel 99 secured on the shaft 87, the teeth of which are engaged by a pawl 100 pivotally mounted on the arm

101. At its upper end the arm 101 is bent and has a roller 102 in engagement with the cam surface 104 of cam wheel 79. The lever 101 has a depending portion 105 to which is attached a tension spring 106 for holding the roller 102 in engagement with the cam wheel. A stop 103 is provided for limiting the swinging movement of the lever, and a spring pressed holding pawl 103′ prevents retrograde movement of the ratchet wheel. The feeding incline 107 of the cam surface 104 is so positioned relatively to the cam groove 80 that feeding movement of the tape wheel is produced while the pin 82 travels through the straight or rest portion of the cam groove 80 which maintains the plate 74 in its rear position. Due to this arrangement of cams, the tape is brought to its proper position before any reciprocation or movement occurs of the links and arms operatively connected to the feeding foot.

In engagement with the opposite edges of the pattern ring or tape, are rollers 108 extending through openings 109 in the casing 77, and journaled in pivotally mounted arms 110. The arms 110 preferably extend at an angle of about 45° to the main shaft 6. These arms have forwardly projecting segments 111 held so that the rollers are in engagement with the pattern by means of tension springs 112. Formed in the segments 111 are guide slots 114, normally lying in their zero positions parallel to the axis of the tubular members 68. The guide slots are of such length that they extend rearwardly over the pivots 115 supported in the brackets 116 projecting outwardly and forwardly from the frame 77. By forming the slots of such length, the lower portion of the roller pins 70 may rest therein directly over the pivots 115, so that swinging movement transmitted to the arms by reason of the engagement of the rollers 108 with the pattern will not cause any movement of the levers 68.

It will now be apparent that as the arms are swung inwardly and outwardly by the configuration of the pattern, that the axes of the guide slots 114 changes with respect to the normal axes of the tubular member 68, so that upon reciprocation of the T-plate 74, the roller pins 70 will be caused to swing in the curved guide slots 71 simultaneously with their longitudinal movement in the direction of the guide slots 114. In case the pattern tape is formed with similar indentations or projections on the opposite edges, the movement of the arms controlling the feeding foot will still be uniform, but in case there happens to be an indentation opposite a projection, or the projections or indentations are unequal, it will be apparent that the feeding foot will be caused to move to one side or the other concomitantly with its movement toward and from the supporting upright 4. Due to this construction, it is possible to cause a feeding movement of the cloth beneath the needle in any desired direction radially thereof so that a stitch of any length and in any direction may be produced.

In order to brake the segments 111 in their different positions, they are provided with comparatively thin segmental portions 117 having rack teeth 118. These rack teeth are in turn in engagement with pinions 119 having hubs 120 rotatably journaled in the forwardly projecting bracket arm 121, and carrying rings 123 preventing raising thereof. Passing through the hubs 120 are rods 122 having cone shaped leather or fiber covered portions 124 formed on their upper ends adapted to fit in and frictionally engage the conical depressions 125 of the pinions 119. For moving the conical portions into frictional engagement with the conical surfaces in the pinions so as to brake the same to hold the segments 111 in their adjusted positions, the rods 122 are connected at their upper ends by a cross bar 126 secured in position by nuts 127. Extending centrally below the cross bar is a guide pin 128 adapted to pass through the opening 129 formed in the bracket arm 121. The guide pin is provided with a coil spring 130 for normally holding the conical portions out of engagement with the pinions so that they are permitted to freely rotate. The conical portions are moved to braking position by either the manually adjustable stop screw 131, or by the cam 132 on shaft 6, adapted to engage the roller 134 carried by the arm 135 pivotally secured to the main casing of the machine in the bracket 136. The roller 134 and its connected arm are in turn connected to the cross arm 126 so that reciprocation thereof is effected, by the pin 137. The cam 132 has the operating projection extending through a period of 45° and is so positioned that it moves the cones to braking position immediately after the operation of the tape feeding mechanism and just prior to the reciprocation of the plate 74. In this manner accidental movement of the segments 111 which would tend to cause a false stitch, is successfully prevented. The segmental portions 117 are prevented from interfering one with the other when swung inwardly by reason of the undercut or cut away portions 138 formed in the members so that they pass over each other. Due to the provision of the braking means, strain on the pattern is reduced to a minimum, as it is only used to position the segments, and not to directly move the entire feeding mechanism, thereby making it possible to construct the pattern from comparatively inexpensive and light material.

