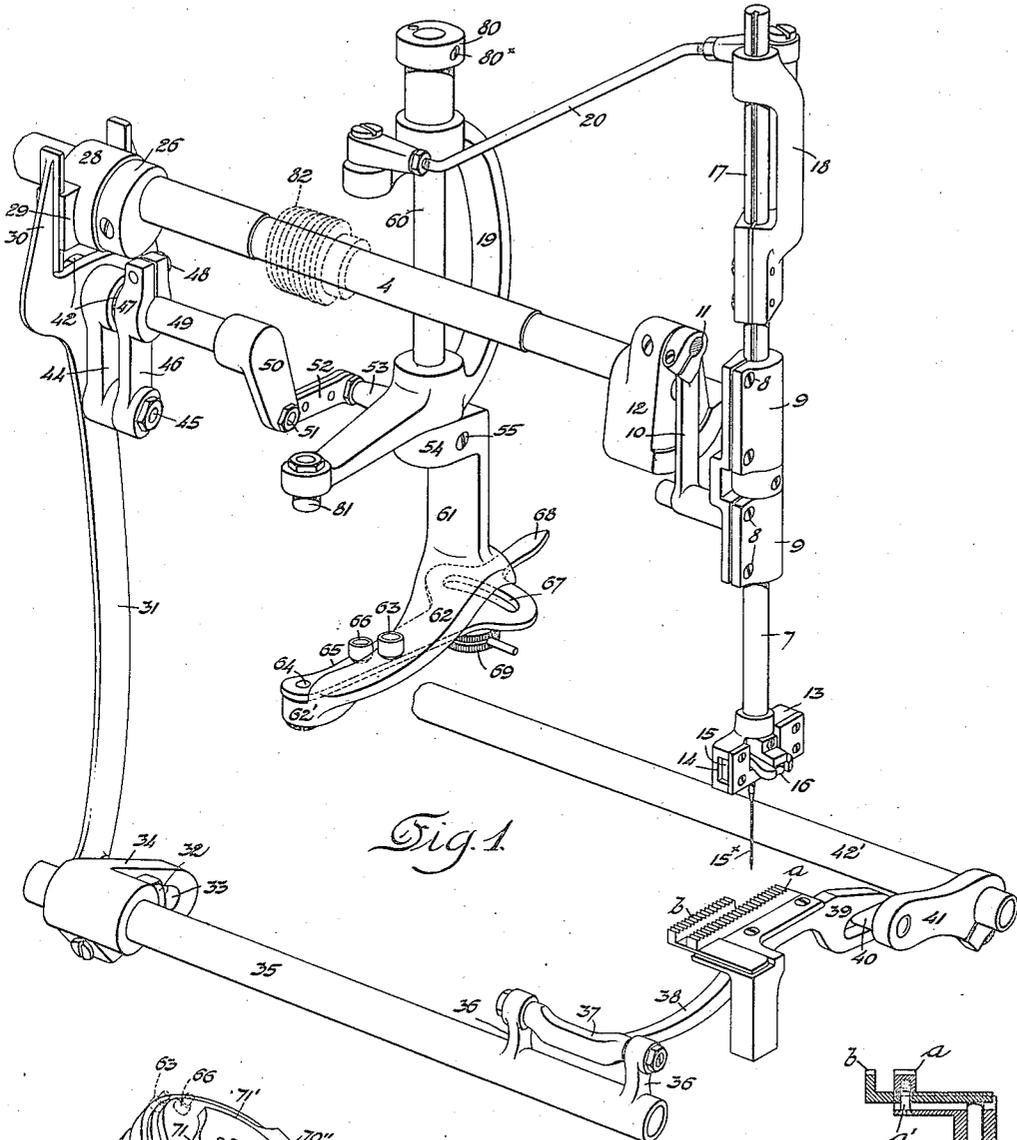


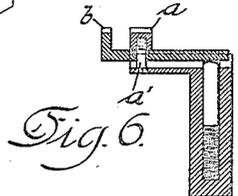
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 APPLICATION FILED OCT. 8, 1913.

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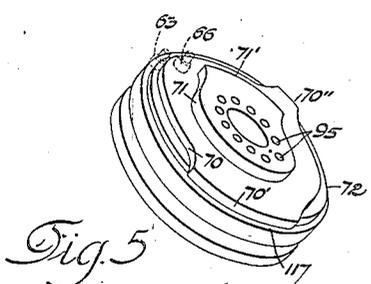
Patented Apr. 24, 1917.  
 2 SHEETS—SHEET 1.



