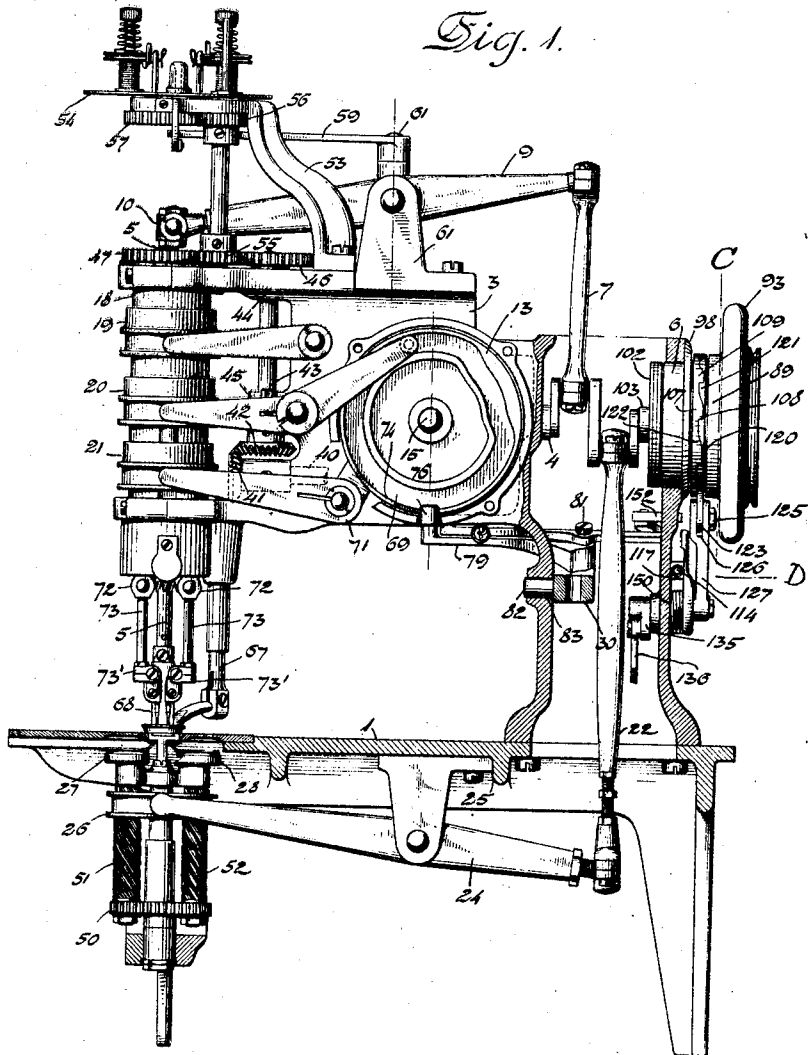


D. NOBLE.
STOP MOTION MECHANISM FOR SEWING MACHINES.
APPLICATION FILED FEB. 11, 1911.

1,058,326.

Patented Apr. 8, 1913.

5 SHEETS—SHEET 1.



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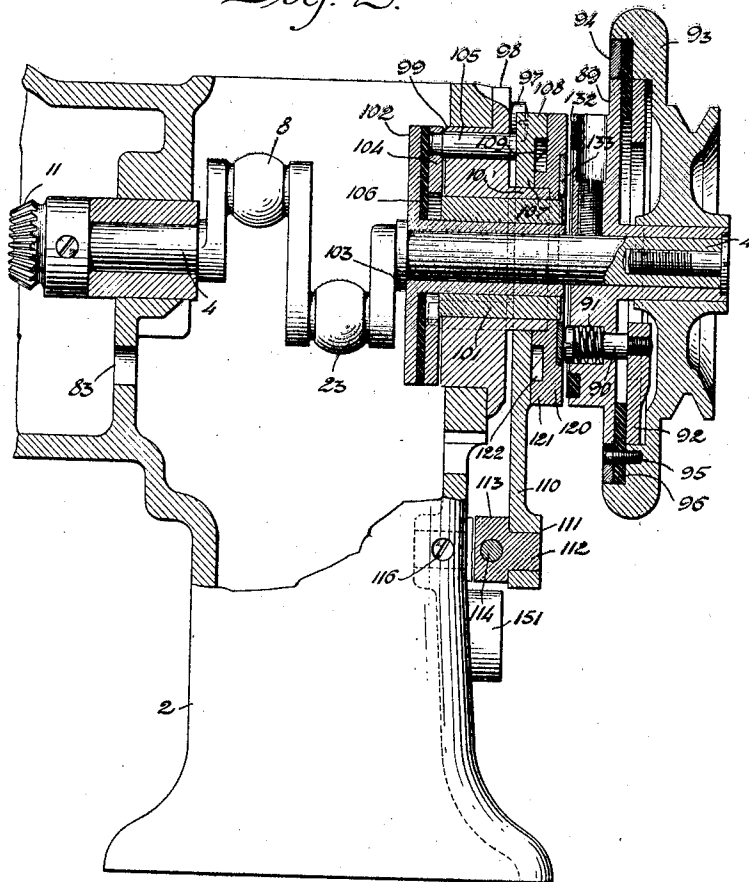
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5 SHEETS-SHEET 2.