By having the plate 66 adjustable, the length of the stitches produced by a given pattern may be varied, as each adjustment

of the plate changes the effective relative length of the levers on the ends of the rods 64.

From the foregoing it is believed that the operation of my improved machine will be readily understood. It is apparent that the pattern tape may be in endless or belt form so that a given design of a specified number of stitches may be successively produced. This is particularly useful in making monograms and the like. Also, the pattern may be fed through a plurality of machines so that identical designs may be simultaneously formed.

While I have illustrated the preferred embodiment for carrying out my invention, it is obvious that changes may be made therein within the scope of the appended claims without departing from the spirit of the invention. Any suitable and well known type of take-up and tension devices may be used with the present machine.

What I claim is:—

1. Feeding means for embroidering machines, comprising a feeding foot, a pair of arms connected to said foot, said arms being independent one from the other, means for moving said arms to move the foot, and pattern operated devices to control the movement of said arms.

2. Feeding means for embroidering machines, comprising a feeding foot, a pair of arms each independent one from the other and loosely connected directly thereto, means for moving said arms to cause feeding movement of the foot, and automatic pattern controlled devices for predetermining the movement of said arms.

3. Feeding means for embroidering machines, comprising a feeding foot, a pair of arms loosely surrounding said foot, and means for moving said arms to cause a feeding movement of the foot.

4. A feeding device for embroidering machines, comprising a feeding foot, a pair of telescopic arms operatively connected thereto, and pattern controlled means for moving said arms to cause feeding movement of the foot according to said pattern.

5. A feeding device for embroidering machines, comprising a feeding foot, a pair of diverging arms operatively connected to said foot, a pair of converging arms pivotally connected to said first mentioned arms, bearings for the converging arms, and means for rocking the arms about said bearings to cause a feeding movement of the foot.

6. A feeding device for embroidering machines, comprising a feeding foot, pairs of arms pivotally connected to the feeding foot, means for moving said arms to cause a feeding movement of the foot, and devices for independently controlling the effective movement of each pair of arms.

7. A feeding device for embroidering machines, comprising a feeding foot, a pair of diverging arms operatively connected thereto, a pair of converging arms pivotally connected at one end to said diverging arms, fixed bearings for the opposite ends of said converging arms, and pattern controlled means for rocking said arms about the bearings to cause a feeding movement of the foot.

8. In an embroidering machine, a pair of pivotally mounted telescopic rods, a feeding foot operatively connected to one end of said rods, and a pattern controlled mechanism operatively connected to the opposite ends of said rods.

9. In an embroidering machine, a pair of pivotally mounted rods, a feeding foot operatively connected to said rods at one side of the pivotal mounting, and a pattern controlled mechanism telescopically connected to said rods at the opposite side of said pivotal mounting.

10. In an embroidering machine, a pair of pivotally mounted rods, a feeding foot operatively connected to said rods at one side of the pivotal mounting, members slidably connected to said rods at the opposite side of said pivotal mounting, and means for sliding said members relative to the rods with the rods so positioned relatively to each other as to cause a feeding movement of the foot.

11. In an embroidering machine, a pair of pivotally mounted rods, a feeding foot operatively connected to said rods at one side of the pivotal mounting, members slidably connected to said rods at the opposite side of said pivotal mounting, and means for simultaneously sliding and swinging said members relative to said rods for causing a feeding movement of the foot.

12. In a machine of the class described, a driving shaft, a feeding foot, slidable and swinging members operatively connected to said foot for causing a feeding movement of the same, a cam on the driving shaft for reciprocating said members, and a pattern controlled mechanism for swinging said members.

13. In an embroidering machine, a pattern carrying wheel, a pattern carried by said wheel, means for rotating said wheel, pivoted members operatively engaging opposite edges of said pattern, a feeding foot, and means controlled by said members for causing a movement of said foot in accordance with the pattern.