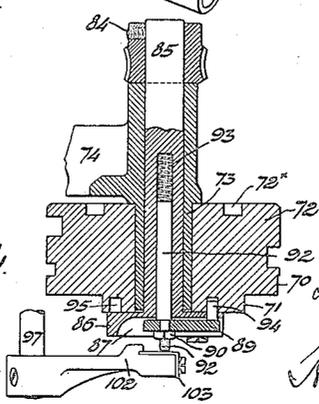
*Fig. 1*



*Fig. 6*



*Fig. 5*



*Fig. 4*

WITNESSES:  
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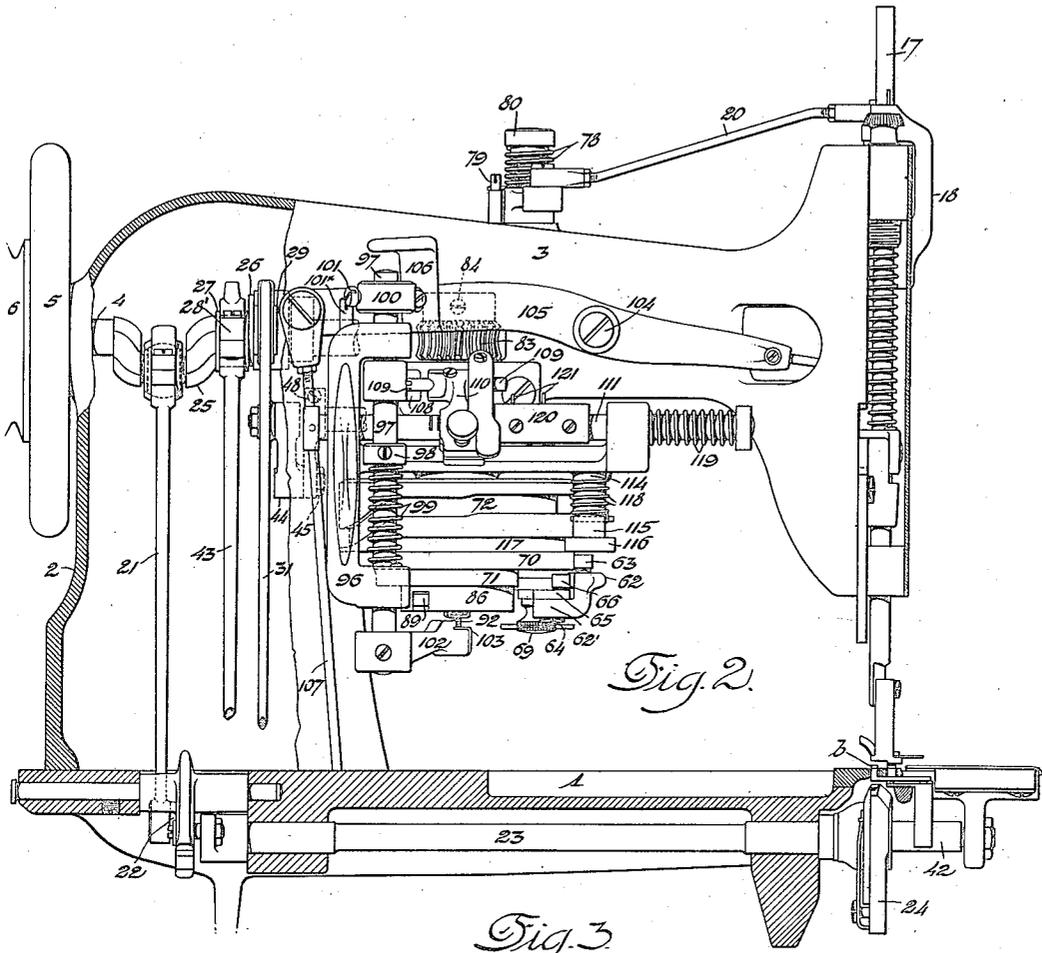
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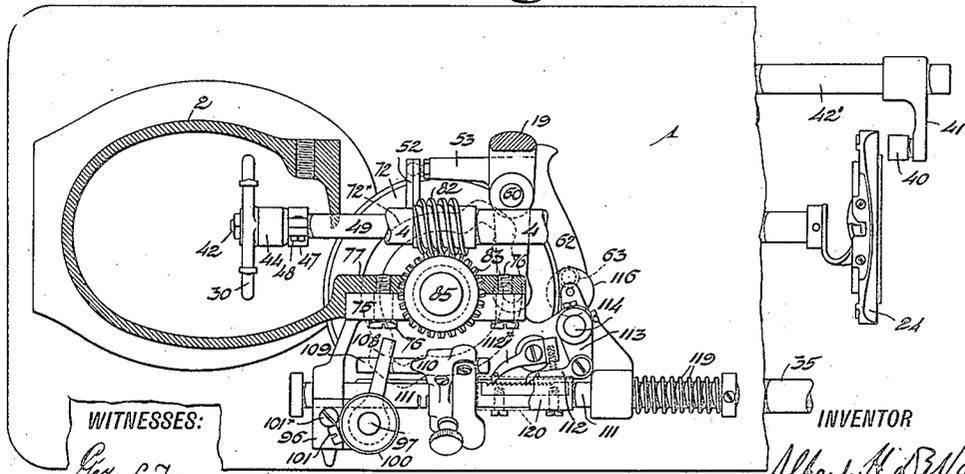
Patented Apr. 24, 1917.