Fig. 2.



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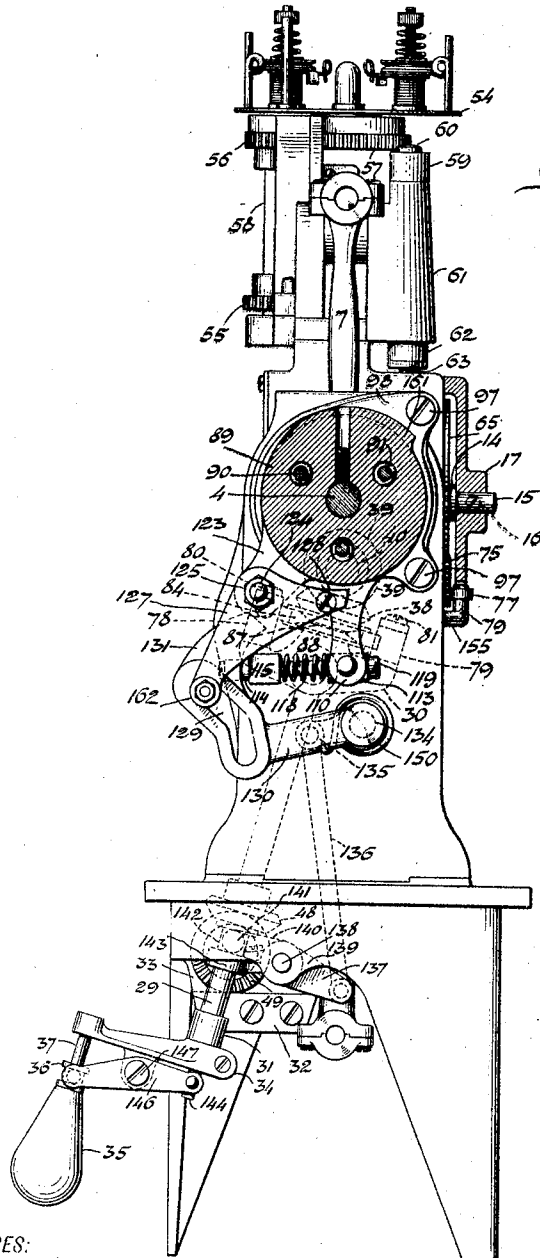
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5 SHEETS-SHEET 3.



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5 SHEETS—SHEET 4.

Fig. 4.

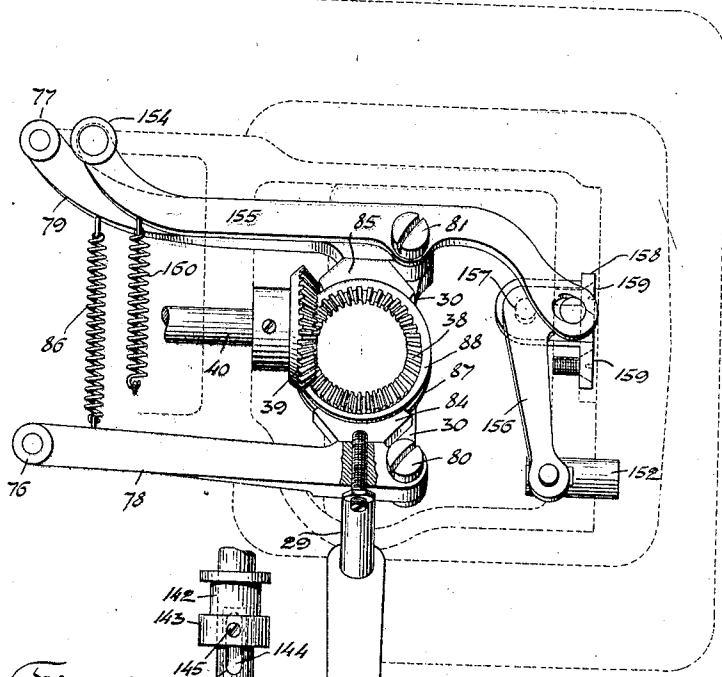
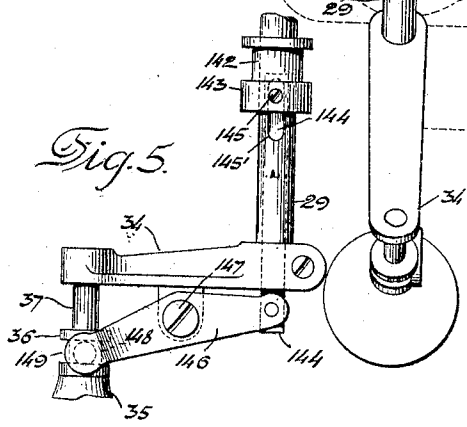