14. In an embroidering machine, a pattern, a pattern carrying wheel, means for rotating said wheel, pivotally mounted segmental members in operative engagement with the opposite edges of said pattern, said members having guiding slots formed therein, a feeding foot, mechanism operatively

connecting said feeding foot with said slots, and means for causing movement of said mechanism relative to said slots for operating the feeding foot.

15. In an embroidering machine, a feeding mechanism, a pair of pivotally mounted members having guiding slots formed therein for controlling said mechanism, a pattern controlling the operation of said members, and means for locking said members in adjusted position.

16. In an embroidering machine, a feeding mechanism, a pair of segments, a pattern for swinging said segments to different positions to control said mechanism, and means for braking said segments in said positions.

17. In an embroidery machine, a needle, a presser foot and a feeding foot, both of said feet being normally concentric to and surrounding the needle, a cam for raising and lowering said feet, and a spring pressed device connecting said cam to the feeding foot.

18. A feeding device for embroidering machines, comprising a feeding foot having an operating groove formed in one end thereof, a plate having bifurcations engaging in said groove, a spring pressed device connected to said plate, and a cam for actuating said device.

19. In an embroidering machine, a feeding mechanism, a pair of segments, a pattern for swinging said segments to different positions to control said mechanism, and a cam for braking said segments in said positions.

20. A feeding device for embroidering machines, comprising a feeding foot, members slidably and swingingly connected to said foot, a cam for sliding said members, and means coöperating with said cam to double the movement thereof transmitted to said members.

21. In an embroidering machine, feeding mechanism comprising a pair of pivotally mounted segments having guide slots formed therein, said guide slots extending over the pivotal mountings for said segments, means for swinging said segments about their pivots, and cloth feeding devices operatively connected with said segments, said cloth feeding devices comprising means sliding in said guide slots and capable of movement over said pivots whereby cloth feeding movement may be accomplished between the elements of zero and maximum feeding movement.

22. In an embroidering machine, a feeding mechanism, a pattern for controlling said mechanism, said pattern being composed of a plurality of interchangeably pivotally connected links having varying indentations and projections on their opposite sides.

23. In an embroidering machine, the combination of needle operating mechanism, a pattern, devices for feeding fabric to said mechanism, means controlled by said pattern for determining the movement of said feeding devices, and means independent of the pattern for transmitting power to operate the change of direction of the feed.

24. In an embroidery machine the combination of needle operating mechanism, a pattern, devices for feeding fabric for the said mechanism, means controlled by said pattern for predetermining the movements of said feeding devices, and holding members for locking said means during the feed movement of said feeding devices.

25. In an embroidering machine of the class described a needle, means for operating said needle, a presser foot, a feeding foot, means for raising and lowering said feet, feeding means for giving said feeding foot a feeding movement when in lowered position, said feeding means comprising two independently operated guiding members whereby said feeding foot may be moved in any direction in a horizontal plane relatively to the said needle.

26. In an embroidering machine of the class described, a needle, means to operate said needle, a presser foot, a feeding foot normally concentric to said needle, means for raising and lowering said feet, and pattern controlled means for moving said feeding foot while in lowered position in any horizontal direction relatively to said needle, said pattern controlled means comprising a pair of independently operated arms connected to the said feeding foot and adapted to concomitantly move the said feeding foot.

27. In an embroidering machine of the class described, a needle, means for operating said needle, a pressure foot, a feeding foot normally concentric to the said needle, means for raising and lowering the said feet, and means loosely connected to the said feeding foot for moving the same while in lowered position, independently operated feeding arms, said last mentioned means comprising a pair of rings surrounding a portion of the feeding foot and operably connected with said independently operated feeding arms.

28. In an embroidering machine, the combination of a pair of telescopic rods, independently operated means for operating said rods, said means comprising a pattern controlled mechanism, a feeding foot, a pair of arms connected to said feeding foot, each arm being connected with one of the said rods whereby the operation of said rods through the pattern controlled mechanism operates the feeding foot.

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