2 SHEETS—SHEET 2.



*Fig. 2.*

*Fig. 3.*

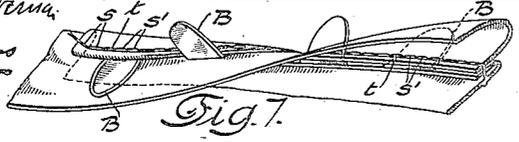


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*Fig. 7.*

# UNITED STATES PATENT OFFICE.

ALBERT H. DE VOE, OF WESTFIELD, NEW JERSEY, ASSIGNOR TO THE SINGER MANUFACTURING COMPANY, A CORPORATION OF NEW JERSEY.

FEEDING MECHANISM FOR SEWING-MACHINES.

1,223,570.

Specification of Letters Patent.

Patented Apr. 24, 1917.

Original application filed May 16, 1913, Serial No. 767,963. Divided and this application filed October 8, 1913. Serial No. 794,029.

## To all whom it may concern:

Be it known that I, ALBERT H. DE VOE, a citizen of the United States, residing at Westfield, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Feeding Mechanism for Sewing-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention has for its primary object to provide a sewing machine with feeding mechanism and controlling means therefor whereby said feeding mechanism is adapted to impart to the work interrupted series of uniform work-advancing movements, the feeding movements of each series differing in number and in length from those of the adjacent series. The feeding mechanism is adapted more especially for use in connection with stitch-forming mechanism and button feeding mechanism such as that forming the subject of my pending application, Serial No. 767,963, filed May 16, 1913; of which the present application is a division. In the aforesaid pending application a construction is provided for stitching on that class of metallic fasteners or buttons commonly attached to one of the overlapping heel flaps of a cloth shoe upper or Japanese "tabi" for introduction within a cord loop secured upon the other flap. The said metallic buttons or fasteners are provided at one end with transverse apertures and said fasteners are secured to the fabric by spaced groups of tacking stitches extending over their opposite edges and into the adjacent apertures and are connected by a few straight-away fastening stitches, the tacking stitches between the fasteners being connected by series of straight-away stitches exceeding in number that of the straight-away fastening stitches and adapted to be increased or decreased in length to vary the spacing apart of the metallic fasteners. Means are provided for adjusting the primary stitch length in addition to that for changing the relative lengths of the fastening and the spacing straight-away stitches.

In the accompanying drawings, Figure 1 is a perspective view of the feeding and needle mechanisms. Fig. 2 is a rear side view partly in section of a sewing machine embodying the present improvements, and Fig. 3 is a plan of the same partly in section.

Fig. 4 is a sectional elevation of the controlling cam and connected parts and Fig. 5 is a perspective view of said cam detached. Fig. 6 is an elevation, in transverse section of the two part feed-dog. Fig. 7 is a perspective view of a fabric-flap provided with fasteners or buttons secured thereto.

As represented in the drawings the feeding mechanism is shown applied to a machine constructed with the bed-plate 1, the hollow standard 2 and the overhanging bracket-arm 3 in which is journaled the main-shaft 4 carrying at its rearward end balance-wheel 5 and belt-pulley 6.