Fig. 5.



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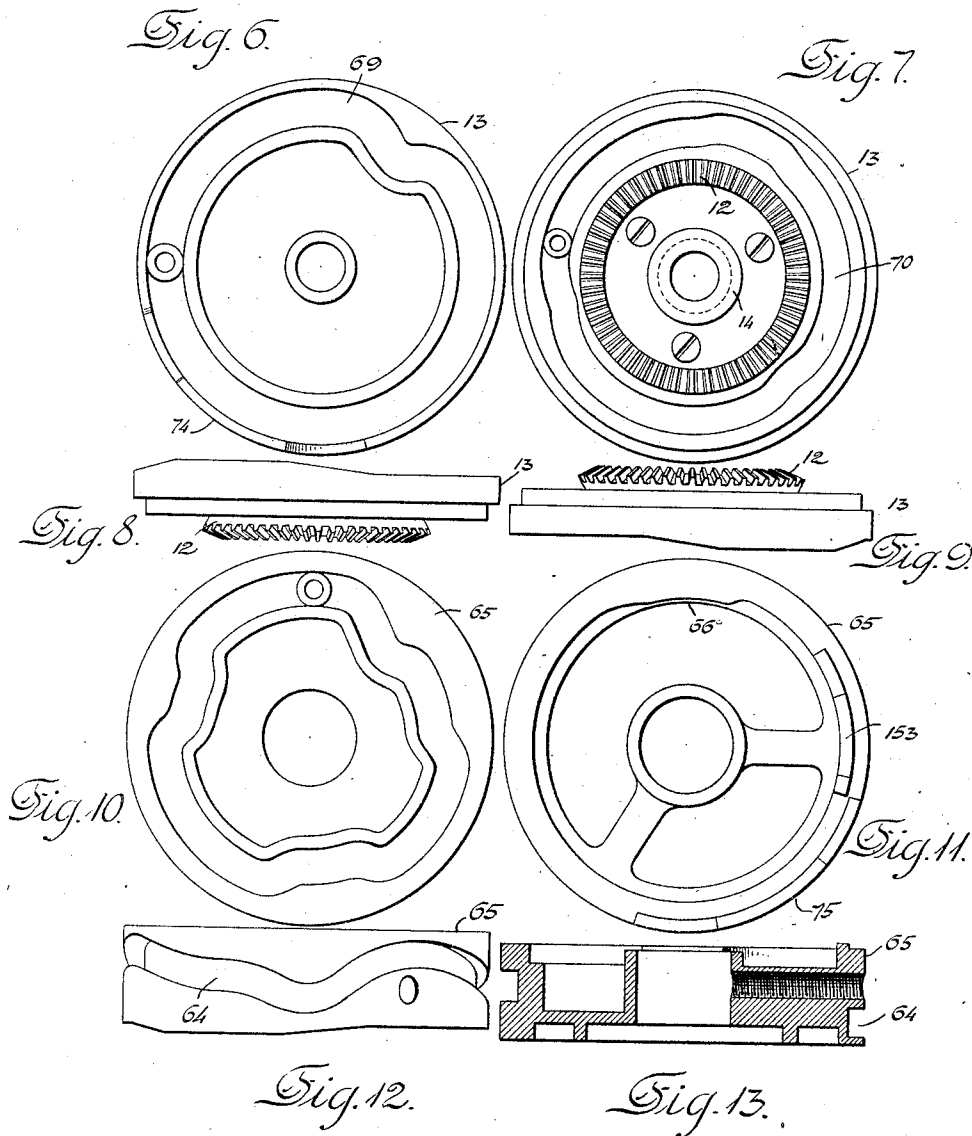
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5 SHEETS—SHEET 5



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UNITED STATES PATENT OFFICE

DONALD NOBLE, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO THE SINGER MANUFACTURING COMPANY, A CORPORATION OF NEW JERSEY

STOP-MOTION MECHANISM FOR SEWING-MACHINES.

1,058,326.

Specification of Letters Patent.

Patented Apr. 8, 1913.

Original application filed November 11, 1907, Serial No. 401,644. Divided and this application filed February 11, 1911. Serial No. 607,893.

To all whom it may concern:

Be it known that I, DONALD NOBLE, a subject of the King of Great Britain, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Stop-Motion Mechanism for Sewing-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to an improved stop-motion mechanism for sewing machines equipped with means for effecting a predetermined figure, design or stitch, as in the construction of hand-crank embroidering machines, and has for its object to arrest the action of the sewing machine only at the completion of a series of individual stitches comprising the embroidery stitch or figure, and to this end there is provided automatic means for controlling the stop-motion mechanism against effective action except at the completion of said embroidery stitch.

In the operation of hand-crank embroidering machines experience makes it practicable for the operator to closely follow the design, but to manually control the stop-motion mechanism so as to arrest the machine only at the completion of an embroidery stitch is impracticable, and owing to this it frequently occurs that when the seam is directed at an angle to the previously formed seam the corner is unsightly owing to the irregular formation of the stitches at such turning point, and to remedy this difficulty is the purpose of the present invention.

In the accompanying drawings illustrating the invention, in the several figures of which like parts are similarly designated,—
Figure 1 is a view in front side elevation of an embroidery machine embodying the improved mechanism, the bed-plate and arm-standard being shown in section. Fig. 2 is a central vertical section of the stop-motion mechanism, the arm-standard being shown partially in full lines and partially in section. Fig. 3 is a rear end elevation of the sewing machine, the crank-shaft and stop-motion mechanism being shown in section on the line C D Fig. 1. Fig. 4 is a detail view of the clutch mechanism for controlling the time at which the direction of the seam formation may be changed and the plunger and its actuating levers for deter-

mining the time of effective action of the stop-motion mechanism, the machine frame being shown in dotted lines. Fig. 5 is a detail view of the mechanism comprising the hand-crank. Figs. 6, 7, 8 and 9 are views of the oppositely arranged cam sections and cam grooves of the cam-disk located at the front side of the arm-bracket. Figs. 10, 11, 12 and 13 are views illustrating the cam sections and cam-grooves of the cam-disk located at the rear side of the arm-bracket.

In the illustrations there is included only so much of one form of crank-hemstitch embroidering machine, that represented by United States pending application Serial No. 401,644, filed November 11, 1907, of which this is a divisional application, as is deemed sufficient for a proper understanding of the present invention. It is well understood by those versed in the construction of predetermined figure sewing machines that to effect a single action of some element or elements during the cycle of stitch-formation, incident to the formation of an embroidery stitch, such element or elements must be controlled by the means employed to determine the cycle of stitch-formation and, accordingly, only such reference will be made to the details in construction of the stitch-forming and cloth-feeding mechanisms herein illustrated as is thought necessary to demonstrate their operative relationship with the means employed for automatically controlling the action of the stop-motion mechanism.

Referring to the figures, 1 represents the bed-plate of the sewing machine upon which is mounted the bracket-arm consisting of the arm-standard 2 and arm-bracket 3 and 4 the crank-shaft journaled in suitable bearings carried by the standard 2.

7 is the needle-bar crank connection, connected at one end with the crank 8 and at its opposite end with the needle-bar actuating lever 9, the opposite end of said lever being connected, through a suitable connection as 10, with the upper end of the hollow needle-bar 5, thus transmitting to the latter its vertical movements.

11 represents a bevel-gear carried by the crank-shaft 4, said gear meshing with a bevel-gear 12 secured to the inner face of the cam-disk 13, the latter formed integral with a hollow cam-shaft 14 mounted to turn

on a short stationary shaft 15, the latter secured by screw 16 in a lug 17 formed integral with the rear wall of the arm-bracket. The gears 12 and 11 are of the ratio of three-to-one, thus effecting one rotation of said cam-shaft 14 to three rotations of said crank-shaft 4 and upon said hollow cam-shaft is secured a cam-member, later to be referred to, for operating the cloth-feeding mechanism and such elements of the stitch-forming mechanism as are located above the bed-plate of the sewing machine.

The directly connected elements for guiding the needle-bar in its vertical movements and for controlling its swinging movements and the elements for giving to the needles their lateral movements, as when forming a hemstitch, are principally located within and carried by the rotary cylinder 18 and controlled in their movements by the rings 19, 20 and 21, mounted to move vertically on said cylinder, and as the specific form of construction and the particular mode of operation of such elements are not essential to an understanding of the present invention it is believed sufficient to briefly point out the means for giving to said rings their effective action.