Journaled in the head of the bracket-arm is the tubular needle-bar 7 on the upper end of which is secured by clamp screws 8 the split collar 9 carrying a lateral stud which is embraced by the lower end of pitman 10 the opposite apertured end of which embraces crank-pin 11 of crank disk 12 upon the main-shaft 4.

The needle-bar carries at its lower end a bracket 13 formed with the transverse slide-way 14 in which is fitted a needle carrying slide-block 15. The slide-block is formed with a lateral forked arm adapted to embrace roller-stud 16 carried by a lateral arm upon the lower end of an oscillatory bar fitted within a chamber formed in the needle-bar and connected to rod 17, the latter being journaled within the split collar 9. The rod 17 is journaled in the upper part of the bracket-arm 3 and is keyed to the spaced members of a rocking bracket 18, whereby the rod is permitted to reciprocate freely within but to partake of the rocking movements of the bracket. Bracket 18 is connected by pitman 20 to a rocking-yoke 19, the latter being actuated by cam 72 to impart jogging movements to the needle, as fully described in my aforesaid application.

To the main-shaft is connected shuttle actuating pitman 21 and intermediate rocker 22 upon the rearward end of a shuttle actuating rock-shaft 23 having upon its opposite end a shuttle driver for imparting oscillatory movements to a shuttle mounted within the race 24 and adapted to cooperate with the needle in the production of stitches. The main shaft has secured thereon adjacent the actuating crank 25 the usual feed actuating and feed lift eccentric 26 and 27, the eccentric 26 being embraced by a strap 28 pre-

vided with channeled bearing lugs 29 embraced by the fork 30 at the upper end of the link bar 31 whose lower end is adjustably connected, by means of the bolt 32 passing through the slot 33 within the lateral arm 34, to the feed rock-shaft 35 having the usual bearing lugs 36 carrying center screws for the cross member 37 of the feed-bar 38 which is formed at its opposite end with the fork 39. Fork 39 is entered by the usual roller-stud 40 carried by the lateral arm 41 of feed-lift rock shaft 42 having at its opposite end connections with pitman 43 actuated by feed-lift eccentric 27 to which the pitman is connected by strap 28'.

The feed-bar 38 has secured thereon the primary feed-dog section *a* having secured thereon by means of screw *a'* a rectangular spring pressed auxiliary feed-dog section *b*. The link-bar 31 carries at its fork 30 the stud-screw 42' embracing the apertured upper end of the link 44 whose lower end embraces the fulcrum stud 45 carried by the depending arm 46 whose split hub 47 is secured by means of the clamp-screw 48 upon the rock-shaft 49 which is journaled in a suitable bearing provided therefor in the bracket arm and carries at its opposite end the depending crank-arm 50. The arm 50 carries a stud 51 embraced by one end of the split-link 52 whose opposite end embraces a stud carried by lateral arm 53 of a rocking feed-regulator frame having the hub 54 secured by the set-screw 55 upon the lower end of rock-shaft 60 and constructed with a depending member 61 from which extends the lateral arm or lever 62 carrying upon its upper face the roller 63. The lever 62 has at its outer extremity the downwardly offset lateral lug 62' in which is mounted the fulcrum screw 64 of the lever 65 carrying upon its upper face the roller stud 66 and having near its opposite end an enlargement containing the segmental transverse-slot 67 and terminating in the finger-piece 68. The lever 65 is secured adjustably upon the lever 62 by means of the clamp-screw 69 whose shank passes through the slot 67 and is tapped into the lever 62.

As represented in the drawings the roller studs 63 and 66 are arranged at different levels, and in register with the peripheral cam-tracks 70 and 71 of a cam cylinder 72 journaled upon the tubular bearing boss 73 (Fig. 4) of a bracket 74 whose foot 75 is secured by screws 76 to a depending flange 77 of the bracket arm member 3. The roller-studs 63 and 66 are maintained in operative relation with the cam 72 by means of a spring 78 surrounding the upper portion of rock-shaft 60 and having one extremity engaged by fixed stud 79 and the other extremity confined within an aperture in the collar 80 secured by set-screw 80\* upon the upper end of the rock-shaft 60.

The upper end of the cam-cylinder 72 is formed with a cam-groove 72\* entered by the roller-stud 81 of the rocking-yoke 19 by means of which lateral jogging movements are imparted to the needle through the connections hereinbefore described.