22 represents the looper-actuating crank connection, connected at one end with the crank 23 and at its opposite end with the looper-actuating lever 24 mounted to oscillate in a bracket 25 suitably secured to the under side of the sewing machine bed-plate, the forward end of said lever being operatively connected with the loop-taker driving ring 26 whose oppositely arranged vertical movements gives to the loop-takers 27 and 28 their stitch-forming movements.

29 represents a hand-crank shaft, the upper end of which is mounted in a bearing formed in a bracket 30, later to be referred to, its lower end being mounted in a bearing 31 formed in the bracket 32 secured to a lug 33 forming a part of the bed-plate. The lower end of the hand-crank shaft is provided with a hand-crank consisting of an arm 34 and crank-handle 35, said handle being provided with a bushing 36, later to be referred to, loosely mounted on the rod 37 secured in the arm 34. The hand-crank shaft bearing formed in the bracket 30 and the bearing 31 are arranged to position said shaft oblique to a plane embracing the axis of rotation of the stitch-forming mechanism, thus giving to the crank-handle rotary movements in a like oblique plane.

Upon the upper end of the crank-shaft 29 is secured a bevel-gear 38 which meshes with a like gear 39 secured on a horizontal shaft 40 the forward end of the latter being provided with a second bevel-gear 41, which latter meshes with a like gear 42 carried by an upright shaft 43 mounted in vertically arranged bearings 44 and 45 forming a part

of the arm-bracket, and to the upper end of the shaft 43 is secured a toothed disk 46 which meshes with a like disk 47 secured to the upper end of the rotary cylinder 18. From the foregoing it will be understood that through the gear connections pointed out manually controlled rotary movements are transmitted from the crank-shaft 29 to the cylinder 18.

Near the lower end of the hand-crank shaft 29 is secured a bevel-gear 48 which meshes with a like gear 49 carried by a second horizontal shaft (not shown) mounted below the sewing machine bed-plate, which shaft acts to transmit rotary movements to the toothed disk 50 carrying the screw-threaded looper-shafts 51 and 52, in substantially the same manner as the shaft 40 transmits rotary movements to the toothed disk 47. Owing to the present means employed for transmitting to the loop-takers rotary movements about the axis of their carriers being of common construction and well understood, it has not been thought necessary to illustrate all of the elements comprising such chain of connection.

Upon the bracket 53 is mounted a plate 54 which carries the thread supply and the elements for tensioning and guiding said threads as they are drawn from the supply, and to effect the rotation of said plate there is provided a train of connections comprising the toothed disks 55, 56 and 57, the two former carried by the upright shaft 58 and the toothed disk 57 carrying the plate 54.

The take-up lever 59 is secured to the upper end of the vertically arranged rock-shaft 60 journaled in suitable bearing formed in the bracket 61 and actuated, through the crank-arm 62 and the depending stud 63, from the cam-groove 64 formed in the periphery of the cam-disk 65, the latter being provided with a cam portion 66 acting, through a suitable train of connections (not shown) located at the rear side of the arm-bracket, to lift the cloth-presser carrying bar 67 once during the formation of three lock-stitches, or at the completion of each embroidery stitch.

68 represents the step or feeding foot, the upper portion only being shown, (see Fig. 1), operated through suitable connections, including the ring 20, from the cam-groove 69 formed in the cam-disk 13, but as it is well understood that certain varieties of constructions of universal feed sewing machines are equipped with an upper feed, as in the present construction, while others employ an under or four-motioned feed, as in the construction represented by United States patent to Kohlbrenner, No. 858,724, of July 2, 1907, and as the present invention is applicable to either, it is not deemed necessary to further describe the means em-

ployed for controlling the movements of the element 68.

The inner side of the cam-disk 13 is provided with a cam-groove 70 which, through suitable connections including a two-part rock-lever 71, ring 21, rocking guide-blocks 72 72, slide-rod 73 73 and needle-clamps 73' 73', transmits lateral movements to the eye-pointed needles carried by said clamps.

To guard against the operator interfering with the feed of the material except at such time as it is being advanced under the needle, the cam-disk 13 is provided at its front side with a cam-portion 74 and the cam-disk 65 with a complemental cam portion 75, said cam portions coacting with the respective rollers 76 and 77 carried by the respective brake-shoe levers 78 and 79, which latter are pivoted on the respective screws 80 and 81 threaded into the bracket 30. The brake-shoe levers 78 and 79 are provided with wedge-shaped brake-shoes 84 and 85 which, through the action of the respective cam-portions 74 and 75, are held, in opposition to the spring 86, in effective relationship with the groove 87 of the pulley 88 except when the feeding mechanism is operated to advance the fabric.

The bracket 30 is provided with a short shaft 82 which enters a bearing 83 formed in the standard 2, thus permitting said bracket to take its proper angle with respect to the shaft 29.

89 is the brake disk, suitably secured to the crank-shaft 4 and provided with openings for the passage of the screws (three) 90, said openings being enlarged for a part of their length to provide pockets for the reception of the springs (three) 91 which are mounted upon the body portions of said screws and confined between the heads of said screws and the bottoms of the spring pockets. The screws 90 pass through the disk 89 and are threaded into the circular plate 92, thus causing the springs 91 to resiliently hold the plate 92 in the direction of the face of the disk 89.

93 is the band-wheel or loose pulley which near its outer diameter has secured to it, by a metal ring 94 and screws 95, a ring 96 which, in the present instance, is made of very firm leather, said ring being of sufficient width to extend in between the disk 89 and circular plate 92, thus, through said plate, causing the springs 91 to normally grip said ring and cause the rotary movements of the band-wheel to be transmitted to the shaft 4 through the disk 89.

To the arm standard there is secured, by screws 97 97, a bearing plate 98 which has formed integral with it a disk portion 99 and a hub 100.

Mounted within and secured to the plate 98 is a bushing 101 into which the shaft 4 is journaled, said bushing extending slightly

beyond the disk portion 99 at one side and slightly beyond the end of the hub 100 at the opposite side.

102 is a resistance disk provided with a hub 103 which, in the present instance, is sweated upon the shaft 4. 104 is a movable brake-disk into which is secured guide-pins (three) 105, which latter pass freely through the disk 99 and extend slightly beyond the face of the plate 98 and outside the periphery of the hub 100. Upon the shaft 4, between the disks 102 and 104, is loosely mounted a brake-ring (leather) 106.

107 is a toothed disk mounted upon the hub 100 and provided with teeth 108 having inclines 109, the inner face of said toothed disk resting against the ends of the pins 105. The disk 107 has formed integral with it an arm 110 provided with an opening 111 into which projects a lug 112 carried by a bracket 113 which, in turn, is mounted upon a screw-threaded rod 114. The threaded end of the rod 114 passes freely through a swivel block 115 journaled in a suitable bearing formed in the arm standard and secured in adjusted position by the screw 116. The threaded end of the rod 114 is provided with an adjusting nut 117, and between the blocks 113 and 115 is confined a spring 118 which acts to hold the block 113 pressed against the head 119 of the rod 114.

120 is a second toothed disk mounted upon the hub 100 and provided with teeth 121 and inclines 122. The disk 120 is provided with an arm 123 which is pivotally secured, by a stud 124 and nut 125, in a slot 126 formed in an L-shaped lever 127, which latter is provided at one end with a brake-shoe 128. The opposite end of the lever 127 is provided with a suitable roller which enters the cam slot 129 formed in the cam lever 130, the latter being provided with an arm 131 later to be referred to.

In the face of the disk 89 is secured a brake-ring 132 which, in the present instance, is formed of leather and located outside the heads of the screws 90, the outer face of said brake-ring lying slightly within the plane of the face of the heads of said screws. In the toothed disk 120 is loosely seated a metal ring 133 which is of sufficient diameter to include the heads of the screws 90.

134 is a short rock-shaft, upon one end of which is secured the cam-lever 130 and upon the opposite end an arm 135, to the outer end of which latter is pivotally attached a connection 136, said connection being pivotally attached to an arm 137 which, in turn, is secured upon a rock-shaft 138 journaled in bearings formed in the lugs 33 and 139, the latter extending downward from the sewing machine bed-plate.

140 represents a second arm secured upon

the shaft 138 and provided at its outer end with a roller 141, which roller enters an annular groove 142 formed in a sliding collar 143 mounted upon the shaft 29. The shaft 29 is provided at its lower end with a tubular portion in which slides a rod 144, said rod being connected at one end, by a screw 145, with the collar 143. The screw 145 passes through the collar 143, then through an elongated slot 145' formed in the shaft 29 and is threaded into the rod 144. The lower end of said rod is connected to one end of a rock-lever 146 pivoted, by a screw 147, to a lug depending from the crank 34. The opposite end of the rock-lever 146 is provided with a stud 148 which enters an annular groove 149 formed in the metal bushing 36 carrying the handle 35, said bushing being capable of both sliding and rotary movements on the rod 37.