Secured upon the main-shaft 4 is the worm 82 meshing with the worm-wheel 83 which is secured by means of the set-screw 84 upon the upper end of the cam-wheel shaft 85 journaled within the bore of the tubular bearing boss 73. As shown and described in my pending application Serial No. 718,807, the shaft 85 has upon its lower end a disk 86 formed in its lower face with the radial channel 87. Fitted to the side walls of the channel 87 is an arm 89 secured by means of the clamp-nut 90 upon the reduced threaded lower end of the plunger-pin 92 which is fitted within an axial socket formed in the shaft 85 and pressed downwardly by means of the spring 93. The arm 89 carries an upwardly extending coupling-pin 94 which passes through an aperture in the disk 86 and is adapted to enter any one of a circular series of holes 95 in the lower end of the cam 72 for detachably securing the latter to the constantly rotating shaft 85. The cam cylinder 72, with its cam-tracks 70 and 71 and the parts actuated by said cam-tracks, thus act as feed changing means connected to the feeding-mechanism through the shaft 49 and arm 46, and when the cam cylinder 72 is disconnected from the constantly rotating shaft 85, it is clear that the feed changing action of the feed changing means is suspended.

The bracket 74 is provided with an upright member 96 having apertured bearing lugs in which is journaled the endwise movable rock-shaft 97 having secured thereon a collar 98 to which is secured one end of a torsion and compression spring 99 whose opposite end is secured in the lower bearing lug. A collar 100 is secured upon the upper end of the rock-shaft 97 by means of the stud-screw 101, the projecting head of the latter being adapted for engagement with the stud-screw 101\* tapped into the bracket-member 96 and serving as a stop to determine the initial axial position of the rock-shaft. Secured at the lower end of the rock-shaft 97 is the hub of the laterally extending latch-arm 102 provided at its outer end with a wear-plate 103 serving as a rest for the lower extremity of plunger-pin 92.

Mounted upon the fulcrum screw-stud 104 is the presser bar lifting rock-lever 105 having upon its rearwardly extending arm the upwardly and laterally offset lug 106 overhanging the upper end of rock-shaft 97. The rearward arm of this rock-lever is pivotally connected to a rod 107 which is adapted in practice to be actuated by means of a knee-lever or treadle to tilt the rock-lever.

Preparatory to a button-stitching operation the coupling arm 102 is in its retracted position with the pin 94 disengaged from the cam-cylinder 72 and one edge of the wear-plate disposed at the side of the plunger-pin 92, it being maintained in such position by the spring 99. Operation of the rock-lever 105 causes the lifting of the presser-foot and the engagement of lug 106 with the end of rock-shaft 97 which causes the lowering of the arm 102 below the end of the plunger-pin 92 thereby permitting the wear-plate 103, under the action of the spring 99, to assume a position beneath the plunger-pin; and the subsequent release of the lever 105 permits the rock-shaft 97 to rise under the action of the spring 99 thereby forcing upwardly the plunger-pin 92 in opposition to its weaker spring 93 and causing the coupling-pin 94 to enter the first of the cam-wheel apertures 95 which it thereafter encounters, whereby the cam-wheel is driven positively.

On setting the machine in motion the high portion 71' of the cam track acts upon roller-stud 66 and shifts the rocking feed regulator frame from the position shown in Fig. 1 to elevate fulcrum 45 of link-bar 31 and enable eccentric 28 to impart rising and falling movements to the link-bar, whereby work feeding-movements are produced to form a few initial straight-away stitches *s* (Fig. 7). During the formation of said stitches, the button feeding mechanism described in my pending application Serial No. 767,963, is actuated to move metallic button B into register with the stitch-forming mechanism, whereupon the cam discontinues its action upon roller-stud 66 and link-bar 31 swings idly in the position shown in Fig. 1, the feeding movements being interrupted and the needle performing its jogging movements to produce the first group of tacking stitches *t* across the edge of the button.

After the formation of tacking-stitches *t*, the high portion 70' of cam track 70 acts upon roller-stud 63 to again throw the feed-dog into action during the formation of fastening straight-away stitches *s'* and the first of the succeeding group of tacking stitches, whereupon the operative movements of the feed-dog are suspended for the second period of needle jogging movements to form the remaining tacking stitches over the edge of the button.

At the completion of the second tack *t*, the high portion 71' of the cam-track 71 again shifts the rocking feed-regulator frame for production of the spacing-stitch work feeding movements, the length of such feeding movements being determined by the position of adjustment of the lever 65 upon the arm 62, and hence the distance of the roller-stud 66 from the lower portion or that of the least curvature of the cam-track 71. The cam-track 70 is shown provided with an

auxiliary high portion 70'' to slightly supplement the action of cam portion 71' of cam track 71 so as to insure the arrest of the work feeding mechanism at precisely the proper time, regardless of the position of roller-stud 66 which may in practice slightly disturb the timing of the suspension of feed. This arrest of the work feeding mechanism occurs when the roller 63 rides off the auxiliary high portion 70'' of the cam-track 70.

The length of the primary stitch is adjusted by changing the position of link-bar bolt 32 within the slot 33 of said feed rock shaft arm 34.

The means for automatically turning the rock shaft 111 to uncouple the cam-cylinder from its actuating shaft at the end of a predetermined stitching cycle are described in my pending application Serial No. 718,807. Such means comprise forked tappet arm 108 carried by rock-shaft 97 to embrace a transverse pin 109 carried by a trip-arm 110 secured upon the rock-bar 111, the latter being advanced by means of actuating pawl 112. Pawl 112 is carried by lateral crank-arm 113 upon the upper end of a rocking-arm 114 whose lower end is similarly provided with a crank-arm 115 carrying a roller-stud 116 maintained in contact with the peripheral cam track 117 of the cam-cylinder 72 by means of a spring 118. When the bar 111 has advanced sufficiently to cause the operative engagement of the trip-arm 110 with the tappet arm 108 of the rockshaft 97, the latter is rocked to shift arm 102 laterally, thereby releasing plunger-pin 92 and permitting the same to descend under the action of spring 93, thus uncoupling the cam-cylinder from the continuously rotating shaft 97.

When the rock-lever 105 is operated, rock-shaft 97 in its descent acts through tappet arm 108 and arm 109 carried by tripping-member 110 to rock the bar 111 and cause stripper-plate 120 carried by said bar to engage upwardly extending pins 121 carried by the actuating pawl 112 and holding pawl 112<sup>x</sup> to retract the latter, thereby permitting the rack-bar under the action of spring 119, to return to its initial position, as fully described in my aforesaid pending application.

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

1. In a sewing machine, in combination, stitch-forming mechanism, feeding mechanism, and feed-controlling means distinct from said feeding mechanism and comprising a cam provided with a plurality of tracks, and a member connected with the feeding mechanism and carrying a plurality of relatively adjustable followers each adapted for engagement with one of said cam-tracks.

2. In a sewing machine, in combination, stitch-forming mechanism, feeding mecha-

nism, and feed-controlling means distinct from said feeding mechanism and comprising a cam provided with a plurality of tracks, a primary lever connected with the feeding mechanism and carrying a follower in register with one of said cam-tracks, and an auxiliary lever mounted upon and adjustable relatively to the primary lever and carrying a follower in register with another of said cam-tracks.

3. In a sewing machine, in combination, stitch-forming mechanism, feeding mechanism, and feed-controlling means comprising a cam provided with a plurality of tracks, actuating means for said cam, a member connected with the feeding mechanism and carrying a plurality of relatively adjustable followers each adapted for engagement with one of said cam-tracks, and means for disconnecting said cam from its actuating means.

4. In a sewing machine, in combination, stitch-forming mechanism, feeding mechanism comprising a feeding element and means whereby its normal length of operative movement may be adjusted, and feed-controlling means comprising a cam having a plurality of tracks, and a member connected with an element of the feeding mechanism and carrying a plurality of relatively adjustable followers each disposed in register with one of said cam-tracks.

5. In a sewing machine, in combination, stitch-forming mechanism, feeding mechanism comprising a feeding member and ad-

justing means whereby the normal length of operative movement may be determined, and controlling means connected with the feeding-mechanism independently of its adjusting means and acting on said feeding mechanism to temporarily interrupt the operation of its elements and thereby prevent motion of the feeding member in the direction of feed at predetermined intervals.

6. In a sewing machine, in combination, stitch-forming mechanism, feeding-mechanism, feed changing means connected to said feeding-mechanism, and automatically acting means for suspending the feed changing action of said feed changing means for an indefinite period without stopping the machine.

7. In a sewing machine, in combination, stitch-forming mechanism, feeding-mechanism, feed changing means connected to said feeding-mechanism, automatically acting means for suspending the feed changing action of said feed changing means without stopping the machine, and manually operated means for causing said feed changing means to resume its feed changing action.

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

ALBERT H. DE VOE.

Witnesses:

W. LEE HELMS,  
LILLIAN M. MILLER.