150 is a spring, one end of which is secured in the hub 151 formed on the arm standard, the opposite end resting against the under side of the cam-lever 130 and normally acting to raise said lever and cause the arm 131 to contact with the stop-member or plunger 152, the plunger 152 acting to hold the stop-motion mechanism against effective action except at the completion of each of the figures comprising the seam.

To prevent the spring 150 from moving the lever 130 except at will, the operator holds the handle 35, in opposition to the force of said spring, in its lowest position, as shown in Fig. 3; but when it is desired to stop the machine, the operator moves the handle 35 vertically on the rod 37, thereby permitting and assisting the spring 150 to move the arm 131 in contact with the plunger 152, and as soon as said plunger is withdrawn the parts are advanced to speed arresting position.

When the operator permits the spring 150 to move the handle 35 to the limit of its upward stroke, the brake-shoe 128 contacts with the cam portion 161 formed on the brake-disk 89, and the roller 162 is positioned at the lower end of the slot 129. The action of the brake-shoe 128 upon the cam portion 161 causes the toothed disk 120 to be slightly rotated, such rotation causing the inclines 122 to ride the inclines 109. The action of the inclines 122 on the inclines 109 forces the ring 133 in contact with the heads of the screws 90 and causes the disk 89 to be moved out of gripping engagement with the ring 96, thus releasing the loose pulley 93 from engagement with the brake-disk 89 and forcing the side of the toothed disk 120 into frictional contact with the leather brake-ring 132.

At the time that the ring 133 is acting upon the heads of the screws 90, the side

of the toothed disk 107 is acting against the ends of the guide-pins 105, thus forcing the movable disk 104 in the direction of the length of the shaft 4 and against the brake ring 106, and the latter against the resistance disk 102, thus effecting frictional engagement between the resistance disk 102 and the disk 104, which latter is held against rotary movements by the pins 105 passing through the disk portion 99. The action of the toothed disk 120 upon the ring 132, and the action of the toothed disk 107 on the resistance disk 102 causes the speed of the machine to be gradually slackened; and the coaction of the brake 128 and cam portion 161 brings the machine to rest and controls the position in which the parts comprising the actuating mechanism of the sewing machine will be brought to rest. The starting of the machine is accomplished by moving the handle 35 to its lowest position.

To guard against the operator interfering with the operation of the machine except at such time as the material is being advanced under the needle, I provide the cam-disk 65 with a cam portion 153 which coacts with a roller 154 once for each rotation of said cam-disk, said roller being suitably mounted upon the free end of a connection 155 pivoted to oscillate on the screw 81. The opposite end of the connection 155 is jointed to an L-shaped lever 156 pivoted at 157 to a bracket 158 which, in turn, is secured by screws 159 159 to the arm-standard. The L-shaped lever 156 is pivoted to the plunger 152 mounted in a suitable bearing formed in the arm-standard, the free end of said plunger normally extending out slightly beyond the outer rear wall of the arm-standard. 160 is a spring one end of which is attached to the under side of the overhanging arm, the opposite end being secured to the connection 155, thus, through the connection described, holding the free end of the plunger 152 in its normal or outward position except when the roller 154 is acted upon by the cam portion 153, when said plunger is drawn within its bearing.

From the foregoing it will be understood that the stopping and starting of the machine is manually controlled, and that such control is automatically timed so as to insure the complete formation of the individual embroidery stitches before the machine is brought to rest, or when it is desired to change the line of the feed in a direction at right angles or obliquely to the previously formed stitches, as is often necessary in the practical operation of the machine.

Having thus set forth the nature of the invention, what I claim herein is:—

1. In a sewing machine, the combination with stitch-forming and feeding mechanisms and actuating means therefor adapted for the production of a seam comprising a suc-

cession of predetermined figures each formed of a multiple of individual stitches, and manually controlled turning means for said stitch-forming and feeding mechanisms, of a stop-motion mechanism for arresting the operation of the machine, said stop-motion mechanism being manually controlled to place its effective action under the control of automatically actuated means, the latter acting on said stop-motion mechanism to arrest the action of the machine at the completion of each of the figures comprising said seam.

2. In a sewing machine, the combination with stitch-forming and feeding mechanisms and actuating means therefor adapted for the production of a seam comprising a succession of predetermined figures each formed of a multiple of individual stitches, and manually controlled turning means for said stitch-forming and feeding mechanisms, of a stop-motion mechanism for arresting the operation of the machine, said stop-motion mechanism being manually controlled to place its effective action under the control of automatically actuated means, which, in turn, is controlled by the feeding mechanism to arrest the action of the machine at the completion of each of the figures comprising said seam.

3. In a sewing machine, the combination with stitch-forming and feeding mechanisms and actuating means therefor adapted for the production of a seam comprising a succession of predetermined figures each formed of a multiple of individual stitches, and manually controlled turning means for said stitch-forming and feeding mechanisms, of a stop-motion mechanism for arresting the operation of the machine, said stop-motion mechanism, including a manually controlled tripping mechanism for placing said stop-motion mechanism under the control of automatically actuated means, the latter acting on said stop-motion mechanism to arrest the action of the machine, at the completion of each of the figures comprising said seam.

4. In a sewing machine, the combination with stitch-forming and feeding mechanisms and actuating means therefor adapted for the production of a seam comprising a succession of predetermined figures each formed of a multiple of individual stitches, and manually operated means for determining the line of seam formation, of a stop-motion mechanism for arresting the operation of the machine, said stop-motion mechanism including a stop-member and means for tripping the stop-motion mechanism into action, the stop-member being normally disposed to arrest the effective action of said stop-motion mechanism, and automatically actuated controlling means whereby the stop-member is withdrawn from interference with the effective action of said stop-motion

mechanism at the completion of each of the figures comprising the seam.

5. In a sewing machine, the combination with stitch-forming and feeding mechanisms and actuating means therefor adapted for the production of a seam comprising a succession of predetermined figures each formed of a multiple of individual stitches and manually operated means for determining the line of seam formation, of a stop-motion mechanism for arresting the operation of the machine, means for tripping said stop-motion into action, and controlling means normally acting to prevent the effective action of said stop-motion but operative at the completion of the stitching of each of said figures to permit said stop-motion to arrest the action of the machine.

6. In a sewing machine, the combination with stitch-forming mechanism mounted for rotation, feeding mechanism adapted for rotation with said stitch-forming mechanism, actuating means for said stitch-forming and feeding mechanisms, and a controlling device for said stitch-forming and feeding mechanisms whereby groups or successions of stitches of predetermined number may be produced, of normally inactive means for turning said stitch-forming and feeding mechanisms, means for rendering said turning means operative at the completion of each group or succession of stitches, a stop-motion, means for tripping said stop-motion into action, and means normally acting to prevent the actuation of said stop-motion but operative at the completion of each group of stitches to permit the actuation of said stop-motion.

7. In a sewing machine, the combination with stitch-forming mechanism mounted for rotation, feeding mechanism adapted for rotation with said stitch-forming mechanism, actuating means for said stitch-forming and feeding mechanisms, and a controlling device for said stitch-forming and feeding mechanisms whereby groups or successions of stitches of predetermined number may be produced, of normally inactive means for turning said stitch-forming and feeding mechanisms, means for rendering said turning means operative at the completion of each group or succession of stitches, a stop-motion, means for tripping said stop-motion into action, and means normally acting to prevent the actuation of said stop-motion but operative at the completion of each group of stitches to permit the actuation of said stop-motion.

8. In a sewing machine, the combination with stitch-forming, feeding and feed directing mechanisms for the production of a seam comprising a succession of predetermined figures each formed of a multiple of individual stitches, of a stop-motion mechanism provided with a brake-shoe for

arresting the action of the machine, said stop-motion mechanism including an automatically controlled stop-member located between the feed-directing mechanism and
5 said stop-mechanism brake-shoe to hold the latter against effective action except at the completion of the stitching of each of the figures comprising said seam.

9. In a sewing machine, the combination
10 with stitch-forming and feeding mechanisms and actuating means therefor adapted for the production of connected groups or successions of stitches of predetermined
15 number, of manually controlled turning means for said stitch-forming and feeding mechanisms, means for preventing the operation of said turning means excepting at
20 the completion of one of said groups or successions of stitches, a manually actuated stop-motion for arresting the operation of the machine, and means for preventing the actuation of said stop-motion excepting at the completion of one of said groups or successions of stitches.

10. In a sewing machine, the combination 25 with stitch-forming and feeding mechanisms and actuating means therefor adapted for the production of connected groups or successions of stitches of predetermined number, of manually controlled turning means 30 for said stitch-forming and feeding mechanisms, means for preventing the operation of said turning means excepting at the completion of one of said groups or successions of stitches, a manually actuated stop-motion 35 for arresting the operation of the machine, and means, independent of the first-named preventing means, for preventing the actuation of said stop-motion excepting at the completion of one of said groups or suc- 40 cessions of stitches.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

DONALD NOBLE.

Witnesses:

THOMAS CAMPBELL,
ABBIE M. DONIHUE.